Andrén, D.

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Long-term absenteeism due to sickness in Sweden.
How long does it take and what happens after?

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 exits 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

1 Introduction

Long-term absenteeism due to sickness has been increasing in Sweden during the past two decades, raising many questions about causes, financing, and policy measures to prevent further increases. 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. However, sickness-spell indicators probably do not give an accurate image of the average health of neither the Swedish population nor the working-age population. 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. Moreover, people are better informed about health risks, and they can invest more in their health throughout their lifetime.

Even though it is expected that investment in health (especially, maintaining a good diet, exercising, etc.) drives the path of choices available for people, the question is how long does a person wait until to leave the labor market, and then what path is she or he choosing? 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 (see Haveman and Wolfe (2000)'s survey and discussion of the main lines of economic research addressing the issues of economic status and behavior of the working-age population with disabilities).

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).

The literature on labor force participation in Sweden contains some studies that found that the rules' change have a significant effect on sickness absenteeism; e.g., Latto and Lindblom (1987), Johansson and Palme, (1996, 2002), Johansson and Brännäs (1998), Bäckman (1998), Lidwall and Thoursie (2000), Andrén (2001a, 2001b, 2001c), Broström et al. (2002), Henrekson and Persson (2002), and Skogman Thoursie (2002). These studies used different databases and statistical methods, the most common setup being to analyze how absenteeism differs across individuals with respect to individual characteristics (age, gender, marital status, earnings, etc.). Economic incentives are captured by the after-tax wage rate, or the difference (or ratio) between the wage rate and the sick-leave compensation. The analyses are done either at a single point in time, or over time. The latest data format (being time series or longitudinal) allows for variation in economic incentives, individuals differing with respect to marginal tax rates, compensation levels, or other aspects of the insurance scheme.

Given the complexity of the decision to exit the labor market, which encompasses both the individual's choice, the medical evaluation, and the decision of the insurance adjudicator, this study considers 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 is done in two steps, using a longitudinal database: 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 supply and demand of labor, stressing health aspects, while sections 4, 5, and 6 present the data, the econometric framework, and the estimated results. The last section summarizes and draws conclusions.

2 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. 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.

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. 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.

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 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.

3 Reduced working capacity and labor market participation

3.1 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.

3.2 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. For example, Andrén and Palmer (2001) 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.

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. 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. This means that there is a higher risk of incurring inconvenience costs with persons with substantial previous sickness.

3.3 Labor market participation

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 would be a decision that rests with the individual. Transition into partial or full disability status is also a clear supply effect. Given the institutional settings, the exit alternatives from a spell of long-term sickness for persons younger than 65 are: return to work, temporary or permanent exit with full or partial disability, and other non-working exits (i.e., unemployment, immigration or return to the home country). 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?

4 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, so the analyzed spells are not left censored, but the sickness history 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 here**>

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 (Tables A1 and A2).

5 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 vary 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.

The spells of long-term sickness can be analyzed regardless of exit type, which might be a perfectly acceptable way to proceed (see for example, Andrén, 2001b). 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 (See, for example, Han and Hausman (1990), Pudney and Thomas (1995), and Van den Berg (2000) for technical details and applications). 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.

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.

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

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

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* 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*:

(2) $\max_j U_{ij}$, 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

$$\textbf{(3)}\ \Pr\left\{U^* = \underset{j}{Max}\, U_{ij}\right\} = \Pr\left\{\varepsilon_j < \varepsilon_{j*} + \theta_{j*} - \theta_j, \forall j \neq j^*\right\},$$

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

$$\textbf{(4)}\ \Pr(Y = j) = \frac{e^{\sum_{k=1}^{K} \beta_{jk} x_k}}{\sum_{j=1}^{J} e^{\sum_{k=1}^{K} \beta_{jk} x_k}},$$

where the parameters β_k distinguish the x variables.

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 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).

6 The results

6.1 Competing risks model

Figure A1 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 A2). 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. In addition to this 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. Both tests indicate 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 A4 in the Appendix).

Table 2 presents the estimates of the computing risks model. The age group of 56-65 years, earnings, earnings loss and the year dummies 1986 and 1987 are the only variables that are statistical significant at the 10% level 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 for some exit types, while others (i.e. naturalized Swede, and respiratory diagnoses 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.

Table 2 here

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.

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

6.2 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 A5 in Appendix). 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 estimated coefficients of the multinomial model of exits from long-term sickness, the relative risk ratios (RRR), and the marginal effects of the explanatory variables on the probability of a given exit from the sickness spell. 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.

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).

Compared to men, women had a higher probability to exit into full disability and other exits than to return to work. 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.

Table 3 here

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 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.

The nonparametric analysis suggested 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.

7 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. Excepting partial disability exits, older employees had longer spells than the younger ones for all exit types. 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 people 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 instead of returning to work.

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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Tables

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

Exit type	N	%	Median	Mean	Std. Dev.	Min	Max
Return to work	2021	75.80	109.0	179.73	202.59	60	1999
Full disabilitry	338	12.68	608.5	711.57	377.85	76	2311
Partial disability	97	3.64	664.0	791.46	479.91	60	2338
Other exits	210	7.88	464.0	649.49	618.77	61	3096

Table 2 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)**	
	β	**HR**	***β***	**HR**	***β***	**HR**	***β***	**HR**
Intercept	**6.99**		**8.06**		**8.12**		**7.01**	
Female (CG: Male)	**-0.13**	**0.87**	**-0.15**	**0.86**	-0.12	0.88	**0.19**	**1.21**
Age-group (CG: <36 years)								
36 – 45 years	**0.29**	**1.33**	**0.31**	**1.37**	-0.02	0.98	0.08	1.09
46 – 55 years	**0.47**	**1.60**	**0.62**	**1.85**	-0.31	0.73	**-0.37**	**0.69**
56 – 65 years	**0.86**	**2.37**	**0.73**	**2.07**	**-0.68**	**0.50**	**-0.82**	**0.44**
Citizenship (CG: native)								
Foreign born	0.10	1.11	-0.15	0.86	0.21	1.24	**0.06**	**1.06**
Naturalized Swede	0.07	1.07	-0.16	0.86	0.20	1.22	-0.22	0.81
Married	**-0.08**	**0.92**	-0.10	0.91	0.00	1.00	-0.10	0.90
Educational Level (CG: Low)								
Medium	**-0.12**	**0.89**	-0.12	0.89	0.00	1.00	**0.22**	**1.24**
High	**-0.18**	**0.84**	**-0.30**	**0.74**	0.13	1.14	**0.40**	**1.49**
Earnings*	**0.00**	**1.00**	**0.00**	**1.00**	0.00	1.00	**0.00**	**1.00**
Regional Unemployment	**0.04**	**1.04**	0.03	1.03	-0.02	0.98	**0.06**	**1.06**
Year when the spell started								
1986	**-1.31**	**0.27**	**-0.38**	**0.68**	**-0.27**	**0.76**	-0.09	0.91
1987	**-1.23**	**0.29**	**-0.45**	**0.64**	-0.06	0.94	**-0.17**	**0.84**
1988	**-1.06**	**0.34**	**-0.57**	**0.57**	0.15	1.16	**-0.16**	**0.85**
1989	**-1.11**	**0.33**	**-0.98**	**0.37**	**-0.38**	**0.69**	**0.18**	**1.20**
Diagnoses (CG: Musculosk.)								
Cardiovascular	0.11	1.12	-0.10	0.91	-0.06	0.94	**0.14**	**1.16**
Respiratory	0.11	1.12	0.04	1.04	-0.20	0.82	-0.04	0.96
Mental	-0.06	0.94	-0.18	0.84	-0.03	0.97	**-0.20**	**0.82**
Gen. symptoms	**-0.49**	**0.61**	-0.17	0.84	0.51	1.66	0.23	1.26
Injuries & poisoning	**-0.60**	**0.55**	-0.03	0.97	-0.04	0.96	**0.24**	**1.27**
Other diagnosis	**-0.47**	**0.63**	**-0.67**	**0.51**	0.05	1.05	-0.10	0.91
Scale	1.00		0.56		0.60		0.47	
Events	2021		338		97		210	
Right censored values	645		2328		2569		2456	
Log likelihood	-3841		-562.3		-258.3		-479.8	

Note: *in thousands of Swedish crowns; CG denotes the comparison group and HR denotes the hazard rate. Bolds indicate significant at the 10%-level or better.

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

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

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

Appendix

Table A1 Descriptive statistics by individual at the beginning of the "first" spell of long-term sickness

	All exits		Type of exit from long- term sickness							
	All exits (*n* = 2666)		Return to work (*n* = 2021)		Full disability (*n* = 338)		Partial disability (*n* = 97)		Other (*n* = 210)	
Variable	**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
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* **(**1000 SEK**)**	160.29	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

Note: * Earnings are inflated using the 1997 CPI.

Table A2 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.

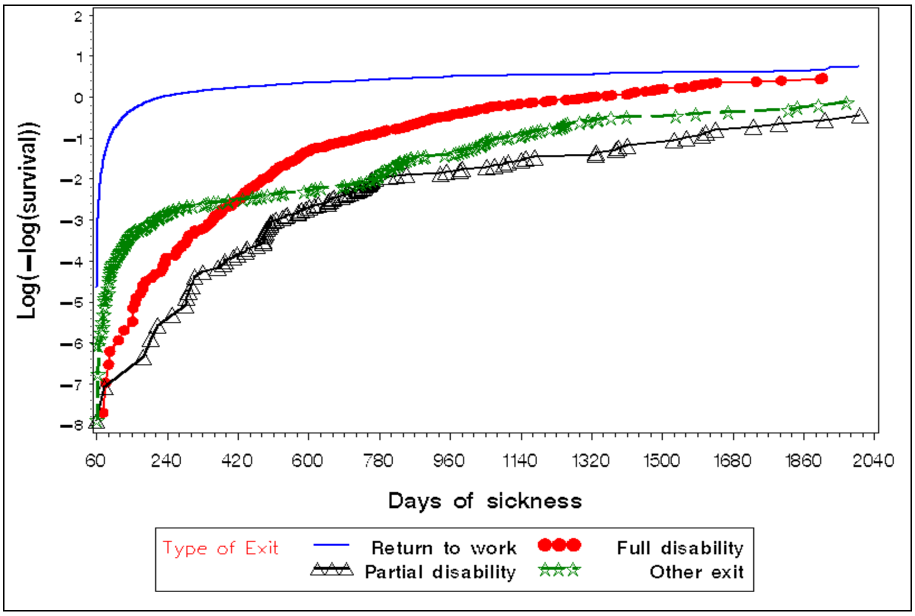

Figure A1 Graphical examination of the proportional hazards hypothesis

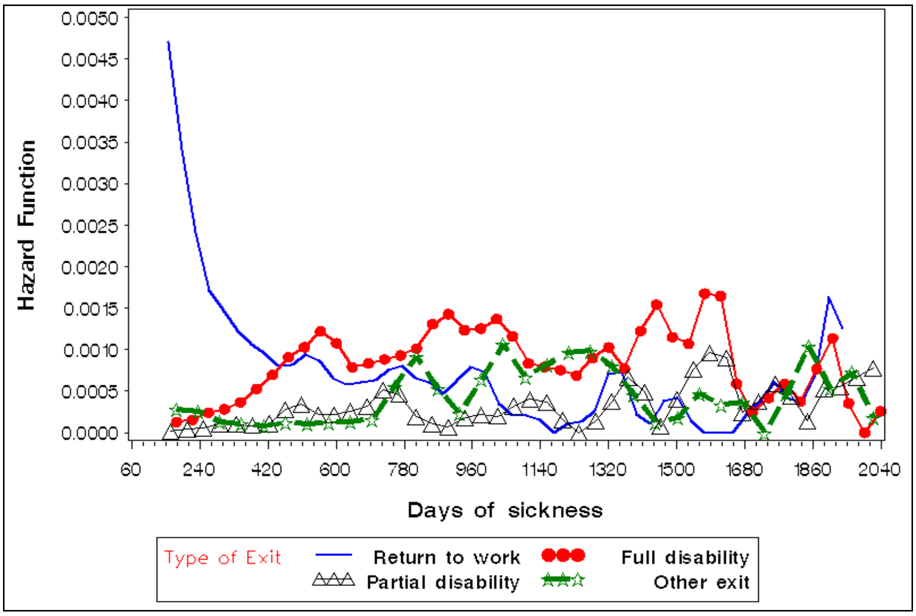

Figure A2 Smoothed hazard of exiting long-tem sickness by destination

Table A3 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 A4 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	Std. Error	Chi-Squared	p
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

Note: 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 A5 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