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FOREWORD

In line with policies long in place in Western Europe, United States disability policy is now attempting to intervene directly in the labor market to increase the employment of people with disabilities. Beginning in July, 1992, the Americans with Disabilities Act of 1990 required employers to provide reasonable accommodation to workers with disabilities. Here we use a continuous time hazard model on retrospective data from the 1978 Social Security Survey of Disability and Work to estimate the effect of employer accommodation on the subsequent job tenure of workers who suffer a work limiting health impairment. We show that the risk of leaving one's employer is significantly influenced both by accommodation and by the Social Security Disability Insurance replacement rate. Accommodation appears to be as important as a worker's expected replacement rate in influencing his risk of job exit.

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THE IMPORTANCE OF EMPLOYER ACCOMMODATION ON THE JOB DURATION OF WORKERS WITH DISABILITIES: A HAZARD MODEL APPROACH

Dissatisfaction over the poor employment experience of people with disabilities has resulted in the implementation of major new legislation aimed at dramatically increasing their market work through mandated job accommodation. Direct market intervention either through quotas (Germany), government subsidized jobs (Sweden), or subsidies for accommodation (The Netherlands), have long been a part of disability policy in Western European countries.[1] Despite the fact that the Americans with Disabilities Act of 1990 (ADA) is now in force, and expectations about its influence on employment are high, little is known about its likely impact on the population with disabilities. For instance, no systematic evidence has been presented to determine the level of accommodation prior to passage of the ADA or to show the efficacy of accommodation as a means of increasing the employment of workers with disabilities.

Here data from the 1978 Survey of Disability and Work is used to trace the ability of workers to continue on the job following the onset of a health condition that affects their ability to work. Using life table analysis, the risk of exit from an employer following onset is shown and then a hazard model is used to estimate the influence of economic variables on that risk.

This data set is of particular value in gauging the potential success of accommodation because it includes data on the incidence of employer accommodation in the workplace prior to the passage of the ADA.[2] We show that contrary to the characterization of irrationally discriminating employers drawn by the anecdotal evidence presented at the ADA hearings, a substantial minority of private employers accommodated workers before passage of the ADA. More important, we argue that such accommodation did significantly increase the expected job duration of workers with disabilities but that the ADA is unlikely to be a full employment panacea for all people with disabilities.

The Americans with Disabilities Act of 1990

Full employment of people with disabilities is an important but elusive policy goal. Nearly 90 percent of able-bodied men were in the labor force in the United States in 1988, but only about 35 percent of men with work disabilities were (U.S. Bureau of the Census, 1989). Burkhauser, Haveman, and Wolfe (forthcoming) estimate that the real earnings of working age men with disabilities were less than one-half that of able-bodied men in 1987.

A further indication of the difficulty of achieving this employment goal is that virtually no one returns to work once they are on either Social Security Disability Insurance (DI) or Supplemental Security Income (SSI), the two major transfer programs targeted on people with disabilities in the United States. The potential employment picture for this population is made even gloomier by the Bound (1989, 1991) findings that under 30 percent of unsuccessful disability applicants were subsequently employed and that only about two-fifths of them were working full time.

Why the work experience of the population with disabilities is so poor is an unsettled question. By definition, workers with disabilities have health conditions which impede to some degree their ability to work. But other factors influence whether health conditions result in reduced work. Most economic research has concentrated on the supply side of the market. Parsons (1980, 1991), for instance, argues that the labor supply of older workers with health conditions is highly sensitive to the reward structure of the DI system relative to wage earnings. Other researchers have found that the expected replacement rate of DI benefits influences labor supply but to a much smaller degree. (See Haveman, de Jong, and Wolfe, 1991, for a recent paper on this subject and Leonard, 1986, and Wolfe, 1987, for reviews of this literature. Aarts and De Jong (1992) provide the only systematic results outside the United States in their analysis of The Netherlands.[3]

Economic research has concentrated much less on demand: yet it is this side of the market that advocacy groups for people with disabilities believe is most responsible for the poor work experience

of those with disabilities.[4] This view dominated congressional testimony on the Americans with Disabilities Act (ADA) of 1990. (For a summary of this testimony see: U.S. Senate, 1989.)

In the extreme, advocates of this demand side perspective hold that people with disabilities have characteristics that distinguish them from the able-bodied, and on the basis of these characteristics, they are discriminated against. Just as one would not cure racial discrimination by making blacks white, the solution to discrimination against people with disabilities does not lie in having them conform to the demands of the marketplace by, for instance, reducing their functional limitations. Rather the solution is to mandate changes in the network of private market relationships that prevent this minority from being fully integrated in the first place.

The ADA became fully operational in July 1992 for employers of 25 or more people and will include employers of 15 or more people in July 1993. It is meant to reduce discrimination against people with disabilities. It is a compromise from the extreme position that accommodation for all jobs is a right possessed by workers regardless of their impairment. While this legislation extends coverage against discrimination under the Rehabilitation Act of 1973 to employees of private firms, it also contains language that explicitly recognizes that substantial expenditures may be necessary to accommodate fully people with disabilities and that this type of accommodation is different from that necessary to integrate blacks or women. Thus, in Title 1 of the ADA, which outlines the legal responsibilities of firms to workers with disabilities, employers are obliged to make only **reasonable** accommodations that would not create an **undue hardship** on the operation of business.

An innovative feature of this legislation is its emphasis on changing the workplace environment. Table 1 shows that almost two-thirds of beneficiaries of DI are between the ages of 50 and 64. Over one-half are that age when they enter the program. Hence, it is likely that the majority of people with disabilities of working age were able-bodied for most of their lives.

For this reason the timing of policy interventions to encourage work may be an important issue. Substantial time may elapse between the onset of a health condition, its first impact on work performance, job exit, and application for disability benefits. For instance, for workers with chronic musculoskeletal conditions, the third most common disease group cited by DI recipients, see Table 1, the journey to total disability is likely to be quite lengthy.

Furthermore applying for disability benefits is a risky gamble on which the outcome can be delayed for years. In 1985 only one in three applications was successful (U.S. Department of Health and Human Services, 1987). Applicants for benefits must "invest" in **not** being able to work to maximize their chances in an often long review process.[5] Hence, the Bound (1989) finding that even unsuccessful applicants are unlikely to return to work does not rule out the possibility that they would have been working if intervention occurred earlier in the disability process.

Proponents of the ADA believe this Act will increase employer willingness to change the work environment both to accommodate new workers with disabilities and to prolong the worklife of employed workers who suffer health conditions that otherwise would lead them to leave their job. Because it is likely that the majority of those with disabilities were employed at the time of onset of their work limiting condition, how the ADA impacts on this group of workers will primarily determine its success in increasing work among those with disabilities.

Unfortunately, little systematic evidence was presented at the ADA hearing to document the degree to which employer discrimination is responsible for the poor labor market experience of people with disabilities. Nor was evidence provided on the percentage of such workers accommodated by their employers or the degree that accommodation prolongs tenure with the firm. This paper is a first attempt to fill part of the void by measuring the importance of accommodation on the job duration of workers with health impairments and by gauging its likely impact on the employment of the population with disabilities.

Data

The most recent nationally representative, economics based data set containing information on workers with disabilities is the 1978 Survey of Disability and Work. This survey of the prevalence of work disabilities in the working age population was conducted by the Social Security Administration. It consists of two frames, a Health Interview Survey (HIS) frame and a Social Security Administration (SSA) frame. The HIS frame of 5,652 persons is representative of the general population of non-institutionalized persons age 18 to 64.

Respondents were asked to identify any health conditions they had and to indicate the time that the condition first limited their ability to work. Additional retrospective information on their labor market activity at the time of onset and subsequent to it was asked. In addition, the survey data were matched with social security earning records. These data contain the yearly earnings of workers since 1951 and their quarters of coverage since 1938.

Combining these two data sets, we are able to trace employment histories of workers with chronic health conditions from the time the condition began to limit work until they left their employer. In our empirical model, the behavior of prime age men, who were less than age 60 at the survey date and older than age 20 at onset, is analyzed.[6] Because we are interested in evaluating the response of employers, we limit our analysis to non-self-employed men who were employed at the onset of their work limitation.[7] Men with missing information on either the timing of their work limitation or their main health condition are deleted. As a result of our selection process we are able to trace the outcomes of 348 men.

Each respondent was asked the calendar year that his condition first began to limit his work. So it is a straightforward exercise to measure the year of onset. Unfortunately this is not the case for measuring duration following onset. Each respondent was asked if he stayed with the firm after onset. If the respondent changed jobs or stopped working immediately after onset then we know he

exited in his first post-tenure year. If he stayed with the same employer after onset and was still employed on that job in 1978, then the time elapsed was from onset to 1978. For all other cases, social security earnings records are used to estimate job exit by looking for breaks in quarters of coverage not related to reaching the social security taxable maximum and by comparing drops in wage earnings relative to previous years.

Job Exit After the Onset of a Work Limiting Health Condition

Disability is a process that begins with the onset of a health condition. Eventually the condition begins to limit the ability to work and can lead to exit from the job and possibility to application for disability benefits. In Table 2, we trace a key component in this process--the time between the onset of a work limiting health condition and separation from an employer.

Table 2 is akin to a life table and measures the risk (hazard rate) of a worker leaving his employer during each year following the onset of a health condition that limits his ability to work, given that he survived the previous period. Some workers who were at risk at the beginning of an interval drop out before its end. The implicit assumption is that attrition from the risk set occurred randomly during the interval, hence the non-survivors were exposed on average for one-half the interval.

The time intervals here are measured from the calendar year the condition first started to affect the person's ability to work. The number of workers falls because of the cumulative effect of job exits; but also because workers enter the risk set in different calendar years and some are still working in 1978. Such workers are right censored in different time intervals.

As can be seen in Table 2 the risk of leaving an employer is high in the first two years but drops substantially thereafter. The risk of leaving the job during the first year is 34 percent, and it is 34 percent in the next year for those who survive the first year. After two years, less than one-half of employees with work impairments remain with the firm. After six years only one-quarter remain.

Our life table assumes that no heterogeneity exists across individuals. More importantly it assumes the sample composition does not change over time. These are strong assumptions. Part of the large reduction in the risk of job exit is caused by changes in the composition of survivors. To specify better the risk of job exit over time, we use a hazard model that adjusts for sample heterogeneity and allows us to separate the effect of initial characteristics from time effects.

Developing an Empirical Hazard Model

Because we are interested in measuring the time it takes before work impairing health conditions affect employment, we use a dynamic model of job exit. Our choice is a discrete-state, continuous-time hazard model. Our model looks explicitly at a worker's risk of leaving his employer each year. Using this model we capture the distribution in the timing of an event as well as its occurrence over a specific interval. Most implicitly, we are able to handle right censoring problems caused by workers with impairments who are still on the job when the survey ends. Ordinary regression specifications are not well adapted to offsetting censoring problems.

More formally we model the hazard rate as the probability of leaving one's employer following onset of a work limiting health condition. Suppose the cumulative probability that a person leaves his onset job by time (t) is given by:

$$G(t) = 1 - \exp\left[-\int_{0}^{t} h(u)\, du \right] \qquad \textbf{(1)}$$

Associated with this distribution function is the density function:

$$g(t) = \partial [1 - G(t)] / \partial t = h(t) \qquad \textbf{(2)}$$

describing the likelihood of job exit at time *(t)*. The instantaneous hazard rate is the conditional probability of leaving the job at *(t)*, given that the person has not left before *(t)*. It is:

$$h(t) = g(t) / [1 - G(t)] \quad \textbf{(3)}$$

To make the distribution function *G(t)* a function of individual attributes, we specify the hazard rate in the form:

$$h(t) = h_1(x) \cdot h_2(t) \cdot v \quad \textbf{(4)}$$

The first term accounts for observable variation across individuals and is modelled as an exponential function:

$$h_1(x) = \exp(X'b) \quad \textbf{(5)}$$

The second term shows the time profile to job exit once individual differences are held constant. In order to allow flexibility we use the quadratic form to capture time dependence:

$$h_2(t) = \exp(at + bt^2) \quad \textbf{(6)}$$

The third term captures unobserved individual heterogeneity. For instance, unobserved heterogeneity may exist because of omitted variables. Less motivated people will exit jobs more quickly but we are not able to control completely for attitudes in our sample. Hence, we may confuse negative time dependence with the fact that in the next period, the remaining sample is dominated by more motivated people who are less likely to exit. To control for such differences, unobserved factors are integrated out of the likelihood function. Here we report our findings using a lognormal distribution to control for unobserved heterogeneity.

For those who leave the onset job, the year of job exit is known. The probability of this event occurring between t_i and $(t_i + s_i)$ is:

$$G_i(t_i + s_i) - G_i(t_i) \quad \textbf{(7)}$$

Since we know the beginning date of the spell, our measure of duration does not suffer from left censoring. However, some spells are right censored. In this case we only know that the true duration of the spell exceeds the observed final value, and hence, the duration is the length of time

until the end of the survey. For individuals who are still working for the same employer at the time the survey ends, *u*, the probability of not leaving the job is:

$$1 \& G_j(t_j \% u) \quad \textbf{(8)}$$

Combining complete and incomplete spell components yields the (M) disabled workers who have left and the (N) who have not left their onset employer:

$$L = \sum_{i=1}^{M} G_i(t_i \% s_i) \& G_i(t_i) \sum_{j=1}^{N} 1 \& G_j(t_j \% u) \quad \textbf{(9)}$$

Variables Affecting Job Duration

The explanatory variables for $(h_1(x))$ in equation (5) are defined in Table 3. They include socio-economic and health status variables used in previous studies, as well as a variable unique to this data set: whether the employer accommodated the worker after his health condition began to affect his work.

Accommodation. Because the Americans with Disabilities Act of 1990 targets job accommodation as the critical policy variable for increasing the work experience of the disabled, we are particularly interested in the incidence of such help prior to the passage of the ADA and its impact on work duration with the firm. We expect accommodation to increase job duration.

Our bivariate measure of accommodation equals one if the employer provided help to the respondent to remain on the job at the time of onset of his work limiting conditions. In an alternative specification we model the accommodation decision as well as the decision to leave the job. It is modeled in a recursive system in which the accommodation decision is made first and that decision affects the job exit decision. In that model we use an estimated probability of accommodation rather than the bivariate value in the job exit equation. The results, however, are not credible owning to high multicollinearity arising from nonlinear identification.

Replacement Rate. The Social Security Disability Insurance replacement rate is the key variable in most economic based studies of the work effort of men with disabilities. If a worker can recover income lost by conforming to the eligibility rules of DI, he is more likely to leave his job to do so. Currently, to receive DI benefits a worker must have sufficient quarters of coverage to be eligible for the program. He must also be unable to perform substantial gainful activity. Roughly, the test is that a worker must have a physical or mental impairment that has prohibited him from working for five months and will make it unlikely that he can work for at least one year.

We use the same method developed by other researchers (for instance: Leonard, 1979; Halpern and Hausman, 1986; and Bound, 1989) to calculate individual replacement rates. We use the social security formula appropriate in the year of onset to calculate a worker's Average Indexed Monthly Earnings (AIME) and his Primary Insurance Amount (PIA). We then explicitly recognize that there is some degree of uncertainty related to acceptance onto the DI rolls by estimating a probit model of DI acceptance from a subsample of DI applicants. We use DI applicants from the HIS frame of the Survey of Disability and Work for this purpose. An expected benefit is then calculated for each worker by multiplying this value by the worker's PIA adjusted for dependents. In obtaining our probability of acceptance measure we must use those workers who actually applied for benefits. Hence, we may have a selection problem. By using a bivariate probit model with a selection correction, we are able to check for possible selection problems. We found no significant selection bias. A detailed discussion of this work is available in an appendix which will be supplied by the authors upon request.

Our expected replacement rate is the expected value of DI divided by a worker's AIME. We follow the lead of others in interpreting the AIME as a measure of the worker's permanent wage.

Other Economic Variables. We would like to hold wealth constant in our model. Unfortunately little information is available on this variable at the point of onset. We approximate the value by the use of a binary variable that is positive if the worker had savings at onset. Two other economic

variables measure job tenure and overall job experience. We expect a long tenured worker to have a lower risk of job exit since he is likely to have more specific human capital invested in the job and hence, both the worker and his employer will have more to lose from an exit. We expect this variable to have a greater impact on retention than overall experience which proxies general as well as specific human capital.

Other Socio-Economic Variables. Age at Onset, Marital Status at Onset, Race, and Education are also included in our empirical model. Marriage, higher education, younger age, and non-black race are generally found to increase work effort.

Job Characteristics. Several researchers have looked at the importance of job attributes on the decision of workers to retire. We report our finding using a binary variable to distinguish white collar workers, but we also used more elaborate job attribute measures developed by Roos and Treiman (1980) from the Dictionary of Occupational Titles. These measures were used by the Social Security Administration in their report U.S. Department of Health and Human Services (1986). We expect that an impaired worker in a more physically demanding job has a higher risk of exiting than if he were in a less demanding job.

Health Measures. Finally we attempt to account for variations in health within our sample by accounting for comorbidity and by seeing if different conditions influence duration. We choose the two most common physical condition among the DI population, cardiovascular and musculoskeletal conditions. We expect that a worker suffering from multiple conditions is more likely to leave a job than a worker with only one health condition.

Results

A univariate interval hazard technique allowing for unmeasured heterogeneity was used to estimate the model. The results are presented in Table 4.

We find that the risk of job exit after the onset of a work impairing health condition is significantly reduced when an employer accommodates the worker. This finding is consistent with the emphasize on accommodation in the Americans with Disabilities Act of 1990. But the fact that 30 percent of workers (see Table 3) in our sample were accommodated by their employer modifies the view that such accommodation was rare prior to the passage of this Act.[8]

Consistent with previous research on the participation rate of impaired workers, we find that a higher expected replacement rate increases the risk of job exit after the onset of a work limiting condition. This finding differs from previous studies with respect to the sequence of events it considers; but it is similar in its support of the hypothesis that supply side economic variables affect the work decision of the health impaired. Our wealth variable, however was not significant.

We also find that longer initial job tenure slows exit. If both employer and employee share training costs, then both have an incentive to delay a job exit. In contrast, we find overall experience in the work force has no significant effect on job exit.

Occupation related variables representing physically demanding jobs also have an insignificant effect. This was true whether our measure was a simple binary variable indicating a white collar job, as shown here, or the more sophisticated scales of physical requirements of the job developed by Roos and Treiman (1980). This is a somewhat surprising finding, and it may be that the variation within these classification schemes is greater than it is across these classification schemes.

We also find no significant effect in our health measures. This finding should be interpreted with care. It certainly does not imply that health does not affect job duration. As we will see, the expected job duration of workers with health impairments is less than that of average workers. All the men in our sample have a job impairing health condition. Hence, the variation in health is less than in most other studies of disability. Furthermore, comorbidity may be a poor proxy for severity.

Unfortunately, our data contain no independent measures of a worker's functional limitations at the time his job impairing health condition occurred.

The simple life table reported in Table 2 showed that the risk of job exit fell over time. The coefficients of time in Table 4 captures time dependence controlled for heterogeneity across workers, and they are not significant.

Measuring the Relative Importance of Employer Accommodation

Because the ADA emphasizes that accommodation is crucial to achieving greater work experience for people with disabilities, it is useful to compare the importance of this variable relative to other policy variables. Using the parameters in the hazard equation in Table 4, we can calculate expected duration for a worker with mean characteristics. We can then measure the impact of a change in an independent variable on duration.

Table 5 shows the marginal impact of the four variables found to be significant in Table 4. At the mean value of all explanatory variables, the calculated expected duration of employment after onset is 2.9 years.

Accommodation importantly increases a worker's expected duration on the job. The mean worker who is accommodated has an expected job tenure of over six years compared to 2.15 years for the mean worker without accommodation, an increase of 3.6 years. Accommodation more than doubles expected work life. This finding suggests that legislation requiring accommodation has the potential to increase substantially the employment of people with disabilities.

The importance of this policy parameter is even better seen when compared to the policy parameter most often measured in disability studies--the expected replacement rate. Using the same mean value for all other variables, we measure the effect of a change in the expected replacement rate from zero to one. This dramatic policy counterfactual which captures the full effect of a guaranteed total replacement of wages for the mean worker versus receiving no benefits reduces expected duration

by 3.3 years. This value is slightly smaller than the estimated effect of accommodation. However, it is unlikely that expected replacement rates will ever be allowed to fluctuate to this degree. Hence, accommodation appears to be a more realistic and more powerful tool for affecting work than does the replacement rate.

The other two variables modestly change expected job tenure. A one year increase in initial job tenure increases expected duration by .11 years. A one year increase in age at onset decreases expected duration by .14 years.

Discussion

Able-bodied working age men are more than two and one-half times as likely to be in the labor force as men with disabilities of that age. In addition to health differences, it has been argued that institutional factors cause this disparity in work activity, most especially Social Security Disability Insurance on the supply side and employer discrimination on the demand side.

The Americans with Disabilities Act of 1990 is an attempt by United States policymakers to increase the work experience of the disabled by requiring firms to provide accommodation for workers with disabilities. Unfortunately this Act was passed with little knowledge of whether accommodation was already taking place and if so, how much it increased the ability of such workers to stay on the job.

Here we show that 30 percent of the men with disabilities in our sample were accommodated by their employers at the time they suffered a work limiting health condition. And more importantly, we show that such help significantly increased their expected job tenure. The mean worker's expected tenure was more than doubled by accommodation, from 2.5 to 6.1 years with standard errors of 0.9 and 1.3. A marginal increase in accommodation more than offsets a marginal change in expected replacement rate for the mean worker. But accommodation appears to have a substantially greater potential for

increasing duration than would decreases in the expected replacement rate, since it is unlikely that dramatic drops in expected DI benefits are politically acceptable.[9]

Whether the ADA will substantially increase the willingness of employers to accommodate handicapped workers remains to be seen. In 1986 The Netherlands passed the Handicapped Workers Employment Act which mandated that employers accommodate their employees with disabilities. As part of that Act, employers could claim compensation for the cost of accommodation. But to date, it does not appear that many employers in Holland have used this option. In contrast to the Dutch policy of subsidizing accommodation, a driving force in the passage of the ADA was that it mandated help to people with disabilities at no direct cost to the Federal budget. Firms and their customers must pay all costs.

Here we have shown that some workers with disabilities were already accommodated prior to the Act but we have not explained the motives for such accommodation. If the central reason firms did **not** accommodate was "rational" discrimination based on an evaluation of its costs against its expected benefits, then it is unclear how much court imposed accommodation will force firms to tilt toward accommodation.

Burkhauser (1990) suggests that extending current tax deduction or providing credits is more likely to achieve accommodation and to do so more efficiently than the arbitrary distribution of cost and the blunt stick of court enforced compliance stemming from the ADA. But our results should give further pause to even the most optimistic supporters of this mandate.

It is likely that our health measures do not fully control for the work limitations of our workers and that the 30 percent of workers who were accommodated in our sample yielded higher returns per dollar of accommodation cost than non-accommodated workers. As the ADA moves employers toward universal accommodation, it is very likely that the returns to accommodation will fall. It is also

likely that the average duration of accommodated workers will also fall as those with more serious impairments are included.[10]

But even if this very likely result does not occur, accommodation while significantly increasing job duration will not be an employment panacea. We find that the average worker leaves his employer less than three years after the occurrence of a work impairing health condition. In our sample, the average worker was age 38 at onset. Even with complete compliance the average work impaired man will still leave his employer after about six years, which is about one-third the expected employment duration of an average worker of this age (Smith, 1985). Accommodation will significantly delay the job exit for men with work impairments but it is very likely that such workers will still experience substantial wage losses prior to normal retirement age that will require health related income transfers to mitigate.

Endnotes

1. See Burkhauser and Hirvonen (1988) for a discussion of disability policy in Germany and Sweden and Aarts and de Jong (1992) for a discussion of disability policy in The Netherlands.

2. Our measure of accommodation is limited to a self-report by the employee with respect to whether his employer provided help to him in remaining on his job at the time of onset of his work limitation. Such subjective responses are subject to measurement error. Ideal data would also provide information on the costs of potential accommodation for all workers at the onset of a work limiting health condition. In the absence of a major new data initiative, the 1978 Survey continues to be the best available data set for measuring the impact of accommodation and other policy variables on the work experiences of Americans with disabilities.

3. A parallel literature on Workers' Compensation has found that injury rates, claims frequency, and time off work following injury vary directly with Workers' Compensation benefits. See Worrall and Butler (1986) for a review of this literature.

4. An exception in the economics literature is Johnson and Lambrinos (1985) which attempts to measure the part of the wage difference between the handicapped and the able-bodied that is caused by discrimination. Their study does not consider the importance of discrimination on employment. In the health literature Nagi (1976) and Yelin et al. (1980) use cross-section data to show that job modifications by employers increase the likelihood that a disabled worker will continue to work.

5. See Weaver (1986) for a discussion of the DI determination and appeals process.

6. We limit our sample to those under age 60 in 1978 to factor out job exit risks associated with reaching retirement age for social security or employer pensions. We also want to exclude those with little or no work history prior to onset so we excluded those below age 20 at onset.

7. We also exclude government employees because they were not covered by social security until the 1980s.

8. In an alternative specification that relaxes our implicit assumption that accommodation is exogenously determined, we modelled accommodation and job exit within a recursive framework. Our results, found in Appendix Table 1-A, are that neither accommodation nor replacement rate is significant in the job exit equation. No variables are significant at the 5 percent level in the accommodation equation, including our health variables. We believe these results are caused by the strong collinearity between estimated accommodation and the other key variables in the job exit equation.

9. See Weaver (1986) for a discussion of the Congressional response to Administration attempts to tighten disability standards in the early 1980s.

10. See footnote 8.

TABLE 1

POPULATION CHARACTERISTICS OF THE SOCIAL SECURITY DISABILITY INSURANCE PROGRAM

	All Beneficiaries[a]			Newly Enrolled[b]		
Diagnostic Groups	**Below Age 50**	**Aged 50 to 64**	**All**	**Below Age 50**	**Aged 50 to 60**	**All**
Mental Disorders	43.2	17.1	26.7	32.0	9.6	19.5
Circulatory Disease	7.1	26.5	19.3	9.5	26.0	18.5
Musculoskeletal	12.1	22.2	18.5	11.1	18.7	15.3
All Others	37.6	34.2	35.5	47.4	45.7	46.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total (in millions)	1.04	1.78	2.82	0.19	0.23	0.42
Total (in percent)	36.9	63.1	100.0	44.4	55.6	100.0

[a]As of December 1988
[b]In 1987

SOURCE: Derived from tables in the *Annual Statistical Supplement of the Social Security Bulletin* (1989).

TABLE 2

HAZARD OF LEAVING A JOB FOLLOWING THE ONSET OF A WORK LIMITING HEALTH CONDITION

Years Since Onset	Number Entering the Interval[a]	Hazard Rate	Cumulative Survival Rate
1	348	.34	.66
2	221	.34	.44
3	131	.17	.36
4	102	.18	.29
5	76	.10	.27
6	57	.08	.25

[a]Sample size falls below 50 after 6 years.

SOURCE: Data from the 1978 Survey of Disability and Work.

TABLE 3

DEFINITIONS OF VARIABLES AND THE SUMMARY STATISTICS FOR THE SAMPLE

Variables	Definitions	Sample Mean	Standard Error
Accommodation	Equals 1 if at onset of work limitation the employer provided help to respondent to remain on the job, otherwise 0	0.30	0.46
Replacement Rate	(expected PIA)/AIME	0.31	0.20
Had Savings	Equals 1 if a worker had savings at onset, otherwise 0.	0.47	0.50
Job Tenure	Years of job tenure at the job prior to work limitation.	9.76	8.86
Experience	Quarters of coverage in all covered employment prior to work limitation.	66.9	36.7
Age at Onset	Age at onset.	39.8	10.0
Married at Onset	Equals 1 if married, otherwise 0.	0.78	0.41
Nonwhite	Equals 1 if nonwhite, otherwise 0.	0.18	0.39
Education	Years of formal education	10.3	3.55
White Collar	Equals 1 if occupation at onset is professional or managerial, otherwise 0.	0.17	0.37
Comorbidity	Equals 1 if respondent had multiple health conditions at onset, otherwise 0.	0.70	0.46
Cardiovascular	Equals 1 if main health condition is one of cardiovascular disease group, otherwise 0.	0.22	0.41
Musculoskeletal	Equals 1 if main health condition is one of musculoskeletal disease group, otherwise 0.	0.44	0.50

TABLE 4

ESTIMATED HAZARD OF JOB EXIT

Hazard Model		
	With Unmeasured Heterogeneity	
Explanatory Variables	**Coefficient**	**t-Value**
Constant	0.48	0.67
Accommodation	-1.19*	-4.55
Replacement Rate	1.09*	2.38
Had Savings[a]	0.06	0.33
Job Tenure[b]	-3.60*	-2.60
Experience[a]	-0.39	-0.91
Age at Onset	0.48*	3.11
Married at Onset	-0.37	-1.61
Nonwhite	0.34	1.32
Education	-0.23	-0.68
White Collar	-0.18	-0.62
Comorbidity	-0.06	-0.33
Cardiovascular[a]	-0.06	-0.02
Musculoskeletal	-0.13	-0.66
Time[a]	0.12	0.11
Time Square[a]	0.13	0.32
Variance of Unmeasured Heterogeneity	0.75	0.87

*Significant at 1 percent
[a]Coefficient values are multiplied by 10.
[b]Coefficient values are multiplied by 100.

TABLE 5

MARGINAL IMPACT OF KEY VARIABLE ON CONTINUED EMPLOYMENT[a]

Explanatory Variable	Mean	Marginal Impact (years)	t-Value
Accommodation[b]	0.3	3.59	+3.64
Replacement Rate[c]	0.3	-3.28	-2.20
Job Tenure[d]	9.7	0.11	2.37
Age at Onset[e]	39.8	-0.14	-2.83

[a]Mean expected duration is 2.9 years.
[b]The marginal impact is an estimate of a change from zero to one.
[c]Expected replacement rate is measured as the change from 0 to 1.
[d]Job tenure is measured as the addition of one more year.
[e]Age at onset is measured as the addition of one more year.

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