EXITS FROM LONG-TERM SICKNESS IN SWEDEN*

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Abstract

In this paper, we analyze exits from long-term sickness spells in Sweden. Using spell data for more than 2500 people, aged 20-64 years during 1986-1991, and who had at least one sickness spell of at least 60 days during 1986-1989, the aim is to analyze the transition to different states, i.e., return to work, full disability pension, partial disability pension, and other exit from the labor force. Given the complexity of the exit decision, which encompasses both the individual's choice, the medical evaluation and the decision of the insurance adjudicator, we will consider the outcome as being the result of two aspects of the exit processes: an aspect that governs the duration of a spell prior the decision to exit, and another that governs the type of exit. Therefore, the analysis will be done in two steps: First, we will analyze the duration of the sickness spells, and then we will analyze the process that governs the type of exit. The results indicate that both individual characteristics, and push factors, such as regional unemployment, are important for both components of the decision process.

Key words: Long-term sickness, returns to work, full and partial disability, spell data, competing risks model, multinomial logit model.

JEL Classification: I12; J21; J28

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1 Introduction

The macro-statistics for Sweden show that the numbers of both recorded sickness days per capita and long-term sickness spells have evolved cyclically over the years,[1] while life expectancy,[2] another measure of health, has increased continuously. The World Health Organization (WHO) presented in June 2000 the new healthy life expectancy rankings. For the first time, the WHO has calculated healthy life expectancy for babies born in 1999 based upon Disability Adjusted Life Expectancy (DALE).[3] Sweden ranks number four (among 191 countries) with a health life expectancy of 73 years (71.2 for men, and 74.9 for women), after Japan (74.5 years), Australia (73.2 years) and France (73.1 years). In Sweden, the health care system and relatively low use of tobacco, are considered as having the strongest contribution on the ranking. This ranking does not shade much light one understanding and explaining the long-term sickness phenomenon in Sweden, but may imply that its effects are contributing to the increase of life expectancy.

The extent to which increased absence due to sickness is attributable to changes in actual or perceived poor health among the employed is not easy to determine. Also, it cannot be ruled out that in the long term a change in the level of absence may be due to changing attitudes and values with regard to reporting sick.[4] Given the *generosity* of the social insurance system, people can choose to leave the labor market, permanently or temporarily more easier now than 30-50 years ago. People are better informed and they

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[1] Statistics from the Swedish National Insurance Board (*RFV*).

[2] *SCB Befolkningsstatistik* del 4, 1997, and *Statistical Yearbook of Sweden* 2000, Statistics Sweden. Additionally, Table A1 in Appendix 1 presents life expectancy, number of survivors, and chances per 1000 of eventually dying from specified causes, at selected ages, by sex in 1996.

[3] DALE summarizes the expected number of years to be lived in what might be termed the equivalent of "full health". To calculate DALE, the years of ill health are weighted according to severity and subtracted from the expected overall life expectancy to give the equivalent years of healthy life. Previously, life expectancy estimates were based on the overall length of life based on mortality data only.

[4] Sickness-spell indicators probably do not give an accurate image of the average health of the Swedish population. This is not the main issue of this study, merely an observation that, on average, employees have not gotten sicker as time progresses.

can invest more in their health throughout their lifetime. Investment in health (especially, maintaining a good diet, exercising, etc.) drives the path of choices available for people. *Poor health* is, thus, a relative term and it has different implications for different people and different situations. In order to decrease the heterogeneity in this variable, this study borrowed the Swedish National Social Insurance Board's definition for *long-term sickness* (as *any sickness spell of at least* 60 *days*), and used it for defining poor health.

The exit alternatives from a spell of long-term sickness for persons younger than 65 are: return to work, exit with full or partial disability, and other non-working exits. The sickness benefit is available for an unlimited period, and given the medical evaluation, the patient can choose the exit alternative that maximizes their utility. Given the requirement of a medical evaluation, the patient's final decision does not look as if it is a choice. Following the medical evaluation, the doctor can suggest different alternatives, but the employee is the one who really decides. We are all familiar with the fact that there are people who prefer to work even though they have the opportunity to leave the labor market with a disability benefit. The real problem is the difficulty to adapt work environment or find a proper job for their health status. Additionally, it is not clear which are the factors that steer people toward one of these alternatives. Are people's decisions related to the duration of the sickness spell, and what determines this? How important is the diagnosis? Do economic incentives influence the choice? How do other factors (e.g., marital status, education, age, and citizenship) influence the decision? This study addresses these questions using data from the LS-database of Swedish National Insurance Board. The main data used here relate to the sickness history of the individuals. Individuals selected have been away from work with compensation *at least* once for *at least* 60 days during the period 1986-1989.

Given the complexity of the exit decision, which encompasses both the individual's choice, the medical evaluation, and the decision of the insurance adjudicator, we will consider the outcome as being the result of two aspects of the exit processes: an aspect that governs the duration of a spell prior the decision to exit, and another that governs the type of exit. Therefore the analysis will be done in two steps: First, we will analyze the spells of sickness, estimating nonparametically the survival and hazard functions, and then estimating a competing risks model (distinguish different types of exit). Second, we will analyze the process that governs the type of exit by using a multinomial logit model.

The study is organized as follows. The next section briefly presents some social insurance facts related to sickness in Sweden, upon which our study is based. Section 3 discusses the literature on labor market participation and exits there from. Section 4 we discusses the supply and demand of labor, stressing health aspects, while sections 5, 6, and 7 present the data, the econometric framework, and the estimated results. The last section summarizes and draws conclusions.

2 Some background facts

2.1 Social insurance during the study period

All residents in Sweden with an annual estimated earned income, from either employment or self-employment, of at least 6000 Swedish crowns (during the period analyzed by this study) are covered by the national insurance regulations on *cash benefits* during illness or injury.[5] People with relatively high incomes do not, however, receive payments from the social insurance office for the entire amount of income lost, in that the insured earned income is limited to of 7.5 times the base amount, although mandatory social security contributions for insurance purposes are levied on their entire income.[6] A sickness benefit (sick-pay) is available for an *unlimited* period when an illness reduces working capacity by at least 25 percent.

During the 1980s and 1990s, social insurance rules changed largely in response to economic developments, with expansion during the good years, and cut backs in bad

[5] Those entitled to use the Swedish health services at subsidized prices are *all* residents of Sweden regardless of nationality, as well as patients seeking emergency attention from EU/EEA countries and some other countries with which Sweden has a special convention.

[6] In 1991 (the end of the analyzed period), the base amount was 32,200 Swedish kronor (U.S.$1.00 equals about 10 kronor in December 2000). This amount is fixed for one year at a time, and it is appreciated in the line with price changes, which are, in turn, measured using the Retail price index.

times. During the period studied (1986-1991), there were two main social insurance reforms, which took effect December 1, 1987 and March 1, 1991.

The first change followed an economic expansion in the middle of the 1980s when the national economy grew at a relatively rapid rate, and unemployment was the lowest since the mid 1970s. From December 1, 1987 sickness insurance began to cover the loss of earnings from the first day the illness was reported; previously there had been an unpaid one-day waiting period. Both before and after, the replacement rate was 90%. Additionally, the 1987 reform constrained the compensation's payment of the first 14 days of sickness only to those days when people were scheduled to work, which affected compensations for persons with irregular schedules.

The second change took place in 1991, the year when Sweden began a recession period. The replacement rate for the sickness benefit had been 90% from the *first* day since December 1987, but from March 1, 1991, this replacement rate was not used until after the 90th day of the sickness spell. Only 65% was now paid for the first three days of the sickness spell, and 80% from then through the 90th day. However most workers also received another 10% from negotiated benefits (i.e., paid directly by their employer, not by the social insurance system), which meant that, for them, the greatest difference was during the first 3 days.

During the period analyzed, a *self-employed* person could opt for a waiting period of 3 or 30 days, the sickness insurance premium being lower for the longer waiting period.

Since July 1, 1990, there have been four rates of sickness cash benefits (full, 75%, 50%, and 25%; that is, one can be on sick leave full-time or partial (75%, 50%, or 25%). Previously only full or 50% could be obtained. The idea behind allowing more partial rates is to aid the gradual return of persons with more serious illness.

Since this study focuses on long-term spells, the changes in rules that occurred during the period analyzed would not be expected to have much effect on the analysis.

2.2 Facts and rule-changes in a longer perspective

Figure 1 shows the flows of people who, due to ill health, left the labor market partially or totally (PD/TD) during the period 1974-1999.

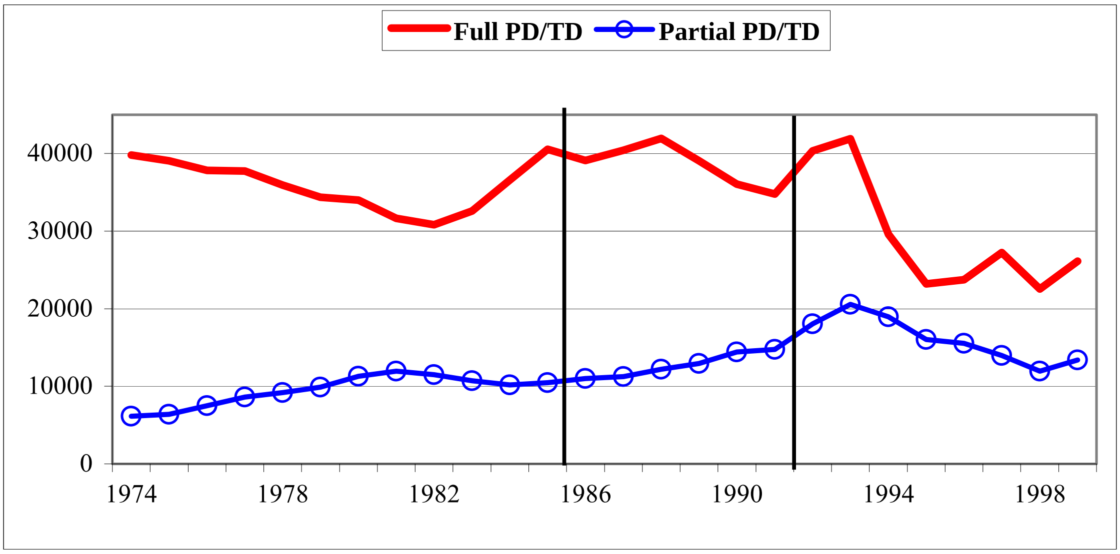

Figure 1 Inflows of full or part-time disability[7]

The exit could be into either *permanent* disability (*PD*) or *temporary* disability (*TD*), compensated either *fully* (1/1), or *partially* (3/4, 2/3, 1/2, or 1/4). Between 1970 and 1993 three forms of partial disability pension were possible: the full pension, and for those retaining some work capacity, a 2/3 or a 1/2 pension. Since July 1993 two new forms were added: the 3/4 and 1/4 pensions, and no further 2/3 pensions were granted.

Figure 2 shows the development of ongoing spells in December 31 of each year, compensated by the social insurance during the time period 1974-1999, all spells, and by duration for spells of 30 days of more.

[7] Source: if no other source is mentioned, all data come from the National Social Insurance Board (RFV).

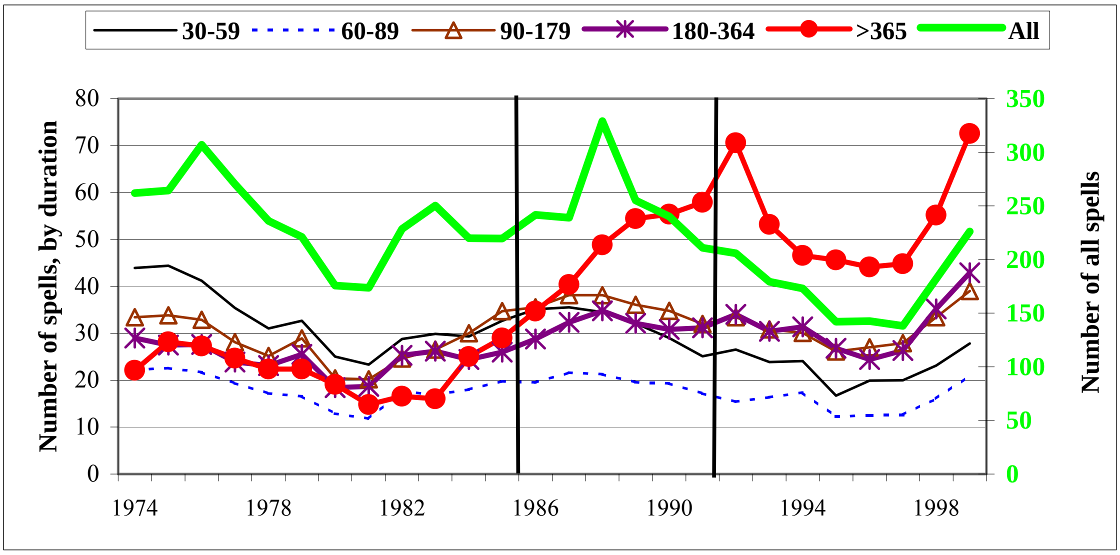

Figure 2 Number of ongoing spells of sickness on December 31 each year (in thousands), by duration and *all* spells

Figure 1 shows that, during the period studied (1986-1991) the number of permanent and temporary exits with a partial pension of some kind increased, while exits with full pensions fluctuated: after a slow decrease in 1986, they increased slowly until 1988, after which they decreased again through 1991. Figure 2 shows that the number of sickness spells longer than one month fluctuated considerably during the period studied. *Only* the number of compensated spells of sickness longer than 1 year *increased* from about 35 thousand in 1986, to almost 60 thousand in 1991, and to more than 70 thousand in 1992. The number of all *other* spells longer than one month decreased after 1987 or 1988. The most spectacular change was the spike in *all* spells (including those under 30 days) in 1988, very likely due to the reform of December 1987, which eliminated the waiting day before compensation was paid.

At the end of the 1980s, there were about 170 thousand people on sick leave with spells of at least 30 days, but in the first half of the 1990s, the number was less than 90 thousand. Many people with long-term sicknesses received permanent or temporary disability pensions in 1992 and 1993 as a result of a policy to “clean the books” of persons who had been on sick leave well over a year. A large number of people on long-term sick leave were granted permanent disability pensions because they were not considered suitable candidates for rehabilitation.

Additionally, there were changes on the replacement rates. From April 1993 the sickness cash benefit available after the 90th day of illness was reduced from 90% to 80%, and the rehabilitation cash benefit was lowered to 95% of the daily salary. From July 1993 the sickness cash benefit was reduced from 80% to 70% after the 365th day, though this rule did not apply to those spells covered by medical treatment. These changes might explain the drop in the numbers of all longer-period sickness spells during and after 1993. This might also explain the peaks of various pension exits from the labor market in 1993. Additionally, in April 1993, a waiting day was introduced again; i.e. sick pay was again not paid for the day when the sickness spell was reported. This may have reduced the number of very short-term sicknesses reported, and thus contributed to the continuing decline in *all* spells after that date.

After the peak year in 1993, the granting of disability pensions fell and in 1995 and 1996 reached the lowest level since the beginning of the 1970s. The fall was due to stricter rules and a more restrictive application of them. For example, since July 1, 1995, the level for the basic pension has been reduced to 90% of the lower base amount for single pensioners, and to 72.5% for married pensioners.

The number of cases of long-term sickness rose in 1999. The number of people terminating their period on the sick list by being declared fit or with a disability pension has not increased to the same extent. Although the level of absence due to sickness is still somewhat lower than in the late 1980s, the trend is worrying. More people have direct access to sickness insurance when the number of people employed rises, and also because people are often more inclined to report sick when the state of the labor market is better. Another explanation is that more people are reaching the age when it is more common to be absent sick.

From these macro facts, we may reasonable conclude that individuals' behavior is a function of the opportunities and restrictions they face. The analysis bellow will be limited to a shorter period (1986-1991), due to the homogeneity of the rules governing long-term sickness, and exits into disability during these years.

3 Literature review

The empirical literature on labor market participation, explaining whether or not people work in general, is vast, but there is relatively little research focused on disability exits per se.[8] The effects of health on labor market participation are theoretically ambiguous, although most research seems to assume that poor health will decrease participation. Little consensus on the magnitude of the effects has been reached, mainly due to different definitions of health.

Until the late 1980s most of the literature on labor market participation concentrated on factors that influence the number of hours worked, but few studies attempted to distinguish different non-working states, such as unemployment, long-term sickness, disability, or early-retirement for other reasons. Those studies that have focused on transitions between states have mainly examined on the transition to and from unemployment.

Nevertheless, there is an emerging genre of literature focusing on retirement decisions of the older labor force, and there is also quite a vast literature regarding the labor force participation of *older workers*. Bound and Burkhauser (1999) reviewed the literature on the labor supply of people with disability and how it is affected by disability program characteristics. They concluded that empirical analyses of programs targeted on individuals with disabilities have focused almost exclusively on trying to understand the behavioral effects of such programs.

During the 1990s there was growing research evidence suggesting that there are many people recorded as long-term sick who could also be classified as unemployed. This calls into question the quality of both the sickness and unemployment statistics. For example in the UK such concerns have been raised at the national level by Disney and Webb (1991) and at regional and local levels by Forsythe (1995), and by Beatty and Fothergill (1996).

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8 Haveman and Wolfe (2000) survey and discuss the main lines of economic research addressing the issues of economic status and behavior of the working-age population with disabilities.

The literature on labor force participation in Sweden contains some studies related to sickness absenteeism. Using aggregate data, Lantto and Lindblom (1987) estimated the effects on days of compensation of aggregate unemployment, and found a significant inverse relation between days of sickness and unemployment.

Henrekson et al. (1992), analyzed the effects of 1987 and 1991 sickness insurance changes on sickness absenteeism, and found that there is a relation between the replacement rate and the number of compensated sickness days.

Björklund (1992), using regression analysis on the 1981 cross section of the Swedish Level of Living Survey (LNU), analyzed the effect of both individual characteristics and working conditions on sickness absenteeism. The explanatory effects of the individual characteristics decreased when the variables related to working conditions were used. Without considering the working condition variables, but using the wage rate as a proxy for the individual's cost of absenteeism, Björklund's estimates indicated that absenteeism increased with decreasing cost.

Brose (1995) used a random sample from the 1984 cross-section of the Swedish HUS (household) database to analyze the influence of economic incentives and the work environment on sickness absenteeism. Using various models (ordered probit, Poisson and negative binomial) he found that individuals incorporated the economic incentive into their decisions about sickness absenteeism. In addition, his results indicated that the work environment is important. Bad working positions, noisy and unclean working environments increased sickness duration.

Sundén (1995), using 1974 and 1981 cross-sections of the Swedish LNU database examined how the partial retirement program affects the retirement program, introduced in 1976, behavior of workers aged 60 years or more. This program enabled people to work part-time, and take partial early retirement (to replace some of the income lost due to reduced time), but without claiming disability or taking an advance old age pension. Her logit estimates indicated that, after controlling for health, occupational characteristics, the labor market, and family conditions, women were less likely than men to retire fully, and more likely to continue working at least partially until age 65.

Sundberg (1996), using the 1981 cross section of the Swedish LNU database, found that the sickness duration of people with prior unemployment experience was greater than of those who had never experienced unemployment. Again, working conditions also influenced workers' health.

Skogman Thoursie (1999) studied the possible effect of the economic incentives present in the Swedish disability pension system on the probability of a disability pension being granted. Using a mixed conditional logit model incorporating various predicted income levels and a sample consisting of workers aged 25-64 from the 1981 Swedish Level of Living Survey, he found that economic incentives do have a significant and positive effect on the likelihood of a disability pension being granted.

The focus of this study is on analyzing the factors such as age, marital status, income, diagnosis, citizenship, number of children, and the unemployment rate that other studies have suggested might affect the duration of sickness spells and the choice between return to work and other exits, using longitudinal data.

4 The labor market and reduced working capacity

4.1 The supply of labor

Health status may affect the labor supply decision by changing the marginal rate of substitution between leisure and consumption. Poor health or injury increases the disutility from work, and creates incentives for leaving the labor market temporarily or permanently, since it makes leisure more valuable relative to work. Human capital is typically acquired at different rates over the working career. For earnings to rise in early years, relatively more capital must be acquired, and if the earnings profile is then to turn down, as statistical evidence suggests, relatively less capital must be acquired later.

The theory of human capital developed by Ben-Porath (1967) suggests that individuals make incremental decisions about new investments in human capital by performing a sort of mental cost-benefit analysis. In empirical analyses, devised cost and benefit measures for costs and benefits can approximate this. Costs can be explicit, such as those accompanying a decision to spend time in education, or implicit, for example if one decides to train on the job, with the possible consequence of foregoing (higher) immediate earnings. The cost of investment in the first case is the wage not received, while in the second case, is the higher wage not received in the short-run. In both cases there is the prospect of doing better in the long run. People do not have the same marginal cost or marginal benefit curves. Persons with greater endowments of intelligence, social competence, etc. can be expected to gain more from a given investment. Furthermore, a strong initial investment in schooling or in other forms of training may make it easier to enhance human capital later, at a lower cost, while its lack may make it harder. This would explain why persons with lower initial educational attainment also tend to have smaller later additional increments to human capital.

If people invest in human capital at a decreasing rate as they age, then their total stock of human capital will also increase at a decreasing rate, or even decrease, due to "depreciation". In order to maintain a given level of earnings, acquisitions of job knowledge must at least equal this depreciation. For many, this may simply mean keeping up through "learning by doing" daily tasks on the job. For others, who might be stuck in a "fixed" technology, i.e., with little "learning by doing" renewal opportunities, the situation might be worse and earnings could stagnate or even decline as they age. They would certainly decline in a free labor market setting where hourly earnings were related to productivity.

This interpretation of the theory suggests that persons with lengthy spells of sickness, even if they become completely well afterwards, will lose some job experience, and may lose some relative job productivity. On the other hand, people with sickness whose human capital is low (highly depreciated) might find long-term sickness leading to disability to be a way out of the predicament. Certainly, long periods of sickness can deplete workplace specific capital, as the dynamics of the workplace continue.

The seriousness of these problems will depend on individual characteristics, the length of sickness and the requirements of the job. Persons with jobs requiring a lower level of skills or less ongoing technical training would experience less serious problems than would persons with jobs requiring more. Also, the effort, and associated costs, to the individual to recapture a training loss, will by definition be greater the higher are the demands of the job.

There may also be an interaction between the type of sickness and human capital. For example, chronic musculoskeletal problems might make it more difficult to perform specific tasks, e.g., stationary tasks or tasks requiring heavy or awkward lifts; depression might make it more difficult to work in an environment where a high level of social competence is necessary; etc. One would need a sophisticated and large database in order to estimate these kinds of interactions.

Because of sickness, an individual's capacity may thus be temporarily or permanently reduced, at least *vis à vis* a specific work task. This suggests a decline in productivity with a given human capital profile, or technically speaking, what we might call extra human capital depreciation.

Of course, changing employers is easier in a tight labor market rather than in a labor market with high unemployment and few new openings, and it is also easier the larger the local job market is. There are other considerations to changing employers, however, among them the total cost for the family: An overall household calculation might show that the most desirable alternative is to stay put in a situation with lower earnings potential, because it costs something to search for a new job, it costs to move, and it may be difficult for a spouse to get their reservation earnings in another location.

Changing occupations usually involves an even higher cost, and probably a more uncertain outcome, the older one is. In addition, the older one is, the fewer are the remaining years of benefits to be reaped from a given investment in training/education. This, together with the other disadvantages listed above, might weight the calculation in favor of no move.

Reduced earnings capacity due to sickness may or may not qualify the individual for a partial disability benefit, depending on the social-insurance legislation in a country and how it is applied in practice. In addition, the medical condition may only be temporary, in which case the individual may not want to apply for disability benefit.

4.2 The demand for labor

Individual earnings are a result of demand as well as supply. In a competitive market profit-maximizing employers will seek out employees whose human capital best suits the requirements of a job at the lowest cost. Given this perspective, employers have no reason to discriminate against persons who have been sick, as long as their human capital is not perceived as being impaired. In fact, human capital may in part be employer or even employer-task specific, rather than general, which means that there are hiring and training costs associated with acquiring new employees. In this case, it is also costly to lay off persons if their only problem is that they are temporarily sick, even if the spell is long.

If the normal situation is that sickness does not impair human capital or work capacity, and if future performance and/or sickness is not normally a function of past sickness, then (ceteris paribus) we should not be able to observe differences between the earnings of persons with lengthy sickness history and those persons without.[9] So long as there is no rational reason for wage differences between persons with a history of sickness and others, i.e., due to reduced productivity per hour, or reduced capacity to work a normal number of hours, or to increased inconvenience costs, then any observed differences would be due to discrimination. However, if sickness is normally a function of past sickness, i.e., if there are "sick" people and "healthy" people, then employers might be expected to offer lower wages to the "sick" people, because absenteeism does create costs for the employer, through inconvenience (and lower overall productivity) at the workplace. Then cost conscious employers, behaving rationally, would take this increased risk into account when establishing pay-rates.

There is evidence from the time covered previous to this study that persons who are sick longer periods have a higher probability of recurring long spells.[10] This means that there is a higher risk of incurring inconvenience costs with persons with substantial previous sickness.

4.3 Supply versus demand effects

We have some means at our disposal for testing whether effects originate from supply or demand. Decreased hours of work after sickness would be a supply effect, as this

[9] Andrén and Palmer (2000, Paper 1 of this thesis) analyzed the effect of sickness on earnings, and concluded that people can expect some decrease in annual earnings during the period after they experience long-term sickness. This could be explained by the fact that some choose to work part time after their sickness spells or not at all, while others choose an exit into temporary or permanent disability, which also decreases their earnings.

[10] According to Swedish data for the period 1979-1986, almost 60% of those who had been sick for 30 days or more had a new case of at least 60 days in the following year (National Social Insurance Board, Long Spells of Sickness, Rehabilitation and Disability – A System Analysis, Stockholm, 1989).

would be a decision that rests with the individual. We can measure this in our study with a full-time/part-time variable. Transition into partial or full disability status is also a clear supply effect. Changes in tasks, or employers, after lengthy sickness, can be positive action to preserve human capital, but may also lead to a decline in earnings, hence, the sign of such a variable is ambiguous. In the absence of significant values for any these variables, we would conclude that income effects originated solely from demand.

5 Data

The data analyzed came the Long-term Sickness (LS) database of the Swedish National Social Insurance Board. A random sample (LSIP) was used, representing all residents in Sweden registered with the social insurance office and born during 1926-1966, who had had at least one sickness spell of at least 60 days during the period 1986-1989. The LSIP sample contains information on 2666 individuals. For all sickness spells, the exact starting dates are known, but not whether the individuals concerned had a long-term sickness record before 1983, so the analyzed spells are not left censored, but the data are left truncated before 1983. At the end of the observation period, some persons continued to be sick, so these spells are right censored. Table 1 presents descriptive statistics of the "first" spells by exit type.

Table 1 Descriptive statistics for the duration of the first three long-term sickness spells by exit type

Exit type	N	%	Median	Mean	Std. Dev.	Min	Max
Return to work	2021	75.80	109	179.73	202.59	60	1999
Full disabilitry	338	12.68	608.5	711.57	377.85	76	2311
Partial disability	97	3.64	664	791.46	479.91	60	2338
Other exits	210	7.88	464	649.49	618.77	61	3096

The majority (about 76%) returned to work, while the rest either exits into full disability, partial disability, or other (non-working) exits. As expected, people who exited into disability (both full and partial) had longer spells (more than 600 days) that those who returned to work (109 days).

Detailed descriptive statistics of the data by individual, and by spell are presented in Appendix 2.

6 Econometric framework

All the individuals studied here were sick for at least 60 days. The duration of absence as well as the exit is one of the outcomes of a medical examination. There is no standard duration for most diagnoses, and even if there is a norm, individual cases can very greatly around this norm. The determinant for receiving a benefit is reduced work capacity, which also depends on the work situation. On top of this, it is the individual him/herself who must relate to doctor how he/she feels, and this is obviously a subjective measure. A natural way to depict this process is to estimate first a model for the timing of the events, and then a (second) model for the type of event. For the timing of events, we will estimate a competing risks model, while for the type of event we will estimate a multinomial logit.

6.1 Duration analysis

The spells of long-term sickness can be analyzed regardless of exit type, which might be a perfectly acceptable way to proceed.[11] However, more often than not, it is desirable to distinguish different kinds of events and treat them differently in the analysis. In other words, it is essential to use a competing risks model instead of a single risk model. This may give supplementary information about a different impact of various factors on different exit types. Therefore, we would distinguish different types of exit (i.e., return to work, full disability, partial disability and "other" exit) and treat them differently in the analysis by using the method of competing risks.

The competing risks approach presumes that each event type has its own hazard that governs both *occurrence* and *timing* of events of that type. A reduced picture of this approach is one of independent causal mechanisms operating in parallel: for the analyzed spells, the production of an output excludes the production of the other events.

[11] Andrén (2000, Paper 3 of this thesis).

Let D_i be a random variable denoting the time of exit for person *i*, and J_i be a random variable denoting the type of exit that occurred to person *i*. The hazard for exit type *j* at time t for person *i* is defined as

(1) $$h_{ij}(t) = \lim_{\Delta t \to 0} \frac{\Pr\{t \leq D_i \leq t + \Delta t, J_i = j \mid D_i \geq t\}}{\Delta t}, \; j = 1, \ldots, 4.$$

The hazard of ending sickness into state *j* is specified as a proportional hazard function

(2) $h_j(t \mid x) = \lambda_j(t)\exp(\beta_j x)$,

where $\lambda_j(t)$ is the baseline, and *x* is the vector of explanatory variable. As a starting-point, the baseline hazard may be specified as a constant, implying time-independence in the decision to exit. This is obviously a rather dubious assumption for analyzing exits from sickness. Another baseline hazard can be specified (i.e. Weibull, exponential, gamma, log-logistic or log-normal).

Although it is a bit unusual, there is nothing to prevent us from choosing a different model for each type of exit, as for example, exponential for return to work, Weibull for both full and partial disability exits, and a proportional hazards model for the "other" exit. It may also be the case that we would not need to estimate models for all event types, and therefore estimate models only for the exit type of interest, treating all other types of exit as censoring.

Before estimating the effects of covariates on different exit types, we would like to test whether the type-specific hazard functions are the same for all events, that is, $h_j = h(t)$. Although the hazards are not equal, it is possible that they might be proportional, that is,

(3) $h_j = w_j h(t)$,

where w_j are constants of proportionality, and $j = 1, \ldots, 4$. This means that, if the hazard for return to work changes with time, the hazards for all other exits may also change over the time. This can be tested by a graphical examination of this hypothesis by plotting log-log survival functions for all exit-types over the time. If the hazards are proportional the plots should be parallel. Additionally, a parametric test of the proportional hazard hypothesis (Cox and Oakes, 1984) in equation (3) can be used. Considering the model

(4) $\log h_j = \alpha_0(t) + \alpha_j + \beta_j t$,

where $j = 1, \ldots, 4$, if $\beta_j = \beta$ for all j, then the proportional hazard hypothesis is satisfied.[12] Otherwise, this model says that the log-hazards for any two types of event diverge linearly with time. Cox and Oakes showed that if two event types diverge, equation (4) implies a logistic regression model for type of event, with time of event as an independent variable. For more than two event types, equation (4) implies a multinomial logit analysis.

If we "subdivide" exits from spells of long-term sickness into four types (return to work, full disability, partial disability, and other exits), under the competing risks approach this implies that there are four parallel processes, an assumption that may not hold for many cases. Rather, there is a process that governs the decision to exit, and another that governs the type of exit. For analyzing the type of exit, a binomial or multinomial logit model is a natural choice, although there are certainly alternatives.

6.2 The multinomial logit model

When choosing the exit pathway at the end of a sickness spell, an employee is assumed to maximize her or his lifetime utility. McFadden (1974) shows how the multinomial logit model can be derived from utility maximization. Consider that the utility of an employee i is associated with J alternatives. We assume that for an employee who has been long term sick, the utility from choosing alternative j is expressed by

(5) $U_{ij} = v_{ij}(x) + \varepsilon_{ij}$

where x is the vector of individual characteristics, and ε_{ij} is an unobservable random variable. The vector of characteristics can be separated into two parts: one, which varies across the choices and possibly across the individuals as well, and the other contains the individual characteristics that are the same for all choices. The alternatives for the exits from long term sickness are specified with respect to the available data: *RW*

[12] Under the proportional hazards hypothesis, the coefficient for time (t) will be zero.

for return to work, *FD* for full (temporary or permanent) disability benefit, *PD* for partial (temporary or permanent) disability benefit, and *O* for other non-working states (homemaking, unemployment, emigration, incarceration, etc.).

The employee's optimization problem is the maximization of his utility function with respect to the alternative *j*:

(6) $\max_j U_{ij}$, where $j \in \{RW, FD, PD, O\}$.

From (6) it follows that the probability that an employee *i* will choose the optimum alternative j^* is

(7) $\Pr\left\{U^* = \underset{j}{Max}\, U_{ij}\right\} = \Pr\left\{\varepsilon_j < \varepsilon_{j*} + \theta_{j*} - \theta_j, \forall j \neq j^*\right\}$, where $\theta_j = v_{ij}(x)$.

McFadden (1974) proved that the multinomial logit is derived from utility maximization if and only if the ε_j disturbances are independent, and identically distributed with a Weibull distribution. Denoting the density function of ε_j by $f(\varepsilon_j)$, the probability that employee *i* will choose the alternative *j* from the *J* given choices is

(8) $$\Pr(Y = j) = \frac{e^{\sum_{k=1}^{K} \beta_{jk} x_k}}{\sum_{j=1}^{J} e^{\sum_{k=1}^{K} \beta_{jk} x_k}},$$

where the parameters β_k distinguish the *x* variables.[13]

There are *J* - 1 sets of β estimates, so the total number of estimates will be $(J - 1) \times K$, which implies that the sample size should be larger than $(J - 1) \times K$. There will be four sets of coefficients $\beta(RW)$, $\beta(FD)$, $\beta(PD)$, and $\beta(O)$ corresponding to outcome

13

$$\Pr\left\{U^1 = \underset{j}{Max}\, U_{ij}\right\} = \Pr\{\varepsilon_2 < \varepsilon_1 + \theta_1 - \theta_2, \varepsilon_3 < \varepsilon_1 + \theta_1 - \theta_3, \varepsilon_4 < \varepsilon_1 + \theta_1 - \theta_4\}$$

$$= \int_{-\infty}^{\infty} f(\varepsilon_1)\left[\int_{-\infty}^{\varepsilon_1+\theta_1-\theta_2} f(\varepsilon_2)d\varepsilon_2 \int_{-\infty}^{\varepsilon_1+\theta_1-\theta_3} f(\varepsilon_3)d\varepsilon_3 \int_{-\infty}^{\varepsilon_1+\theta_1-\theta_4} f(\varepsilon_4)d\varepsilon_4\right]d\varepsilon_1$$

$$= \int_{-\infty}^{\infty} \exp(-\varepsilon_1)\exp[\exp(-\varepsilon_1)]\exp[-\exp(-\varepsilon_1 - \theta_1 + \theta_2)]\times\exp[-\exp(-\varepsilon_1 - \theta_1 + \theta_3)]\exp[-\exp(-\varepsilon_1 - \theta_1 + \theta_4)]d\varepsilon_1.$$

categories. However, the model is unidentified, in the sense that more than one set of betas can lead to the same probabilities for the outcomes. To identify the model, one of the betas has to be set to zero (an arbitrary choice). The equations for the other choices are expressed using this normalization, with the numerator is dependent only on the β-coefficients for the choice, and the denominator dependent on the β-coefficients for all choices.

Although the choice of the base-alternative is arbitrary, it influences the estimated values of the remaining alternatives, and, consequently, the estimated coefficients cannot be interpreted straightforwardly. Although it is not very intuitive, the β coefficients for each choice can be interpreted as measures of the effect of changes in x on the log-odds ratio of alternative j relative to the base-alternative. More information about the effects of changes in x are given by the marginal effects (for continuous variables) and probability differences (for dummy variables). The marginal effect is the partial derivative of the probability of choosing alternative j with respect to the variable of interest:

(9) $$\frac{\partial P(Y=j)}{\partial X_k} = P_j\left(\beta_{jk} - \sum_{j=1}^{J} P_j \beta_{jk}\right).$$

The probability differences for dummy variables might be evaluated as $P_j(dummy=1) - P_j(dummy=0)$, with other variables at the sample mean, for example. The estimated coefficients and the marginal effects, or of the probability differences do not necessarily have the same sign.

One important issue in the use of multinomial logit models is the assumption of independence from irrelevant alternatives, IIA. Given any particular observation, the IIA property means that the ratio of the choice probabilities of any two alternatives of the response variable is not influenced systematically by other alternatives. IIA is the notorious assumption, in individual decision theories and in social choice theory, that the choice (preference) a collection of alternatives is not affected if non-chosen alternatives are made unavailable. Hausman (1984) presented a test for the IIA assumption. Hausman's test compares the maximum-likelihood estimator of the beta based on *all* data (β_f) with maximum-likelihood estimator of beta that are based on data in which one alternative j has been dropped (β_r), while cases in which alternative j was actually selected are fully dropped. Under IIA, β_r and β_f should be approximately equal, while IIA is violated if the two estimates are significantly different. Formally, Hausman has shown that the test statistic

(10) $$H = (\beta_r - \beta_f)' \, (V_r - V_f)^{-1} (\beta_r - \beta_f),$$

is approximately chi-square distributed under Ho: IIA, where β and V, respectively, denote the estimate and the approximate variance matrix, based on the full (f) and restricted (r) data.

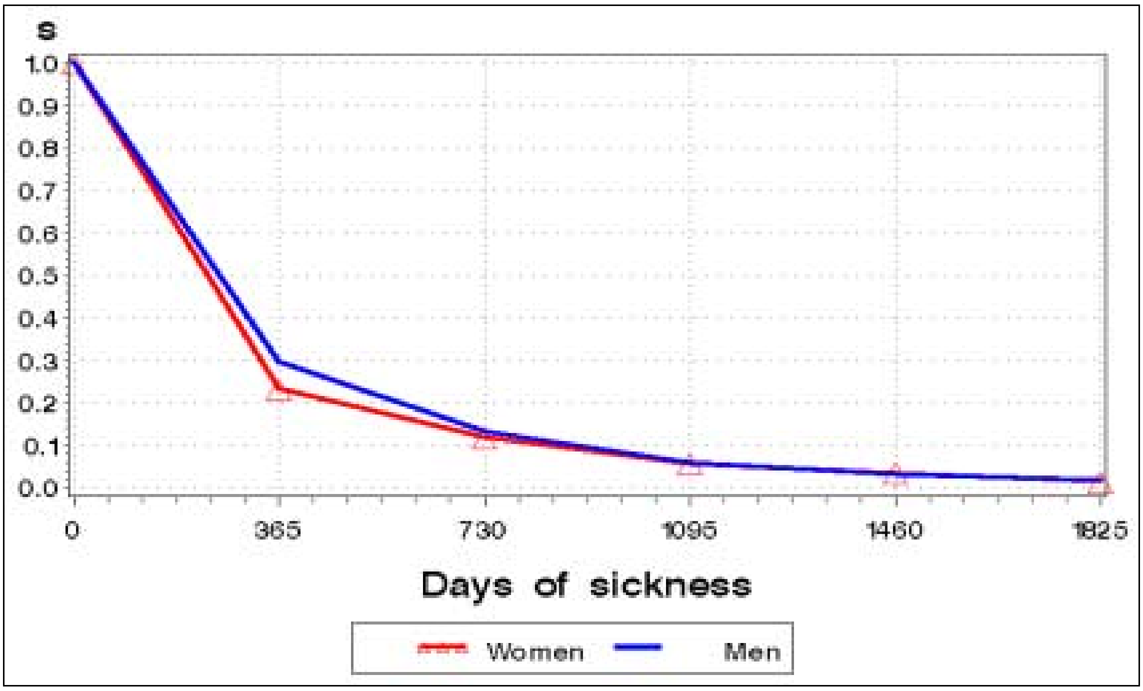
7 The results

7.1 Nonparametric estimates

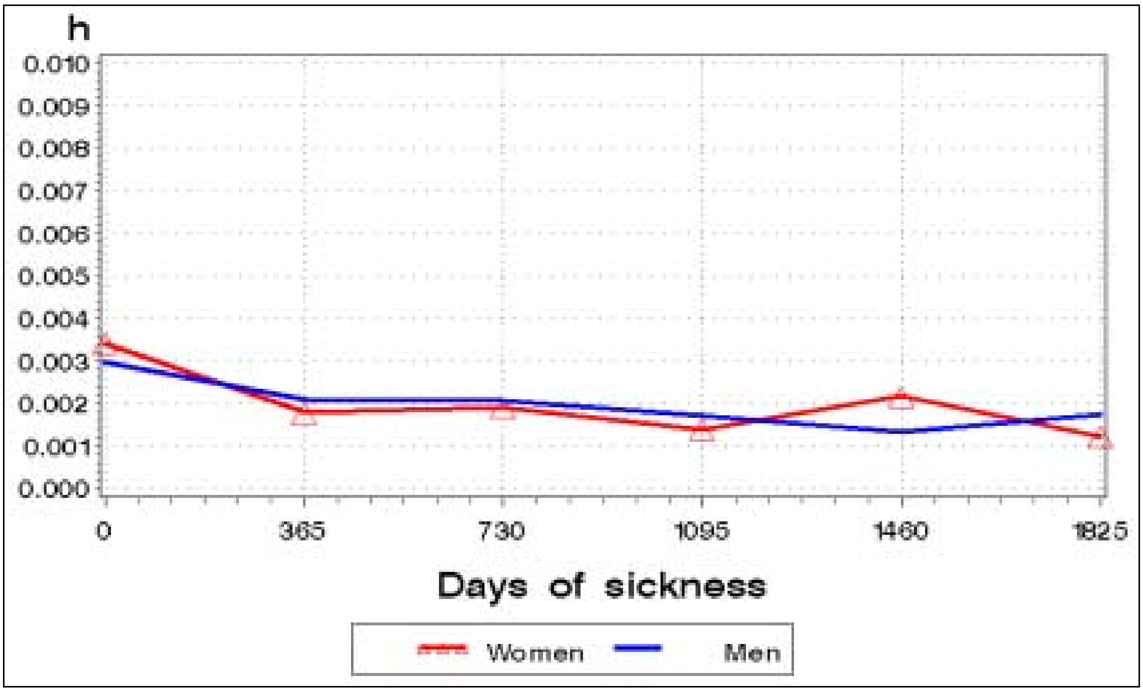
The life-table estimates of survival (s) and hazard (h) curves until the time of exit from long-term sickness (Figure 3-7) show that there are some differences between men and women, among age groups, among persons with different levels of education, by type of exit, and by marital status (Table A4, in Appendix 3, present tests of equality over strata). Figure 3a shows that women generally exited slightly faster than men during the first two years, after that there is no difference between men and women. From about 10 months to about three years of sickness, men had a higher risk to exit than women (Figure 3b).

Figure 4a shows that younger persons generally exited faster than older persons. People aged 46-55 might be quite sick, but their work capacity had not decreased enough to give them the right to leave the labor market. From about 10 months to about two and half years of sickness, people aged 56-65 had the highest risk to exit (Figure 4b), which is logical since they get disability easier.

People with lower education were slower to leave a sickness spell than were those with more education (Figure 5a). On the other hand, their risk to exit after one year is higher than the risk of those with more education (Figure 5b). This might be explained by their work characteristics and work environment, as people with lower education are more likely to be working in more difficult conditions, perhaps executing jobs requiring repetitive movements, heavy lifts, etc.

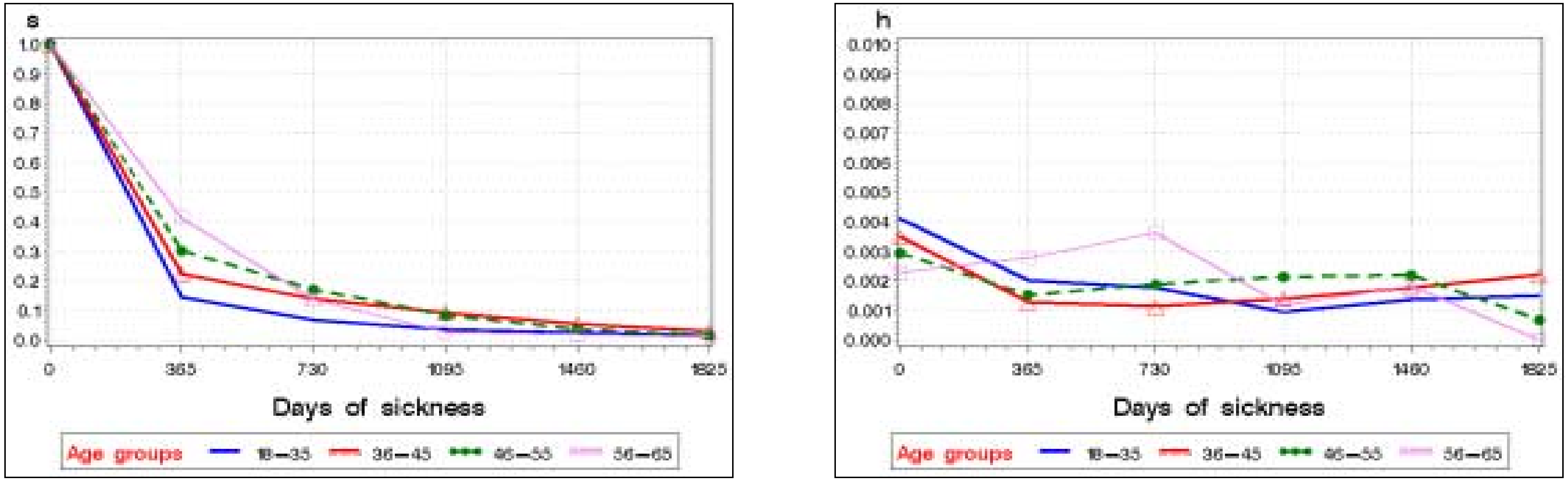


a) Survival estimates



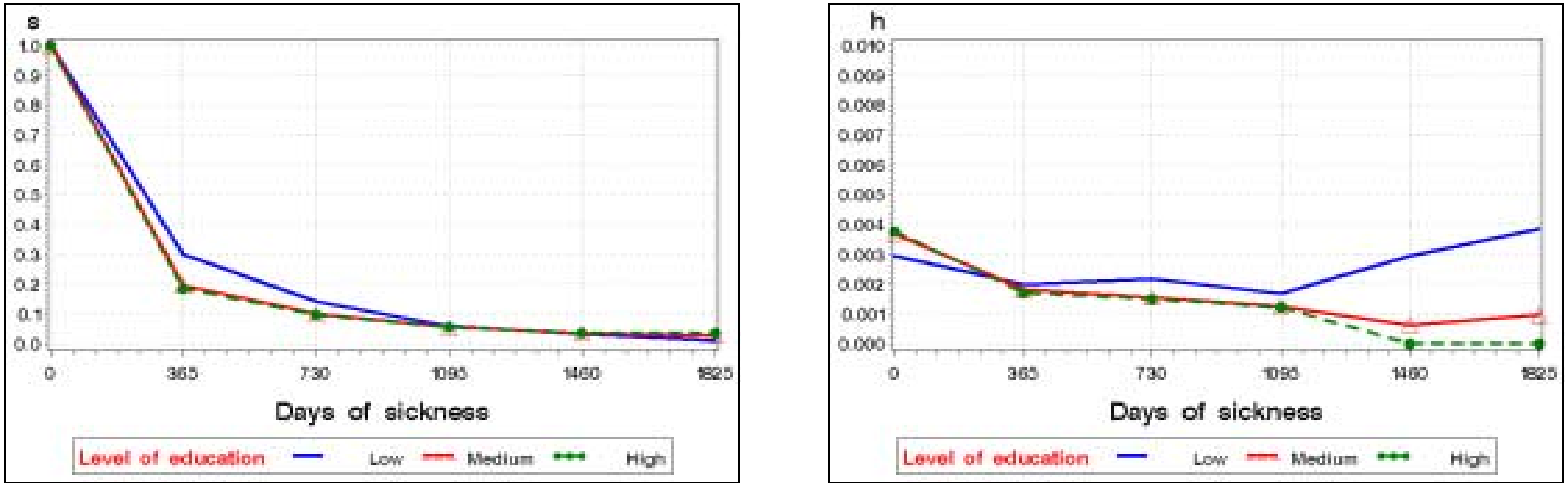
b) Hazard estimates

Figure 3 Survival and hazard estimates by waiting time, and by sex



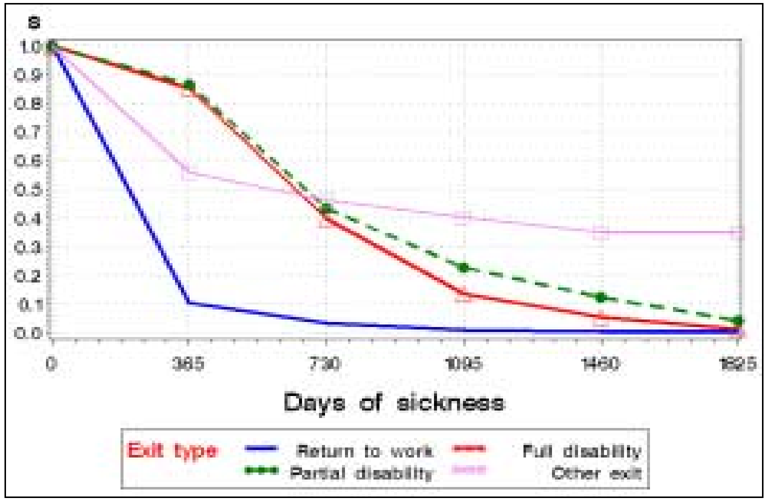
a) Survival estimates **b)** Hazard estimates

Figure 4 Survival estimates by waiting time, and by age groups

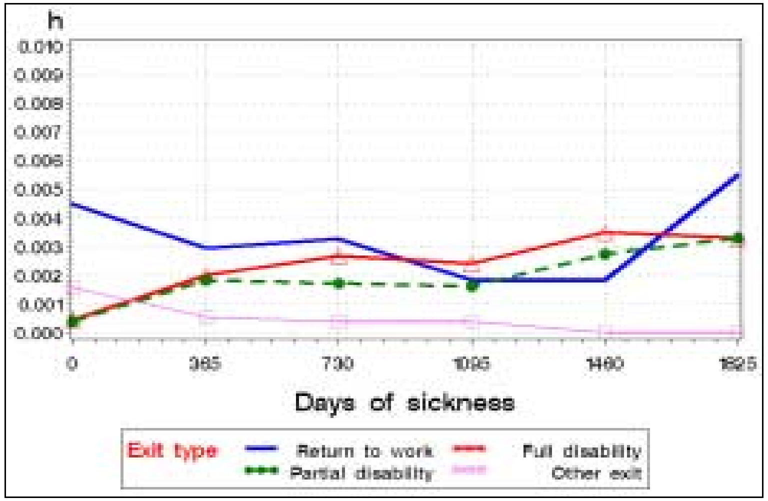


a) Survival estimates **b)** Hazard estimates

Figure 5 Survival and hazard estimates by waiting time, and by educational level

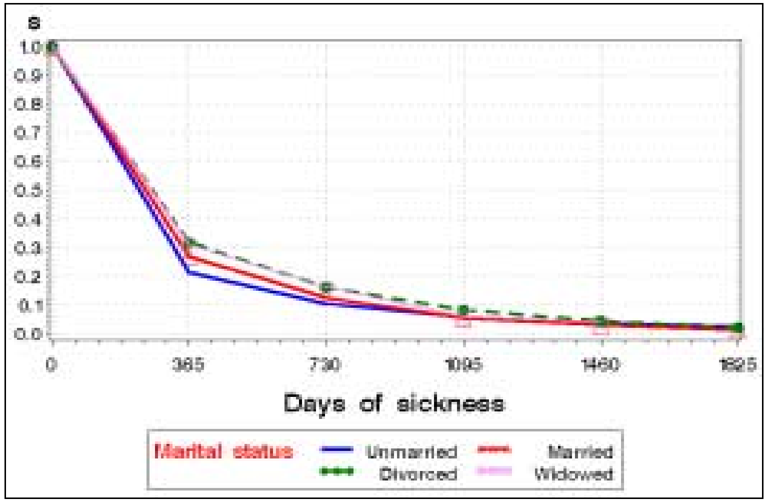


a) Survival estimates

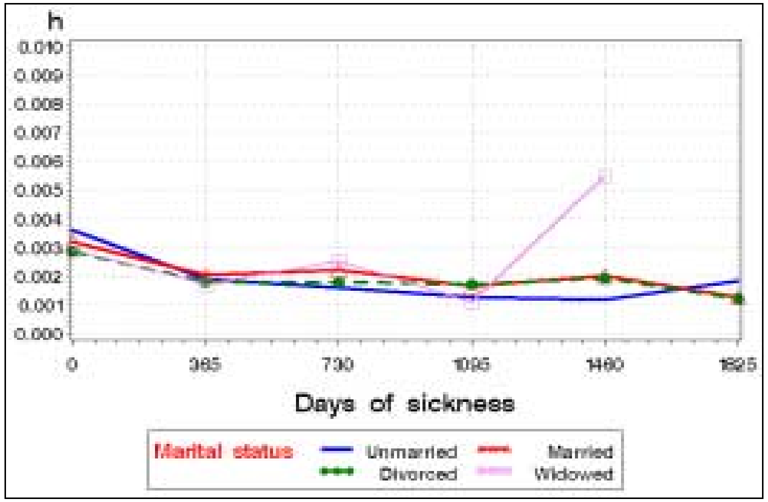


b) Hazard estimates

Figure 6 Survival and hazard estimates by waiting time, and by exit type



a) Survival estimates



b) Hazard estimates

Figure 7 Survival and hazard estimates by waiting time, and by marital status

Figures 6a and 6b show that the vast majority of people who returned to work were back into one year. From one year of sickness onwards, the risk to exit into full disability is higher than the risk to exit into partial disability.

Widowed and divorced people were generally sick longer than those having another marital status (Figure 7a). This may be explained by the fact that widowed people are on average older than the others. Conversely, unmarried people, who are on average younger than the other groups, exited fastest.

7.2 Competing risks model

Figure 8 shows the log-log survival functions for all exit-types over the time, without covariates. For all types of exits, more than 80% of the spells ended before the third year, which means that estimates for later years are based on a relatively small number of observations and may be unreliable. The curve for return to work is always the highest, while the curve for exit to partial disability is much lower than the other three curves during the first 2 years. For more information, we also examine the smoothed hazard plots (Figure 9). The hazard for return to work drops rapidly during the first 420 days of sickness, and fluctuates for the rest of the period, while the hazard for full disability exit increases during the first 600 days. This means that excepting the relationship between full and partial disability, we should reject the proportionality hypothesis.

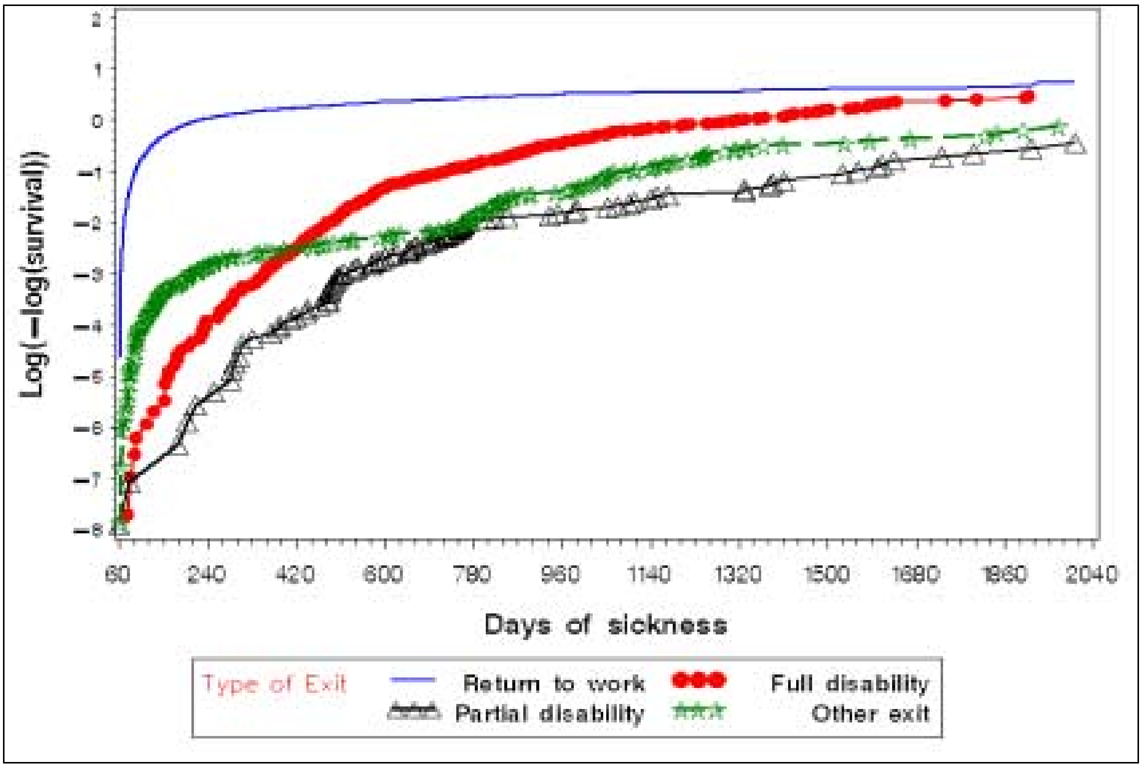


Figure 8 Graphical examination of the proportional hazards hypothesis

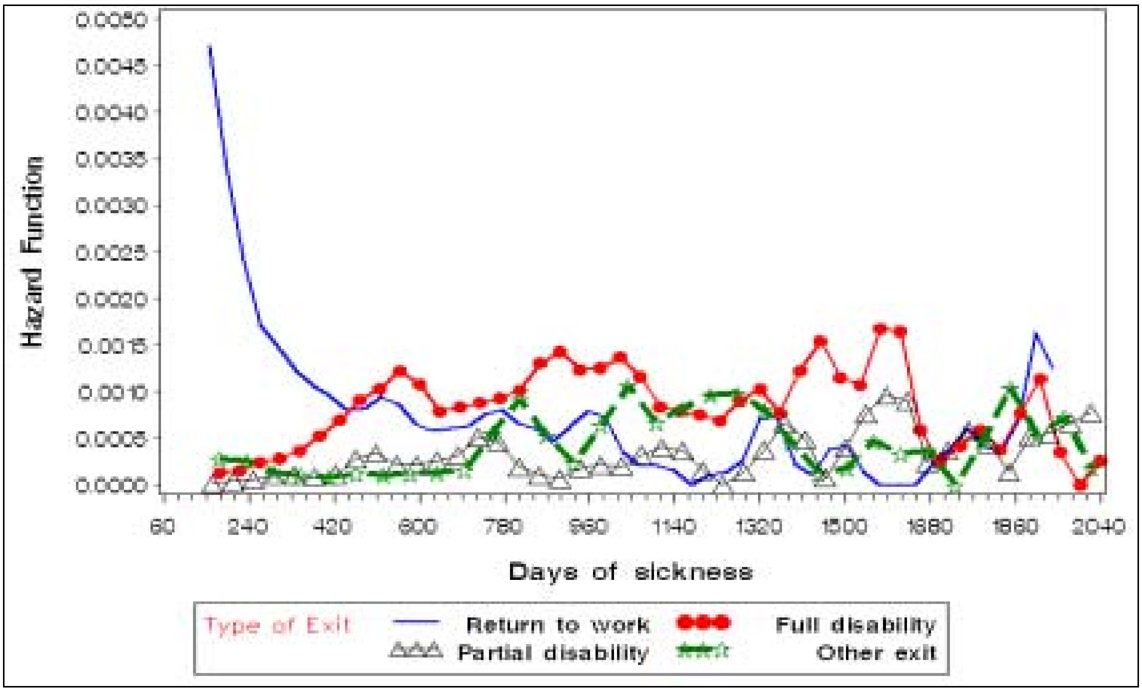


Figure 9 Smoothed hazard of exiting long-tem sickness by destination

In addition to the graphical test, we run a parametric test of the proportional hazards hypothesis (Cox and Oakes, 1984), which shows that the effect of the time variable is highly significant, indicating the rejection of the proportionality hypothesis. Excepting the parameter of the contrast between full and partial disability, all other parameters are significant, which means that proportionality can be rejected for all pairs of two hazard types (Table A5 in Appendix 3).

Table 2 shows only the direction (i.e. the sign) of the relationship between the explanatory variables and the duration of the spell (and the estimates are presented in Table A6 in Appendix 3). The age group of 56-65 years, earnings, earnings loss and the year dummies 1986 and 1987 are the only variables that are significant for all types of exit. Other variables (i.e., the other two age group dummies, the educational level dummies, regional unemployment rate, the other year dummies, and some diagnosis dummies) are significant at the 10% level for some exit types, while others (i.e. some diagnosis dummies) are not significant for any of the exit types.

Excepting the exit into partial disability, the gender effect was significant for all other type of exits, and indicates that women had shorter spells than men for both return to work, and exit into full disability, but they had longer spells than men for "other exits". The age effect varies across exit types: compared to the youngest age group (i.e., younger than 36 years), employees in all other age groups had longer spells of sickness before returning to work or exiting into full disability, while those who exited into partial disability had shorter spells when they were older than 55.

Excepting both types of exit into disability, married people had shorter spells than those with another marital status. This could reflect financial pressure if they are the only income earners in the family, or if both incomes are needed. It is also possible that married persons are healthier, on average.

Those with higher earnings returned to work faster than the other employees, but they had longer spells before full disability and "other exits". Those with higher education who exited into full disability, and those with medium or higher education who returned to work had shorter spells of sickness than those with a lower level of education. Those with medium or higher education leaving with an "other exit" had longer spells than those with lower education.

Table 2 Direction of the effects in the competing risks model for exit destinations

Variable	Return to work	Full disability	Partial disability	Other exit
Intercept	+	+	+	+
Female (CG: Male)	-	-	?	+
Age-group (CG: <36 years)				
36 – 45 years	+	+	?	?
46 – 55 years	+	+	?	+
56 – 65 years	+	+	-	+
Citizenship (CG: Swedish born)				
Naturalized Swede	?	?	?	?
Foreign born	?	?	?	-
Married	-	?	?	-
Educational Level (CG: Low)				
Medium	-	?	?	+
High	-	-	?	+
Annual earnings*	-	+	?	+
Regional Unemployment (%)	+	?	?	+
Year when the spell started				
1986	-	-	?	?
1987	-	-	?	-
1988	-	-	?	-
1989	-	-	?	+
Diagnoses (CG: Musculoskeletal)				
Cardiovascular	?	?	?	+
Respiratory	?	?	?	?
Mental	?	?	?	-
Gen. symptoms	-	?	?	?
Injuries & poisoning	-	?	?	+
Other diagnosis	-	?	?	-

Note: * in thousands of Swedish crowns; CG denotes the comparison group.

Except the disability exits, for all other exit types, higher unemployment rates implied longer spells of sickness, which could be related to both to unemployment fear, or its impact on health status.

7.3 Multinomial logit estimates

A multinomial model was estimated for the whole sample of the "first" spell of long-term sickness, and for sub samples of men and women. Using Hausman's test for independence of irrelevant alternatives, the null hypothesis cannot be rejected (Table A7 in Appendix 4). This means that, given any particular observation, the ratio of the choice probabilities of any two alternatives of the response variable is not systematically influenced by other alternatives.

Table 3 presents the direction of the effects of explanatory variables on the probability of a given exit from the sickness spell. Unlike the analysis of the competing risks model, for which the impact of explanatory variable was estimated for each exit type, now they were estimated using “return to work” as the reference category against other response categories (full disability, partial disability, and other exits). The estimated coefficients of the multinomial model of exits from long-term sickness, the relative risk ratios (RRR)[14] and the marginal effects are reported in Tables A8 and A9 in Appendix 4).

Women exited into full disability less then did men. For the other two exit alternatives (partial disability and “others”), the differences between men and women were not high. The older people were, the higher was the probability that they would exit to either full or partial disability instead of returning to work. Foreigners exited into full disability more often than did Swedish born people. People with medium or higher education had a lower probability of exiting than did those with lower education.

The effect of economic incentives on estimating the probability of choosing another exit than return to work is estimated by using two variables: earnings (i.e., annual work income) at the beginning of each sickness spell, and earnings loss related to the sickness spell. Earnings appear to have been important, as the likelihood of exiting to a non-working state was lower for higher-income earners. On the other hand, the estimated parameter for the loss in earnings (that is an interaction variable) has a positive sign, which suggests that the likelihood of choosing a non-working state increased with the level of the loss of earnings. This variable was computed as a function of expected annual earnings if people would work as scheduled, the ceiling level for compensation, replacement rate and compensated days of sickness, and it can take the same value for a high-income earner with no necessarily very long spells of

[14] The relative risk ratios report the exponentiated value of the coefficient, exp(β). If the RRR = r, and returning to work is the reference category, this means that the relative risk of the exit j over return to work ratio is r for cases when a dummy variable takes value 1 relative to cases with zero value; or r for one unit change in the a continuous variable. Then, the likelihood of choosing a non-working exit (full disability, partial disability, or “other” exit) can then be compared with that of returning to work.

sickness, and a low-income earner with a very long spell of sickness. The relationship between the number of sickness days and the loss of earnings due to (this) sickness is linear, but because of the benefit ceiling, people with high earnings lost more than did those with low earnings for the same duration.

Table 3 Multinomial logit results for various exits from sickness spells, compared to the alternative "return to work"

Variable	Full disability			Partial Disability			Other exits		
	All	Men	Women	All	Men	Women	All	Men	Women
Female (CG: Male)	-			?			-		
Age-group (CG: <36 years)									
36 – 45 years	+	?	?	+	+	?	+	?	-
46 – 55 years	+	+	+	+	+	+	+	?	?
56 – 65 years	+	+	+	+	+	?	+	?	-
Citizenship (CG: Swedish born)		?	?		?	?		?	?
Naturalized Swede	?			?			?		
Foreign born	+			?			+		
Married	?	?	?	?			?	?	?
Educational Level (CG: Low)									
Medium	-	?	-	?	?	?	-	?	?
High	-	?	?	?	+	?	-	?	?
Earnings*	-	-	-	-	-	-	-	-	-
Earnings Loss*	+	+	+	+	+	+	+	+	+
Regional Unempl.	?	?	?	?			?	?	?
Duration of sickness spell (CG: 60-90 days									
91-180 days	+			?			+		
180-366 days	+			?			+		
> 366 days	+	?	?	+	?	+	+	+	+
Year when the spell started									
1986	-	-	?	-	?	?	-	-	-
1987	-	-	?	-	?	?	-	-	?
1988	-			-			-		
1989	-			?			-		
Diagnoses (CG: Musculoskeletal)		?	?		?	?		-	-
Cardiovascular	?	?	?	?	?	?	?		
Respiratory	?			?			?		
Mental	+	+	?	?	?	?	+	?	?
Gen symptoms	?			?			?		
Injuries	-	?	-	?	?	?	?	?	-
Other diagnosis	?			?			+		
Intercept	-	?	-	-	-	-	-	-	-

Note: * in thousands of Swedish crowns; CG denotes the comparison group.
indicates that the variable was not included in the model due to few or no observations.

We already know from the nonparametric analysis that the average duration of the analyzed spells of long-term sickness differed across the exits. The multinomial estimates of duration dummies show that the more days of sickness people experienced, the higher was the probability of another exit than returning to work. The year when people started their sickness spell also had a significant effect on the exit type, which might be explained by events not captured by other variables.

The diagnosis also had a significant effect on people's exits. Comparing to the musculoskeletal group, persons with a mental diagnosis had a higher probability of exit into full disability instead of returning to work, while those with injuries or poisoning had a lower probability.

When the samples of men and women were analyzed separately, given the smaller sample size some characteristics were represented in a very small proportion, and therefore there are fewer explanatory variables. For example, instead of using three dummies for citizenship, only a dummy for those who were Swedish born is used, and this group is compared to all others; instead of using four dummies for the duration of the sickness spell, there is only a dummy for spells longer than a year; and year and diagnosis dummies in each case are compared to the groups which do not have the dummy characteristic.

Comparison of all other three exits with the alternative of returning to work, gives the following results: Some factors had the same significant direction of their effect for both women and men for all exit types (i.e., earnings and earnings loss). Some factors had the same significant directional effect for both women and men for only some exit types (i.e., the dummy for the age group 46-55, only for both full and partial disability; the dummy for spells longer than one year, only for other exits, etc.). Some factors had the significant direction of their effect either only for men, or men, and/or only for one or some exit type (i.e., Swedish born women had a lower probability of having another exit than other women, higher educated men had a higher probability of exiting into a partial disability than other men, men with a mental diagnosis have a higher probability of returning to work than men with another diagnosis, etc).

8 Summary and conclusions

Using the Swedish National Insurance Board's LS-data for the period 1986-1991, exits from long-term sickness were analyzed by using both duration analysis and a multiple choice framework. This analysis in two steps was suggested by the complexity of the exit decision, which implies, in a very simplified framework, at least two aspects of the exit process: an aspect that governs the duration of sickness spell, and another that governs the type of exit. Therefore, first, the analysis of the duration of the sickness spells was done, and then, using a multinomial logit model, the analysis of process that governs the type of exit was done. The results indicate that both individual characteristics, and push factors, such as regional unemployment, were important for the final output, and that there were some factors that had different effects for men and women.

The estimates from the duration analysis showed that excepting the exit into partial disability for which the gender effect was not significant, women had shorter spells of sickness than men before return to work or exit into full disability, and longer spells when they had "other exit" types. Older employees had longer spells than the younger ones for all exit types, excepting partial disability for which they had shorter spells. Except the group of "other exits" for which foreign-born people had shorter spells than people born in Sweden, the citizenship dummies were not significant by the conventional criteria. Excepting the disability exits, married employees had shorter spells of sickness than those who were not married for all other three types of exit, results that could be interpreted either as the pressure of the economic incentive and/or a better health status of these people. For those who returned to work, people with medium and higher education had shorter spells than those with a lower educational level. Excepting the exits into disability, a higher regional unemployment rate implied longer spells for all other three types of exit.

The multinomial logit analysis of the type of exit showed that the probability of not returning to work increased with age and by duration of the sickness spell, and decreased by year during the period studied, which was a growth period. Compared to people born in Sweden, it was more likely that a foreign born person would exit into full disability or "other exits" instead of returning to work. Compared to those with a musculoskeletal diagnosis, it was more likely that a person with a mental diagnosis would exit into full disability exit instead of returning to work.

When the analysis was done by gender, the results showed that for both women and men, higher earnings decreased the probability of choosing another exit than return to work, while higher loss of earnings associated with the spells of sickness increased the probability of having another exit than return to work. This result indicates that for two persons with *same* loss of earnings, but who belong to two different earnings-groups, the person with earnings *under* the ceiling level had *longer* spell than the person with earnings *above* the ceiling level.

Nevertheless, summing together the results of this study with the previous findings and theoretical foundation, it seems that, at least for those people who have been working before the sickness spells, it should be possible to make a greater use of their working capacity through active collaboration between patients, medical personnel qualified for evaluation of working capacity, employer, and social insurance officers. In this process, differences in the conditions and circumstances of different groups (such as, men and women, younger and older employees, etc.) should be considered.

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Appendix 1 Facts on life expectancy in Sweden

Table A1 Life Expectancy, number of survivors, and chances per 1000 of eventually dying from specified causes, at selected ages, by sex, Sweden 1996

Age (X)	Life expectancy at certain ages X	Number of survivors to certain ages out of 100 000 live births	Chances (per 1000) of eventually dying from:							
			Infectious and parasitic diseases	Malignant neoplasms	Diseases of the circulatory system	Heart diseases	Cerebro-vascular diseases	Diseases of the respiratory system	External causes	Motor vehicle traffic accidents
Males										
0	76	100 000	7.7	225.9	493.4	347.1	91.2	88.4	50.5	6.0
1	75	99 605	7.5	226.7	495.3	348.4	91.6	88.7	50.6	6.0
15	62	99 367	7.5	226.7	496.4	349.2	91.8	88.8	50.0	5.8
45	33	96 643	7.3	229.3	506.8	356.4	93.6	90.7	37.8	3.3
65	16	84 528	7.6	216.4	525.2	365.5	99.2	98.7	27.4	2.4
Females										
0	81	100 000	8.7	201.2	502.1	314.1	128.4	84.3	31.0	3.1
1	81	99 640	8.7	201.9	503.8	315.2	128.8	84.5	31.1	3.1
15	67	99 471	8.7	201.9	504.6	315.6	129.0	84.6	30.6	2.9
45	37	98 057	8.7	200.0	510.1	319.1	130.3	85.5	26.5	2.1
65	19	90 468	8.9	171.9	535.7	335.0	136.5	88.9	22.1	1.4

Source: 1997-1999 online version of the World Health Statistics Annual

Appendix 2 Descriptive statistics by individual, and by spell

Table A2 presents some descriptive statistics for the variables used in the model, calculated both for the whole sample and by the type of exit from the first spell of long-term sickness. There are more women (55.48%) than men in the sample, but the proportion of men who exited into full disability was higher (15.42%) than that of women (10.42%). The proportion of women who returned to work (77.55%) was greater than that of men (73.63%).

Under citizenship, "Swedish-born" (84.5%) and "naturalized Swedes" citizens (8.3%) are distinguished, as well as "foreign-born" (12.6%). Swedish-born appear to be over-represented with partial disability and under-represented with "other" exits, while both naturalized Swedish and foreign-born exhibit an opposite pattern. In addition, naturalized Swedes appear to be over-represented with full disability, while foreign-born may be slightly under-represented.

Married persons are by far the largest group in the sample and seem fairly evenly distinguished over all the exits. Those who are divorced are over-represented with partial disability, as well as full disability, and are underrepresented with "other exits". The category *Widowed* includes all widows and widowers, plus 13 older people from whom no information on their marital status was available. They are over-represented with partial disability.

Table A2 Descriptive statistics by individual – (first spell of long-term sickness)

Variable	All exits (*n* = 2666)		Type of exit from long- term sickness: Return to work (*n* = 2021)		Full disability (*n* = 338)		Partial disability (*n* = 97)		Other (*n* = 210)	
	Mean	**Std. Dev**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Women	0.555	0.497	0.568	0.496	0.459	0.499	0.515	0.502	0.605	0.490
Age	43.703	11.817	42.067	11.459	52.914	9.127	51.247	9.584	41.138	11.781
Age groups										
< 35 years	0.294	0.456	0.336	0.472	0.071	0.257	0.072	0.260	0.352	0.479
36-45 years	0.242	0.428	0.260	0.439	0.115	0.320	0.175	0.382	0.295	0.457
46-55 years	0.245	0.430	0.241	0.428	0.290	0.454	0.289	0.455	0.190	0.394
56-65 years	0.219	0.414	0.163	0.369	0.524	0.500	0.464	0.501	0.162	0.369
Citizenship										
Swedish born	0.845	0.362	0.850	0.358	0.840	0.367	0.907	0.292	0.786	0.411
Nationalized Swedes	0.083	0.275	0.080	0.272	0.092	0.289	0.041	0.200	0.110	0.313
Foreign born	0.072	0.259	0.070	0.256	0.068	0.252	0.052	0.222	0.105	0.307
Educational level										
Low	0.634	0.482	0.603	0.489	0.837	0.370	0.722	0.451	0.562	0.497
Medium	0.284	0.451	0.308	0.462	0.127	0.334	0.216	0.414	0.333	0.473
High	0.082	0.275	0.089	0.284	0.036	0.185	0.062	0.242	0.105	0.307
Marital status										
Unmarried	0.266	0.442	0.282	0.450	0.175	0.380	0.155	0.363	0.314	0.465
Married	0.547	0.498	0.538	0.499	0.598	0.491	0.557	0.499	0.538	0.500
Divorced	0.164	0.370	0.158	0.365	0.201	0.401	0.227	0.421	0.124	0.330
Widowed	0.024	0.153	0.022	0.146	0.027	0.161	0.062	0.242	0.024	0.153
Young children (<7 years)	0.169	0.484	0.190	0.516	0.030	0.202	0.021	0.143	0.257	0.536
Children (7-16 years)	0.171	0.489	0.191	0.517	0.036	0.228	0.124	0.415	0.214	0.515
Previous cases of sickness	5.317	5.968	5.489	5.793	3.337	4.335	4.021	4.668	7.443	8.809
Prev. cases of ST sickness	2.984	4.867	3.164	4.885	1.325	3.023	1.969	3.193	4.386	6.698
Days of sickness (spell 1)	306.42	371.91	179.73	202.59	711.58	377.86	791.46	479.92	649.49	618.77
Earnings[15]**(**1000 SEK**)**	160.292	76.388	165.240	77.050	132.936	76.796	146.917	74.215	162.875	58.738
Earnings loss (1000 SEK)	86.423	72.650	69.362	58.538	141.65	86.768	154.948	85.562	130.08	82.697
Regional unemployment, %	2.296	1.293	2.237	1.253	2.638	1.345	2.759	1.482	2.107	1.365
Diagnosis										
Musculoskeletal	0.386	0.487	0.366	0.482	0.500	0.501	0.505	0.503	0.333	0.473
Cardiovascular	0.068	0.252	0.055	0.229	0.127	0.334	0.144	0.353	0.057	0.233
Respiratory	0.027	0.323	0.024	0.152	0.033	0.178	0.062	0.242	0.029	0.167
Mental	0.118	0.161	0.114	0.318	0.130	0.337	0.103	0.306	0.148	0.356
General symptoms	0.040	0.195	0.045	0.207	0.018	0.132	0.010	0.102	0.038	0.192
Injuries & poisoning	0.130	0.337	0.155	0.362	0.038	0.193	0.062	0.242	0.071	0.258
Other	0.232	0.422	0.241	0.428	0.154	0.361	0.113	0.319	0.324	0.469

[15] Earnings are inflated to "present" values using the 1997 CPI

The unmarried are the only category over-represented with return to work, which might be explained by the fact that they are probably generally younger, but also it may be that with a second income it is easier economically to exit the labor force.

Those with young children and those with school age children are both slightly over-represented among those who return to work, and heavily under-represented with either partial or full disability, again probably because they are generally younger. They are also over-represented among those with “other exits”, which may represent homemakers who chose to stay home after long-term sickness.

The average duration of the first sickness spells analyzed was higher for people who exited to partial and full disability (791, and 711 days respectively), and much lower for people who returned to work (179 days).

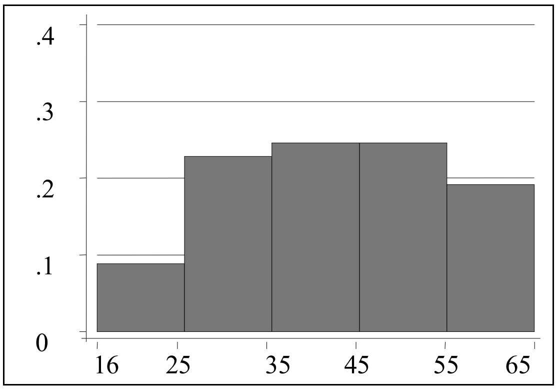
Previous sickness history is measured both by the number of sickness spells shorter than 60 days, and the number of short-term sickness spells (i.e. spells of maximum 7 days) before the analyzed spell of long-term sickness. Given that the first spell of long-term sickness may have started any time from January 1986 through December 1989, it is difficult to compare these measures across the exits. If the truncation is random, we can say that people who exited into either full or partial disability had on average fewer cases than did those who either returned to work or had another exit.

The most "problematic" variable is the earnings of individuals over the observation period. Individual earnings came from incomplete sources in the database: income giving pension rights (PGI); income from work according to the tax records (A- and/or B- income); and, income qualifying for sickness allowance (SGI), i.e., income from the social insurance office records. All of these should give about the same measure. These sources were combined in such a way that missing data were replaced; the highest amount was chosen when two or more sources disagreed.

As expected, the average annual earnings of those who returned to work were highest, while those who exited with partial disability were higher than those with full disability. The relatively high earnings of those who had an “other exit” are difficult to explain although since they had on average relatively long spells of sickness (about 649 days), the high-income replacement rate could be part of explanation.

In the full sample, almost 39% had a musculoskeletal diagnosis. This proportion is even higher (about 51%) for those who exited with either full or partial disability. For the whole sample, and also across the exits, the lowest proportions are for people with a respiratory diagnosis or general symptoms.

Figure A1 shows the age distribution of the sample as a whole, while Figure A3 shows it by type of exit.



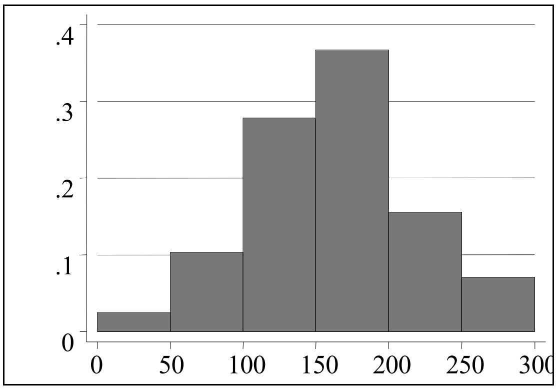


Figure A1 Age distribution **Figure A2** Earnings (1000 SEK)

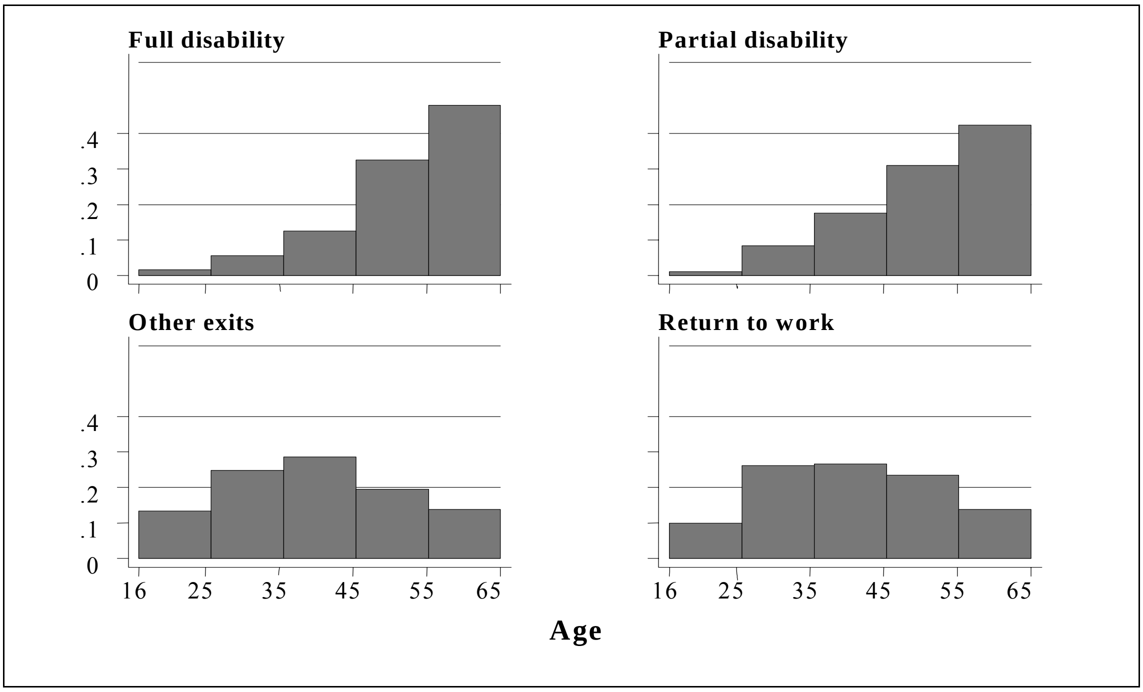


Figure A3 Age distribution by exit-state

Those who returned to work and those with "other exits" show age distributions for similar to that of the whole sample. Young people (16-25 years old) were the smallest group (less than 9%) of the whole sample (Figure A1). Almost 50% of those who exited into full or partial disability were 55-65 years old (Figure A3), while they were less than 20% of the full sample. We can thus expect that age will have a positive effect on exits into disability.

Figure A2 shows the distribution of annual earnings for the whole sample, adjusted to 1997 values, while Figure A4 shows it by type of exit.

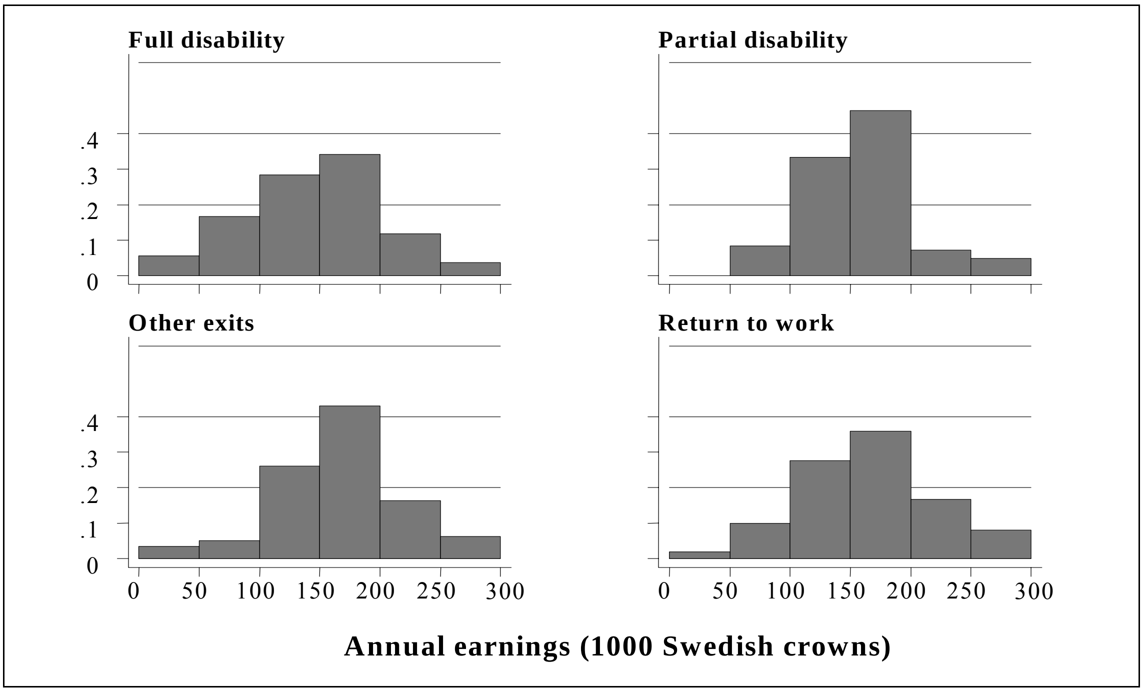


Figure A4 Earnings distribution by exit-state

Again the distribution for those who return to work seems most similar to that of the whole sample, although relative to the whole sample, it is skewed to the right, while the distributions of those with disabilities are skewed to the left. In other words, the proportions of people who exited into full or partial disability decreased with increasing earnings (approximately 24% of those who earned less than 100,000 Swedish crowns, but only 7% of those who earned more than 250,000); while conversely, the proportion of people who returned to work increased with earnings: from 69% of those who earned less than 100,000 Swedish crowns to 82% of those who earned more than 250,000. Note that persons with partial disability have higher earnings, and earnings of people who return to work are higher than those who have full disability.

Table A3 presents descriptive statistics for the first three spells by exit type. As noted earlier with respect to spell 1, people who returned to work had, on average, much shorter spells. The proportion of people who return to work decreased from 75.8% (after the first spell) to 63.4% (after the second spell), and to 62.5% (after the third spell). Similarly, the proportions for those who exited into full disability fell, while the proportions for those who exited into partial disability did not change very much from the first to the third spell.

Table A3 Descriptive statistics for the duration of the first three long-term sickness spells by exit type

Exit type	N	%	Median	Mean	Std. Dev.	Min	Max
LS1→W	2021	75.80	109	179.73	202.59	60	1999
LS1→FD	338	12.68	608.5	711.57	377.85	76	2311
LS1→PD	97	3.64	664	791.46	479.91	60	2338
LS1→O	210	7.88	464	649.49	618.77	61	3096
LS2→W	755	63.40	114	175.70	179.85	60	1696
LS2→FD	114	10.48	514	568.42	302.57	115	1632
LS2→PD	34	3.12	525	576.35	263.75	186	1259
LS2→O	185	17.00	267	420.58	372.81	64	1904
LS3→W	258	62.46	130	187.24	171.74	60	1309
LS3→FD	40	9.69	519	528.42	254.35	62	1091
LS3→PD	13	3.15	504	499.61	262.06	167	928
LS3→O	102	24.70	315	401.11	322.69	60	1620

Note: *LS*1 = the first spell of long-term sickness, *LS*2 = the second, *LS*3 = the third; W = return to work, *FD* = full (temporary or permanent) disability benefit, *PD* = partial (temporary or permanent) disability, and *O* = other (non-working) exits.

The proportion of those who had "other exit" increased from less than 8% (after the first spell) to 17% (after the second), and then to almost 25% (after the third spell). This is probably explained by the fact that this category includes all censored spells.

Appendix 3 Duration analysis

Table A4 Test of equality over strata

Strata	DF	Test		
		Log-Rank	Wilcoxon	-2Log(LR)
Sex	1	**7.35**	**8.95**	**10.4**
Age	3	**71.63**	**92.17**	**91.58**
Education	2	**16.83**	**31.41**	**19.06**
Exit type	3	**943.77**	**780.02**	**1257.49**
Marital status	3	<u>9.96</u>	<u>11.07</u>	**15.55**

Note: **Bold** -significant at less than 1%, and <u>underline</u>- significant at the 5% level.

Table A5 Test of proportionality

Maximum Likelihood Analysis of Variance

Source	DF	Chi-Square	Pr > ChiSq
Intercept	3	1739.29	<.0001
Time	**3**	**549.07**	**<.0001**

Analysis of Maximum Likelihood Estimates

Effect	Parameter	Estimate	Standard Error	Chi-Square	Pr > Chi-Square
Intercept	1	3.886	0.129	895.53	<.0001
	2 (2|1)	0.314	0.146	4.58	0.0324
	3 (3|1)	-1.136	0.209	29.38	<.0001
Duration	4 (4|1)	-0.005	0.000	402.45	<.0001
	5 (2|3)	0.000	0.000	1.88	0.1706
	6 (4|3)	0.001	0.000	4.89	0.0271

Parameter 2 is the beta-coefficient for the contrast between type 1 (return to work) and type 2 (full disability) indicates that the hazard for full disability increased much more rapid than the hazard for return to work. Excepting parameter 5 (that is a contrast between type 3 and 2), all other parameters are significant, which means that proportionality can be rejected for all pairs of two hazard types.

Table A6 Competing risks model for exit destinations (the distribution of waiting time is reported in parentheses)

	Return to work (exponential)			Full Disability (gamma)			Partial disability (gamma)			Other exit (Weibull)		
Variable	***β***	**SE**	**exp (*β*)**	***β***	**SE**	**exp (*β*)**	***β***	**SE**	**exp (*β*)**	***β***	**SE**	**exp (*β*)**
Intercept	**6.99**	0.12		**8.06**	0.20		**8.12**	0.27		**7.01**	0.14	
Female (CG: Male)	**-0.13**	0.05	0.87	**-0.15**	0.09	0.86	-0.12	0.10	0.88	**0.19**	0.05	1.21
Age-group (CG: <36 years)												
36 – 45 years	**0.29**	0.06	1.33	**0.31**	0.11	1.37	-0.02	0.21	0.98	0.08	0.11	1.09
46 – 55 years	**0.47**	0.07	1.60	**0.62**	0.12	1.85	-0.31	0.19	0.73	**-0.37**	0.10	0.69
56 – 65 years	**0.86**	0.08	2.37	**0.73**	0.13	2.07	**-0.68**	0.19	0.50	**-0.82**	0.10	0.44
Citizenship (CG: Swedish born)												
Foreign born	0.10	0.09	1.11	-0.15	0.13	0.86	0.21	0.20	1.24	**0.06**	0.10	1.06
Naturalized Swede	0.07	0.08	1.07	-0.16	0.13	0.86	0.20	0.22	1.22	-0.22	0.09	0.81
Married	**-0.08**	0.05	0.92	-0.10	0.09	0.91	0.00	0.10	1.00	-0.10	0.05	0.90
Educational Level (CG: Low)												
Medium	**-0.12**	0.05	0.89	-0.12	0.09	0.89	0.00	0.12	1.00	**0.22**	0.07	1.24
High	**-0.18**	0.08	0.84	**-0.30**	0.14	0.74	0.13	0.21	1.14	**0.40**	0.14	1.49
Earnings*	**0.00**	0.00	1.00	**0.00**	0.00	1.00	0.00	0.00	1.00	**0.00**	0.00	1.00
Regional Unemployment	**0.04**	0.02	1.04	0.03	0.04	1.03	-0.02	0.04	0.98	**0.06**	0.02	1.06
Year when the spell started												
1986	**-1.31**	0.08	0.27	**-0.38**	0.14	0.68	**-0.27**	0.14	0.76	-0.09	0.08	0.91
1987	**-1.23**	0.09	0.29	**-0.45**	0.15	0.64	-0.06	0.16	0.94	**-0.17**	0.08	0.84
1988	**-1.06**	0.09	0.34	**-0.57**	0.14	0.57	0.15	0.20	1.16	**-0.16**	0.09	0.85
1989	**-1.11**	0.10	0.33	**-0.98**	0.14	0.37	**-0.38**	0.17	0.69	**0.18**	0.11	1.20
Diagnoses (CG: Musculoskeletal)												
Cardiovascular	0.11	0.10	1.12	-0.10	0.18	0.91	-0.06	0.15	0.94	**0.14**	0.08	1.16
Respiratory	0.11	0.15	1.12	0.04	0.25	1.04	-0.20	0.21	0.82	-0.04	0.14	0.96
Mental	-0.06	0.08	0.94	-0.18	0.13	0.84	-0.03	0.16	0.97	**-0.20**	0.08	0.82
Gen. symptoms	**-0.49**	0.11	0.61	-0.17	0.21	0.84	0.51	0.44	1.66	0.23	0.18	1.26
Injuries & poisoning	**-0.60**	0.07	0.55	-0.03	0.17	0.97	-0.04	0.20	0.96	**0.24**	0.12	1.27
Other diagnosis	**-0.47**	0.06	0.63	**-0.67**	0.10	0.51	0.05	0.15	1.05	-0.10	0.07	0.91
Scale	1.00	0.00		0.56	0.02		0.60	0.11		0.47	0.03	
Shape							0.46	0.26		0.69	0.14	
Events	2021			338			97			210		
Right censored values	645			2328			2569			2456		
Log likelihood	-3841.98			-562.31			-258.35			-479.87		

Note: * in thousands of Swedish crowns; **Bolds** indicate significant at the 10%-level.

Appendix 4 Multinomial logit model

Table A7 Hausman's test for assumption "Independence of Irrelevant Alternatives"

Alternative	n	Hausman	df	p
Return to Work	645	15.89	38	0.9994
Full Disability	2328	-12.01	38	1.0000
Partial Disability	2569	-2.18	39	1.0000
Others	2456	0.64	37	1.0000

Table A8 Multinomial logit results for various exits from sickness spells, compared to the alternative "return to work"

Variables	Full Disability						Partial Disability						Other exits					
	Coef.	**Std.**	**RRR**	**Std.**	**ME**	**Std.**	**Coef.**	**Std.**	**RRR**	**Std.**	**ME**	**Std.**	**Coef.**	**Std.**	**RRR**	**Std.**	**ME**	**Std.**
Female (CG: Male)	**-0.61**	0.19	**0.55**	0.10	**-0.005**	0.00	-0.04	0.27	0.96	0.26	0.000	0.00	**-0.61**	0.19	**0.55**	0.10	**-0.005**	0.00
Age-group (CG: <36 years)																		
36 – 45 years	0.57	0.33	1.76	0.58	0.005	0.00	**0.97**	0.49	**2.64**	1.30	0.005	0.00	0.57	0.33	1.76	0.58	0.005	0.00
46 – 55 years	**1.71**	0.31	**5.55**	1.73	**0.015**	0.01	**1.52**	0.48	**4.56**	2.20	**0.009**	0.00	**1.71**	0.31	**5.55**	1.73	**0.015**	0.01
56 – 65 years	**2.93**	0.32	**18.73**	5.98	**0.025**	0.01	**2.61**	0.49	**13.63**	6.64	**0.015**	0.01	**2.93**	0.32	**18.73**	5.98	**0.025**	0.01
Citizenship(CG: Swedish born)																		
Naturalized Swede	0.03	0.34	1.03	0.35	0.000	0.00	-0.36	0.52	0.70	0.37	-0.002	0.00	0.03	0.34	1.03	0.35	0.000	0.00
Foreign born	**0.82**	0.32	**2.28**	0.73	**0.007**	0.00	-0.18	0.57	0.84	0.48	-0.001	0.00	**0.82**	0.32	**2.28**	0.73	**0.007**	0.00
Married	-0.01	0.19	0.99	0.18	0.000	0.00	-0.23	0.26	0.80	0.20	-0.001	0.00	-0.01	0.19	0.99	0.18	0.000	0.00
Educational Level (CG: Low)																		
Medium	**-0.54**	0.23	**0.58**	0.14	-0.005	0.00	0.03	0.30	1.03	0.31	0.000	0.00	**-0.54**	0.23	**0.58**	0.14	-0.005	0.00
High	**-0.83**	0.42	**0.44**	0.18	-0.007	0.00	-0.16	0.52	0.85	0.44	-0.001	0.00	**-0.83**	0.42	**0.44**	0.18	-0.007	0.00
Earnings*	**-0.04**	0.01	**0.97**	0.01	**-0.003**	0.00	-0.02	0.01	0.98	0.01	0.000	0.00	**-0.04**	0.01	**0.97**	0.01	**-0.003**	0.00
Earnings Loss*	**0.03**	0.01	**1.03**	0.01	**0.000**	0.00	0.01	0.01	1.01	0.01	0.000	0.00	**0.03**	0.01	**1.03**	0.01	**0.000**	0.00
Regional Unempl.	-0.05	0.07	0.95	0.07	0.000	0.00	0.08	0.10	1.09	0.11	0.001	0.00	-0.05	0.07	0.95	0.07	0.000	0.00
Duration of sickness spell (CG: 60-90 days)																		
91-180 days	**1.31**	0.80	**3.72**	2.97	0.011	0.01	-1.02	1.24	0.36	0.45	-0.006	0.01	**1.31**	0.80	**3.72**	2.97	0.011	0.01
180-366 days	**1.75**	0.80	**5.73**	4.59	**0.014**	0.01	1.24	0.95	3.47	3.29	0.007	0.01	**1.75**	0.80	**5.73**	4.59	**0.014**	0.01
> 366 days	**3.07**	0.87	**21.59**	18.87	**0.025**	0.01	**2.96**	1.18	**19.35**	22.76	0.016	0.01	**3.07**	0.87	**21.59**	18.87	**0.025**	0.01
Year when the spell started																		
1986	**-0.98**	0.26	**0.38**	0.10	**-0.008**	0.00	-0.58	0.34	0.56	0.19	-0.003	0.00	**-0.98**	0.26	**0.38**	0.10	**-0.008**	0.00
1987	**-0.68**	0.27	**0.51**	0.14	**-0.006**	0.00	**-0.94**	0.40	**0.39**	0.16	-0.005	0.00	**-0.68**	0.27	**0.51**	0.14	**-0.006**	0.00
1988	**-0.64**	0.29	**0.53**	0.15	-0.005	0.00	**-1.42**	0.50	**0.24**	0.12	-0.008	0.00	**-0.64**	0.29	**0.53**	0.15	-0.005	0.00
1989	**-1.54**	0.35	**0.21**	0.08	**-0.014**	0.01	-0.29	0.42	0.75	0.31	-0.002	0.00	**-1.54**	0.35	**0.21**	0.08	**-0.014**	0.01
Diagnoses (CG: Musculoskeletal)																		
Cardiovascular	-0.13	0.30	0.88	0.26	-0.001	0.00	0.05	0.39	1.05	0.41	0.000	0.00	0.04	0.37	1.04	0.38	0.003	-0.13
Respiratory	0.29	0.50	1.34	0.67	0.002	0.00	0.80	0.57	2.22	1.27	0.004	0.00	0.53	0.52	1.70	0.87	0.032	0.29
Mental	**0.51**	0.27	**1.67**	0.46	0.004	0.00	0.12	0.41	1.13	0.46	0.001	0.00	**0.47**	0.26	**1.60**	0.42	0.029	**0.51**
Gen symptoms	-0.32	0.62	0.73	0.45	-0.003	0.01	-0.73	1.08	0.48	0.52	-0.004	0.01	0.35	0.43	1.41	0.61	0.022	-0.32
Injuries & pois.	**-1.09**	0.37	**0.34**	0.13	**-0.009**	0.00	-0.52	0.49	0.60	0.29	-0.003	0.00	-0.34	0.32	0.71	0.23	-0.020	**-1.09**
Other diagnosis	-0.01	0.25	0.99	0.24	-0.001	0.00	-0.32	0.38	0.73	0.28	-0.002	0.00	**0.87**	0.21	**2.40**	0.50	**0.054**	-0.01
Intercept	**-2.55**	0.94			**-0.019**	0.01	**-4.62**	1.29			-0.024	0.01	**-3.67**	0.54			**-0.225**	**-2.55**

Note: *in thousands of Swedish crowns; **Bolds** indicate significant at the 5%-level, underlines -significant at the 10%-level; RRR means the relative risk ratio, ME denotes marginal effects, and CG is the comparison group.

Table A9 Multinomial logit coefficients and marginal effects for various exits from long-term sickness spells compared to the alternative "return to work", by gender

Variables, by exit type	Men Coef.	Men Std. Err.	Men ME Coef.	Men Std. Err.	Women Coef.	Women Std. Err.	Women ME Coef.	Women Std. Err.
Full Disability								
Age-group (CG: <36 years)								
36 – 45 years	0.76	0.46	0.009	0.01	0.32	0.46	0.002	0.00
46 – 55 years	**2.22**	0.44	**0.025**	0.01	**1.20**	0.43	0.007	0.00
56 – 65 years	**2.98**	0.45	**0.034**	0.01	**2.71**	0.44	**0.016**	0.01
Swedish Born	-0.28	0.33	-0.003	0.00	-0.44	0.36	-0.002	0.00
Educational Level (CG: Low)								
Medium	-0.37	0.32	-0.004	0.00	**-0.77**	0.34	-0.005	0.00
High	0.12	0.71	0.001	0.01	-0.91	0.55	-0.005	0.00
Earnings (1000 SEK)	**-0.05**	0.01	**-0.001**	0.00	**-0.04**	0.01	**0.000**	0.00
Earnings Loss (1000 SEK)	**0.04**	0.01	**0.001**	0.00	**0.03**	0.01	**0.000**	0.00
Regional Unemployment (%)	0.01	0.09	0.000	0.00	0.18	0.11	0.001	0.00
Sick > 1 year	0.00	0.45	-0.001	0.00	**2.45**	0.47	0.014	0.01
Spell starts in 1986	**-0.70**	0.31	-0.007	0.00	-0.45	0.35	-0.002	0.00
Spell starts in 1987	**-0.77**	0.32	-0.008	0.00	0.33	0.32	0.002	0.00
Musculoskeletal	0.16	0.33	0.002	0.00	-0.24	0.31	-0.001	0.00
Cardiovascular	0.16	0.42	0.002	0.00	-0.78	0.55	-0.004	0.00
Mental	**0.82**	0.43	0.009	0.01	0.28	0.44	0.002	0.00
Injuries & poisoning	-0.77	0.54	-0.008	0.01	**-1.19**	0.60	-0.006	0.00
Intercept	-0.45	0.70	-0.004	0.01	**-2.31**	0.68	-0.013	0.01
Partial disability								
Age-group (CG: <36 years)								
36 – 45 years	**2.21**	1.10	0.012	0.01	0.28	0.59	0.002	0.00
46 – 55 years	**2.80**	1.09	0.016	0.01	**0.77**	0.56	0.005	0.00
56 – 65 years	**4.06**	1.08	0.023	0.01	1.51	0.59	0.009	0.01
Swedish Born	1.82	1.05	0.010	0.01	-0.46	0.46	-0.002	0.00
Educational Level (CG: Low)								
Medium	0.18	0.46	0.001	0.00	-0.09	0.40	-0.001	0.00
High	1.42	0.80	0.008	0.01	-1.20	0.81	-0.007	0.01
Earnings (1000 SEK)	**-0.03**	0.01	**0.000**	0.00	**-0.03**	0.01	**0.000**	0.00
Earnings Loss (1000 SEK)	**0.02**	0.01	**0.000**	0.00	**0.03**	0.01	**0.000**	0.00
Regional Unemployment (%)	0.16	0.13	0.001	0.00	0.15	0.14	0.001	0.00
Sick > 1 year	1.26	0.82	0.007	0.01	**1.92**	0.68	0.011	0.01
Spell starts in 1986	-0.17	0.45	-0.001	0.00	-0.09	0.42	0.000	0.00
Spell starts in 1987	-0.34	0.47	-0.002	0.00	-0.81	0.53	-0.005	0.00
Musculoskeletal	-0.15	0.47	-0.001	0.00	0.41	0.47	0.003	0.00
Cardiovascular	-0.38	0.61	-0.002	0.00	0.83	0.67	0.006	0.00
Mental	0.18	0.68	0.001	0.00	0.41	0.65	0.003	0.00
Injuries & poisoning	-0.18	0.69	-0.001	0.00	-0.39	0.87	-0.001	0.01
Intercept	**-6.66**	1.74	**-0.037**	0.02	**-3.54**	0.97	-0.020	0.01

Variables, by exit type	Men				Women			
	Coef.	Std. Err.	ME Coef.	Std. Err.	Coef.	Std. Err.	ME Coef.	Std. Err.
Other Exits								
Age-group (CG: <36 years)								
36 – 45 years	-0.10	0.36	-0.007	0.02	0.17	0.26	0.011	0.02
46 – 55 years	0.15	0.37	0.006	0.02	**-0.63**	0.32	**-0.044**	0.02
56 – 65 years	-0.18	0.42	-0.013	0.02	0.03	0.34	0.000	0.02
Swedish Born	-0.18	0.34	-0.011	0.02	**-0.68**	0.25	**-0.046**	0.02
Educational Level (CG: Low)								
Medium	-0.07	0.31	-0.004	0.02	0.36	0.23	0.025	0.02
High	0.68	0.57	0.037	0.03	0.20	0.33	0.014	0.02
Earnings (1000 SEK)	**-0.01**	0.00	**0.000**	0.00	**-0.01**	0.00	**0.000**	0.00
Earnings Loss (1000 SEK)	**0.01**	0.00	**0.001**	0.00	**0.01**	0.00	**0.001**	0.00
Regional Unemployment (%)	-0.07	0.10	-0.004	0.01	-0.14	0.10	-0.009	0.01
Sick > 1 year	**1.26**	0.49	**0.069**	0.03	**1.18**	0.37	**0.078**	0.03
Spell starts in 1986	**-1.24**	0.39	**-0.068**	0.02	<u>-0.52</u>	0.29	**-0.035**	0.02
Spell starts in 1987	**-1.12**	0.38	**-0.061**	0.02	-0.43	0.27	-0.029	0.02
Musculoskeletal	<u>-0.60</u>	0.35	<u>-0.033</u>	0.02	**-0.80**	0.24	**-0.054**	0.02
Cardiovascular	-0.14	0.48	-0.008	0.03	**-1.41**	0.67	**-0.095**	0.04
Mental	0.08	0.42	0.004	0.02	-0.41	0.32	-0.028	0.02
Injuries & poisoning	-0.59	0.42	-0.032	0.02	**-2.07**	0.74	**-0.139**	0.05
Intercept	**-1.40**	0.66	<u>-0.075</u>	0.04	**-1.18**	0.44	**-0.077**	0.03
LR chi2(48)	793.28				829.88			
Log-likelihood	-585.62				-707.41			

Note: There are fewer variables than in Table 4 because of the smaller number of observations. **Bolds** - significant at the 5%-level, <u>underlines</u> -significant at the 10%-level. Except the continuous variables (earnings, earnings loss and regional unemployment), when a comparison group (CG) was not mentioned, the group with the given characteristic was compared to the group without this characteristic.