

The Effect of Vocational Rehabilitation and Work Incentives on Helping the Disabled-Worker Beneficiary Back to Work

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This article is the second in a series of articles that use data from the New Beneficiary Followup survey to analyze the work efforts of the Social Security Administration's Disability Insurance beneficiaries. Survival analysis techniques are used to determine the effect of vocational rehabilitation efforts and work incentive program provisions on actual work outcomes. The findings indicate that the demographic variables of age, gender, race, education, and marital status affect the tendency to return to work in the expected way. The results suggest a possible disincentive effect may be built into certain work incentive provisions of the program. The encouraging news is that the vocational rehabilitation efforts seem to have a positive effect on the tendency to return to work. Physical therapy, vocational training, general education, and job placement efforts all seem to increase the tendency to go back to work.

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The growth of the Social Security Administration's Disability Insurance (DI) program has been a topic of much debate over the past few years. Applications have increased dramatically since 1989, from fewer than 1 million to more than 1.4 million in 1993. The increase in applications led to increased numbers of persons on the program rolls and higher expenditures for disability benefits. Between 1989 and 1993, the number of persons in current pay-status rose by nearly 30 percent, from 2.9 million beneficiaries to 3.7 million. Trust fund expenditures rose by more than half, from 22.9 billion in 1989 to 34.6 billion in 1993.

Chart 1 shows that the number of beneficiaries in pay status each year had been growing over the years, except for a decline in the late seventies and early eighties. At the same time, the chart indicates that, while the number of program terminations each year had exhibited modest growth up to 1982, the number of recoveries has declined, though not consistently, since that time. The decline in recoveries occurred despite a consistent growth in the beneficiary population from 1989 to 1993. According to an earlier study of a cohort of 1972 entitlements,¹ the vast majority of an entitlement cohort of disabled-worker beneficiaries leave the DI program by conversion to the retirement program at age 65 (53 percent) or by death (36 percent). Only a small percentage (11 percent) leave the program because of a work or medical recovery.

Clearly, the number of medical and work recovery terminations has not kept pace with the increasing size of the DI program. Despite improvements in medicine, technology, and vocational rehabilitation techniques, there has been a decline in the proportion of beneficiaries who terminate from the program because of a medical or work recovery. As policymakers seek to control growth through a more efficient and responsive program, they must examine the work incentive structure and address concerns that entrance into the DI program is viewed as a permanent removal from the labor force. Without this focus on

return to work the increase in allowances, coupled with a population whose average age at entitlement has become younger, will serve to continue the recent growth in program benefit costs. A careful examination of the work attempts of disabled workers to identify factors that help and/or hinder their ability to go back to work is an important step in this direction. The experience of persons interviewed for the New Beneficiary Followup (NBF) survey should provide some clues to effective return to work efforts.

An earlier study,² using the NBF survey data examined the work efforts of disabled-worker beneficiaries who were entitled to benefits for the first time from June 1980 to June 1981. The study considered beneficiaries' experience with, and effectiveness of, such interventions as vocational rehabilitation (VR) services (including physical therapy, vocational training, job counseling, general education, and job placement) and work incentive provisions (including the trial work period (TWP), the extended period of eligibility (EPE), and extended Medicare eligibility).

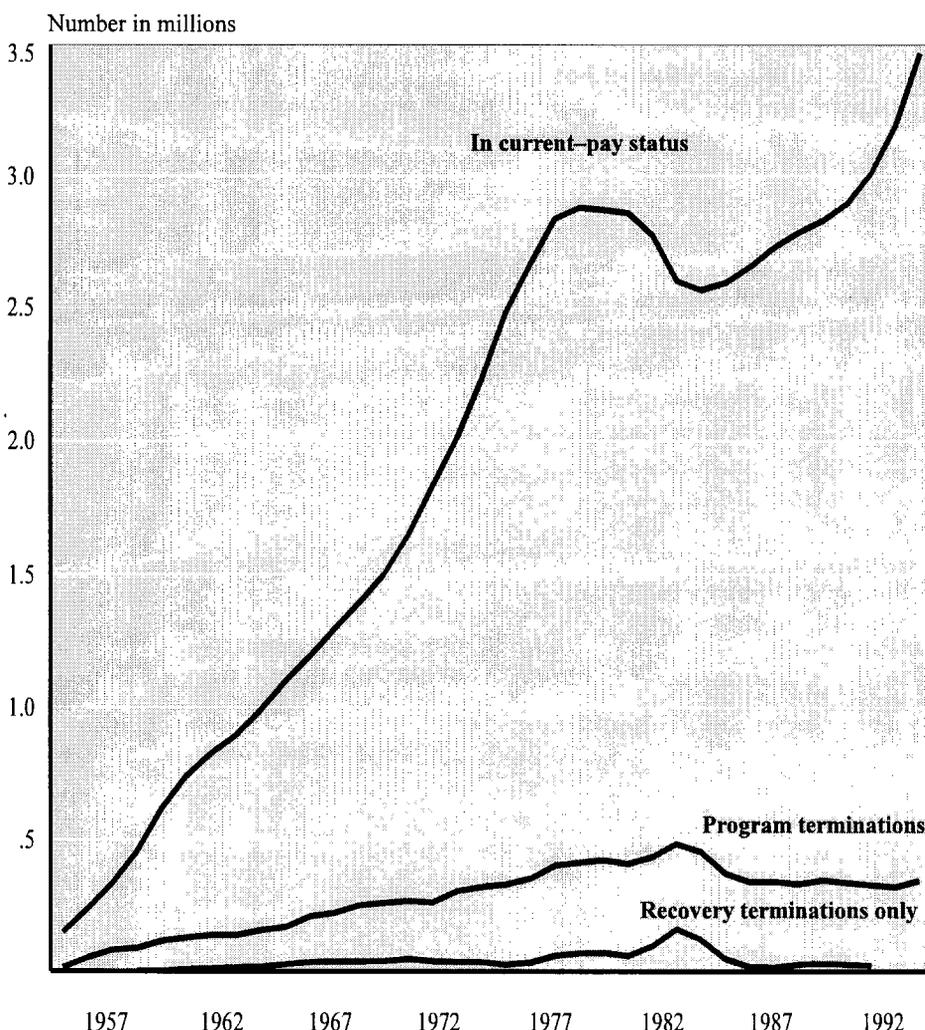
It was estimated that about 27 percent of DI beneficiaries received some type of vocational rehabilitation. Table 1 shows the percentage of beneficiaries who received each of the various types of VR services. Not surprisingly, job placement had the highest percentage of beneficiaries who said it was helpful, with two-thirds of those receiving job placement services indicating that it helped them return to work. However, job placement was the service provided to the smallest number of beneficiaries, with only 2 percent of the beneficiaries reporting having received such services. On the other hand, the VR service most frequently received was physical therapy, which was provided to 1 in 5 beneficiaries although only one-fourth of those reported that physical therapy helped them return to work or continue working.

The prior research showed that few respondents reported having any knowledge of program work incentive

provisions before returning to work, and, among those aware of the provisions, few were influenced by the provisions. As shown in table 2, only 1 in 5 persons reported having been aware of the trial work period before attempting a return to work. Among those who had knowledge of the TWP, only 12 percent said that they were influenced by it. A little over 15 percent reported being aware of the extended period of eligibility (EPE) and just over 10 percent were aware of extended Medicare coverage. Of those who were aware of the EPE and extended Medicare provisions, only 10 percent and 7 percent, respectively, reported that the provision influenced their decision to return to work.

The findings of the earlier research point to few VR services being provided to beneficiaries and very little beneficiary knowledge of work incentive provisions. Beneficiaries tend to portray VR as having little impact on their ability to return to work or to continue working, and view work incentive provisions as not influencing their decision to work. However, while beneficiary attitudes toward the effectiveness of vocational rehabilitation and work incentive provisions are important, it is equally important to see if these interventions appeared to have an effect on actual work outcomes. This article presents the results of the analysis.

Chart 1.—Number of disabled-worker beneficiary program terminations, compared with those in current-pay status



Source: *Annual Statistical Supplement to the Social Security Bulletin*, 1994.

The Data

The New Beneficiary Followup survey—the data employed in this research—represents a 10-year follow-up of persons interviewed in the New Beneficiary Survey in 1982. Special attention was given to designing the followup survey to allow a careful analysis of return to work by Disability Insurance beneficiaries. A detailed disability/work module was designed and included in the NBF to facilitate the collection of information about work that cannot be obtained directly from administrative data systems.

The disability/work module contains detailed retrospective questions about the first work attempt after entitlement to DI benefits. Questions about the job search mechanism, employer accommodations, vocational rehabilitation efforts, and knowledge of the DI program work incentive provisions were asked. Other questions asked the respondent to compare their post-disability job with their last pre-disability

job. The followup survey also contains less detailed questions about subsequent work attempts that might have occurred if their first job after entitlement was not sustained.

Experience has shown that few beneficiaries even attempt to return to work, and only a small group of those are successful in leaving the program rolls and returning to self-supporting work. In order to begin to answer questions about post-entitlement work patterns of DI beneficiaries, and to assure reliable data and estimates with reasonable precision, it was determined that the NBS sample frame of the disabled would have to be enlarged. Since the original frame had sufficient “nonworker” cases, it was determined that any additional cases should be among individuals targeted as likely workers. The original sample was augmented by an add-on frame of approximately 3,000 DI beneficiaries for whom earnings were posted to their earnings record at some point after entitlement to disability benefits. This group was target-

ed due to their likelihood of having worked at some point during the period since entitlement. The add-on frame was stratified based on whether the individual had been terminated from the program to assure sufficient numbers of persons with a successful return to self-supporting work.³

Sample Population

The population sampled in the NBS included all disabled-worker beneficiaries who were initially entitled between June 1980 and June 1981, and who were awarded DI benefits before May 1982. For this research, a number of exclusions were made from this population. The nature of the exclusions, and a brief explanation of the reason for each exclusion, are presented below.

- **Respondents whose initial entitlement to disability benefits did not begin in the time window (June 1980-June 1981).**

There are some cases in the original NBS sample where the disability entitlement period is not the first period of disability. There are many ways in which the first episode as a DI beneficiary could be different from subsequent periods of disability. For example, beneficiaries in a second period of entitlement may not be eligible for a trial work period. Therefore, only beneficiaries who are initially entitled to benefits during the time window are included in the analysis.

- **Beneficiaries in the add-on sample whose date of award was after April 1982.**

Because the NBS sample was chosen in April 1982, it did not contain any beneficiaries for whom retroactive awards were made after that date. Late awards could be systematically different from early awards. For example, the time required to obtain an award may be long because the applicant went through a lengthy appeals process before being awarded benefits,

Table 1.—Percent of beneficiaries receiving various vocational rehabilitation services and percent reporting that it helped in their return to work

Vocational rehabilitation service	Percent receiving service	Did VR services help?		
		Total	Yes	No ¹
Any service.....	27.0	100.0	30.5	69.5
Physical therapy.....	19.6	100.0	24.0	76.0
Vocational training.....	4.6	100.0	47.8	52.2
Job counseling.....	3.6	100.0	50.0	50.0
Job placement.....	2.2	100.0	68.2	31.8
General education.....	2.5	100.0	52.0	48.0
Other.....	4.7	100.0	6.4	93.6

¹Includes missing responses.

Table 2.—Percent of beneficiaries who knew of work incentive provisions and percent reporting that it influenced their decision to return to work

Work incentive provision	Percent aware of provision	Did work incentive provisions influence you?		
		Total	Yes	No ¹
Any work incentive.....	20.7	100.0	14.1	85.9
Trial work period.....	19.6	100.0	11.7	88.3
Extended period of eligibility..	15.1	100.0	9.9	90.1
Extended Medicare coverage..	10.5	100.0	7.6	92.4

¹Includes missing responses.

which may indicate that they may be less severely disabled. While beneficiaries whose initial entitlement was in the time window and whose date of award was after April 1982 were interviewed, the fact that the NBS frame did not include these individuals led us to drop them from the analysis to avoid biasing the results.

• **Date of death before June 1992.**

Because of the complex sample design, some date had to be chosen in order to compute the case weights to adjust for deaths. To facilitate the computation of the case weights only the population who were alive as of June 1992 were included.

• **Interview by proxy.**

The NBF contains numerous questions about the sequencing of events, many of which took place about 8 or 9 years ago. Even when the beneficiary responded, there may be inaccuracies in the responses, particularly in the dates of events. Although the event of returning to work may be memorable enough for the beneficiary, little confidence can be given to retrospective data gathered from someone other than the actual beneficiary. Hence, to assure the best possible recall of the sequencing of the events, those sample cases represented by proxy interviews were excluded from the present analysis.

• **Beneficiary does not acknowledge receipt of benefits near date of entitlement.**

The disability/work module of the followup questionnaire began by establishing that the person being interviewed remembered beginning to receive DI benefits somewhere near the date of entitlement. If, even after some probing, the individual was unable to acknowledge receipt of benefits around that time, the interviewer was instructed to skip the job questions. If the individual was unable to establish a point of reference for the receipt of cash benefits, there would be little hope of obtaining reliable

information about subsequent events such as a return to work. In fact, a small number of individuals originally sampled in the NBS were later determined to be ineligible and never became beneficiaries. For the goal of quality, reliable recall took precedence over the slight potential for bias created by making this exclusion.

There are 6,820 records in the NBF dataset that are disability cases (3,881 respondents from the NBS interview and 2,939 from the add-on population). When the above exclusions are applied, 4,405 cases remain (2,509 from the NBS and 1,896 from the add-on sample. Most cases were excluded for one of the following reasons: failure to acknowledge receiving benefits around the date of entitlement, the updated Master Beneficiary Record (MBR) shows no period of entitlement to disability in the time window, or the award was made retroactively after April 1982.

Methodology

A Model of Return to Work as a Competing Risk

Analyzing the effect of vocational rehabilitation efforts and work incentive provisions on the ability to go back to work is not a simple task. One of the complexities of the analysis is that, at any given point in time after an individual is entitled to benefits, the beneficiary may experience events other than a return to work, such as death, a medical recovery termination, or attainment of age 65 (and conversion to the retirement program) before they actually return to work.

The intent of this research is to provide insight into the effect that VR and work incentives have in promoting a return to work by DI beneficiaries. Because the provisions and intent of the retirement program are different from those of the DI program, any work that began after conversion to the retirement program will not be considered. Similarly, since those who medically recover prior to work do not represent savings to the program,

termination for medical recovery is the competing event.

Death is generally a competing event, however, because the NBF survey includes interviews (and data collection) only with those individuals who survived to the followup interview, death could not be analyzed as a competing risk for these individuals. Thus, termination for medical recovery and retirement are the outcomes that compete with work in this analysis as potential outcomes.

Medical recovery terminations and retirements occur at different points in time for people. Thus, when assessing the effect of an intervention on the ability to go back to work, one can not simply compare the percentages of persons who go back to work between the group of beneficiaries who received the intervention and the group that did not. Medical recovery or retirement may intervene before the individual has the opportunity to capitalize on the capacity for work gained from the vocational rehabilitation services.

The complexity of the analysis is increased because interventions can be received at different points in time after entitlement and, clearly, only those VR interventions that began before the start of the first job attempt can be considered effective in helping the beneficiary return to work. Each beneficiary has a different "window of time" during which interventions can have an effect on the return to work. The beginning time of this "window" is the start of the intervention and the ending time is the start of work (in this case, the first job), medical recovery, or retirement. The actual dates that make up the window are different for each beneficiary, despite the fact that each beneficiary came from the same cohort. Another complication is that, for some DI beneficiaries, the end of the observation period—the time of the interview—occurs before the first outcome of interest (that is, start of the first job, recovery termination or retirement). For these beneficiaries, we have incomplete (or right censored) observations.

Statistical Procedure

To assess the impact of vocational rehabilitation and work incentives on helping DI beneficiaries return to work, a technique must be chosen that takes into account all the aforementioned difficulties. Such a procedure is provided by a mathematical technique called the Cox proportional hazards regression model.⁴ The procedure is widely used with this type of data to explain the effect of explanatory variables on the tendency for a given event, such as the start of work, to occur. Unlike many other procedures, this one also allows for time-dependent explanatory variables such as the start of VR or the start or end of a marriage.

The SAS procedure PHREG⁵ was used to estimate the parameters of the covariates in the Cox proportional hazards model. The model assumes that individuals with different covariate values (for example, different educational levels) have parallel work tendency curves over time. Because they are parallel, the ratio of the values of the two curves at any point in time is the same. This ratio will be called the tendency ratio. The PHREG procedure estimates the coefficients and the tendency ratio for each covariate. Because of the complex sample design, a half-sampling method was used to estimate standard errors.⁶

Outcome Measures

The analysis assumes that, at any point in time after entitlement to DI benefits, a beneficiary who is younger than 65 could medically recover, go back to work, or remain on the program rolls, having no observable outcome. Thus, a "work tendency" and a "medical recovery tendency" compete with each other. If both tendencies are low at a particular point in time, the probability of either event will be low. If both tendencies are high, the probability of one of the events at that point in time will be high. The strength of the two tendencies relative to each other will dictate which of the two events has the larger probability of

occurrence at that particular point in time.

The tendency to go back to work can change over time. If one compares two groups of beneficiaries and the work tendency curve over time for the first group is higher than the work tendency curve for the second group, it does not necessarily follow that there will be more work attempts in the first group. If the tendency toward medical recovery in the first group is also substantially higher than the tendency to recover medically in the second group, more terminations due to medical recovery and fewer work attempts could occur in the first group, compared with the second group. Also, if the first group is older than the second group, the higher work tendency in the first group may not be strong enough to cause more work attempts before retirement.

Thus, a higher tendency towards work does not automatically translate into a larger percentage of work recoveries. Other factors, such as those mentioned above, also effect the percentage of work attempts. Program work incentives and VR services are specifically designed to encourage more work attempts (that is, they are aimed at increasing the tendency to work). If the effect of VR efforts and work incentive provisions is to increase the tendency to go back to work, other questions need to be addressed, such as whether the interventions are cost effective. The cost effectiveness question requires the consideration of competing risks (such as medical recovery or attainment of age 65), the cost of the services, rates of reentitlement, and many other factors. However, an increased tendency to work is a basic requirement for achieving success in returning beneficiaries to work. Failure to observe an increase in the tendency to work would raise issues about the appropriateness of program work incentives and VR services as now administered.

Demographic Covariates

In addition to considering work incentives and VR services in assessing

the tendency to return to work, it is helpful to include demographic characteristics and other economic variables to adjust for differing characteristics across individuals. This will help net out the effects of human capital, lifecycle labor force decisions, and other factors on the decision to return to work. Furthermore, to the extent that VR service providers select those individuals most likely to return to work, using these variables will reduce the influence of the selection process on the measurement of the effect of VR services in returning individuals to work. It is important to recall that many of the characteristics represented by these variables can change over time. Where possible, these variables have been made time dependent, that is, allowed to change over time. The demographic variables included in the model are discussed below.

Age

A beneficiary's age certainly has an effect on the tendency of the person to die. It also seems possible that a younger beneficiary would have a stronger tendency to go back to work than an older beneficiary, if only due to the longer time horizon until retirement. Furthermore, the previous analysis⁷ showed that the age distribution of the beneficiaries who had certain VR services is different from the distribution for those that did not. Age at entitlement is included in the model to examine the effect of age on the tendency to return to work and to control for the effect age has *vis-a-vis* the various interventions.

Education

The educational level of a beneficiary is hypothesized to affect the tendency to go back to work in two ways. On the one hand, from a human capital perspective, it seems that higher levels of education would permit the beneficiary to adapt more easily to their impairment, accept new occupational opportunities and/or learn new job skills. As such, higher educational attainment would be expected to

increase the tendency to go back to work. On the other hand, the educational level of the beneficiary might be correlated with the severity of the disabling condition. The disability determination process allows vocational factors to be used in determining whether to award benefits to persons who cannot be denied or awarded benefits strictly on medical factors alone. Because educational attainment is considered a vocational factor, beneficiaries with more education may be more severely disabled than those with less education. In this sense, the education variable may also represent a proxy for the severity of the disabling condition. As such, one would expect beneficiaries with more education to have a lesser tendency to go back to work because they are more severely disabled. Because there is no data to control for the severity of the disabling condition, the results exhibit the net effect of the two conflicting associations of education on the tendency to work.

Primary Insurance Amount

The primary insurance amount (PIA) is the dollar value of the cash benefit that is payable to the disabled worker. It is also the basis for computing the family benefit when there are dependents involved. The PIA is calculated based on average indexed monthly earnings of the beneficiary prior to onset of the disability. The PIA captures two effects: it serves as a rough proxy for the level of lifetime earnings and gives a rough indication of economic status because it is directly related to the cash benefit received. On one hand, the PIA as it relates to higher earnings reflects more human capital and perhaps a greater tendency to return to work. On the other hand, higher benefit payments make labor-force alternatives less attractive.

Gender, Marital Status, and Race

The gender variable is included because men, in the general population, tend to have a stronger attachment to the labor force than women.

The variable, married, is included to account for the marital status and family composition of the beneficiary. Married individuals make different labor supply decisions than non-married persons for several reasons including: having a spouse as a substitute worker; receiving higher cash benefits, if there are dependents; or assigning a different value to home time (particularly if there is a small child or retired spouse). Marital status was entered as a time-dependent variable, changing in the model at the point in time that the marital situation changed. Race is also included in the analysis as a standard demographic variable and to account for differences in labor supply as noted in the general population.

Primary Diagnosis

In past analyses, primary diagnosis of the disabling condition or some other health measure has been included to represent the nature and severity of the impairment, as well as the potential for return to work. Unfortunately, due to the nature of the analysis and data collection, it was not possible to develop a health measure representing severity at the time of the return to work. The primary diagnosis, which has been available for use in other studies from the Master Beneficiary Record (MBR), was not available for the cohort under study in the followup survey. The MBR, from which much of the administrative data used in this study was extracted, did not start to record the primary diagnosis until 1983. Since the NBF population consists of beneficiaries who were entitled to benefits in 1980 or 1981, most of them do not have a primary diagnosis recorded. Furthermore, the health questions in the followup survey ask about the respondents' health at the time of the survey. The NBF provides no data about the health of the individuals at the time they were first entitled to benefits or at the time they began to work.

Lastly, while those individuals who were surveyed for the New Beneficiary

Survey were asked about their health in 1982, nearly half of the disabled in the followup survey were not part of the original survey. Consequently, there is no health information for them. Again, there is no direct measurement of health in the model and we consider this to be a serious shortcoming of the analysis.

Vocational Rehabilitation

In the NBF, respondents were asked whether they received any rehabilitation services, specifically, any physical therapy, job or vocational training, job counseling, general education, assistance in job placement, or some other rehabilitation service. If the respondent indicated that a VR service was received, they were asked if the service began before their first job after getting DI benefits.⁹ The VR services variables were time dependent. As a double check on the exact timing of VR relative to a work attempt, service dates were used for the analysis only when the respondent indicated that the VR service had been received prior to their first job attempt. We chose this approach, as opposed to a simple comparison of the dates the respondent gave for the start of work and for the start of VR, to minimize errors in the event history. Again, the approach to this analysis relies most heavily on the respondent's recollection of the sequence of events, rather than the precise dates of the events.

The five major types of VR services were separately entered into the analysis so that each will start to affect the tendency curve at the point in time when the service began. The remaining VR service category, "other," was excluded from the analysis since it is not clear what type of services are specifically included in this response.

Work Incentive Provisions

Respondents were asked, "Are you aware of any work incentive provisions in the [Disability Insurance] program that allowed you to test your ability to work?" If the respondents indicated that they were aware of the

provisions, they were then asked if they were aware of the trial work period, the extended period of eligibility, and extended Medicare coverage. A follow-up question asked the respondents when they became aware of each provision and whether they knew about it before they made their first work attempt.¹⁰ The work incentive co-variables were analyzed in the same way as the VR covariates, that is, were treated as time-dependent variables. Again a double check was employed by using both the report of sequencing knowledge of work incentives relative to the start of work, as well as the reported dates. If the respondents reported that they were aware of the provision before the start of their first job, then the given work incentive provision variables will start to have an effect on the tendency to go back to work at the time when they said that they first became aware of the provision.

Findings

Table 3 shows the parameter estimates for the model, standard errors, and the tendency ratios for age, education, marital status, primary insurance amount, gender, and race, as well as the five VR services and the three work incentive provisions. It is important to remember, when considering the measure known as the tendency ratio, the estimated result simply indicates an increase or decrease in the tendency to return to work and does not mean that the probability of working is increased or decreased. The relationship is more complicated than that. The tendency to go back to work competes over time with the tendency to medically recover until one reaches retirement age, when the beneficiary is converted to the retirement program. The probability of the return to work event occurring depends on all these competing outcomes. One would have to estimate all of these tendencies in addition to the model of returning to work and, using the mathematics of competing risk, compute the probabilities of going back to work before ter-

mination from the DI program. However, the purpose of this study was more limited, intending only to estimate the effect of the various co-variables and, more importantly, the interventions on the tendency to return to work. Again, it is the tendency to return to work that one hopes to impact through the provision of VR services and work incentives. Specific results are discussed below.

Demographics

The coefficient for age at entitlement is negative and significant, suggesting that the work tendency for older beneficiaries is lower. This result is consistent with our expectations and other research on the return to work of the disabled beneficiary population. The tendency ratio is 0.96, showing that the strength of the work tendency for a beneficiary of a given age at entitlement is 96 percent of that for a similar beneficiary who is 1 year younger at entitlement.

The coefficient for education is positive. The result is consistent with other research and shows that, even without a measure of severity, DI beneficiaries with higher levels of education have a higher work tendency. The tendency ratio of 1.13 suggests that one additional year of education raises the work tendency to 113 percent of the previous level.

The amount of the PIA had a negative coefficient suggesting that benefi-

ciaries with a higher PIA have a lower tendency to go back to work, perhaps because the higher benefit offers greater financial security. The potential for a positive relationship between PIA and return to work, due to a possible association between higher pre-disability earnings that generate a higher PIA and greater post-disability earnings potential, does not seem to hold. The fact that education has been held constant in the model may account for this finding because education is also a human capital variable that explains earnings potential.

Marital status had a negative and significant coefficient, suggesting that the tendency to go back to work is less for those who are married. This supports the hypotheses that persons who are married either receive some financial support from the spouse and, therefore, have less pressure to go back to work or that the value of home time is greater for married individuals.

The gender coefficient is positive and significant, indicating that men have a higher tendency to go back to work. The result is consistent with past research and labor supply research in general. Race was not found to have a significant impact on the tendency to return to work, with a p-value of 0.37. In summary, all of the demographic variables seem to affect the tendency to go back to work in the expected way.

Table 3.—Results for first work attempt

Variable	Coefficient	Standard error	p-value	Tendency ratio
Age.....	-0.042	0.003	<0.0001	0.96
Years of education.....	.120	.015	<.0001	1.13
PIA (in thousands).....	.005	.002	.0009	.99
Gender (1 = male).....	.177	.084	.0350	1.19
Married.....	.433	.112	.0001	.65
Race (1 = white).....	.093	.104	.3721	.91
Physical therapy.....	.400	.095	<.0001	1.49
Vocational training.....	.678	.139	<.0001	1.97
Job counseling.....	.163	.169	.3362	1.18
Job placement.....	.519	.169	.0021	1.68
General education.....	1.491	.161	<.0001	4.44
Trial work period.....	.732	.195	.0002	2.08
Extended period of eligibility.....	.231	.256	.3668	.79
Extended Medicare coverage.....	.504	.261	.0535	.61

Vocational Rehabilitation

Five VR service categories (physical therapy, job or vocational training, job counseling, general education, assistance in job placement) were considered in this model and each had a positive coefficient. With the exception of one VR category—job counseling—all of the coefficients were statistically significant, indicating that, for the most part, VR services had a positive effect on the tendency for a beneficiary to return to work. As one might expect, job placement services have the highest tendency ratio, 4.44. Beneficiaries who are provided with such a service demonstrate a tendency to go back to work that is over four times that of a beneficiary who does not receive this service. Referring back to the survey responses about VR as shown in table 1, it is evident that the beneficiaries themselves felt that job placement service helped, with two-thirds of those who had the service reporting it helped. However, only about 2 percent of the beneficiaries received job placement services.

The model shows that vocational training seems to double the tendency for going back to work. Although the model indicates a relatively high effectiveness, only about 5 percent of the beneficiaries received vocational training. Beneficiaries themselves reported vocational training to be effective, with just under 50 percent of those who received this service reporting that it that it helped them return to work.

General education also seems to have a significant positive effect on the work tendency, with an increase of about two-thirds in the tendency to return to work. Again, a relatively small group of beneficiaries (about 2.5 percent) received this type of service and, of those who did, about half said that it helped.

The model yields a tendency ratio of 1.49, indicating that receiving physical therapy increased the tendency to work by about 50 percent over the tendency for those who received no physical therapy. Table 1 indicates that physical therapy was provided to about 20 percent of the beneficiaries before they

started work, by far the most frequently offered VR service for this population. Despite our relatively optimistic model results, only one-fourth of those persons receiving physical therapy said that the service enabled to return to work. The result remains encouraging despite relatively few beneficiaries indicating that physical therapy assisted them in returning to work. It is possible that much of the physical therapy that is offered to beneficiaries is not directly aimed at getting the beneficiary back to work, but instead is intended to meet some other goal, such as helping the individual adjust to the impairment thereby improving the quality of life. Thus we see a significant increase in the tendency to return to work, while many beneficiaries report that the service did not help them return to work.

Overall, the vocational rehabilitation results are encouraging. But, it is important to remember that VR services are not given to everyone. There is a “screening process” that takes place for each service (that is, an assessment is made about whether the beneficiary can benefit from the given service). To the extent that the model does not control for all factors that play a part in the screening process, the results reflect the net effect of the screening process and the VR services. On the other hand, we have controlled for age, education, and a number of other demographic and economic factors that should account for a sizable portion of the overall effect of the screening process.

Work Incentive Provisions

The model examined the impact that knowledge of the three major work incentives (the trial work period, the extended period of eligibility, and extended Medicare coverage) had on the tendency to return to work. The coefficients and tendency ratios for the work incentive provisions present an interesting finding. The coefficient for the TWP is positive and significant, indicating that, if one had knowledge of the TWP before returning to work, the tendency to go back to work

increases. The ratio of 2.1 suggests that the tendency to work more than doubles. The coefficient for the EPE was found not to be significant, and thus appears to play no significant roll in getting beneficiaries back to work. The coefficient for knowledge of Medicare is negative and significant, suggesting that knowledge of extended Medicare provisions decreases the tendency to go back to work. The tendency ratio indicates that knowledge of the extended Medicare provision reduces the work tendency to about 70 percent of its level for those without such knowledge. The Medicare result is, of course, unexpected and counterintuitive.

Because of this unexpected finding, we decided to investigate further. Table 4 shows the percent of persons who knew about various combinations of the three provisions. The vast majority of the beneficiaries (80 percent) did not know about any of the provisions. Of the 1 in 5 beneficiaries that had some knowledge of work incentive provisions, about 45 percent knew about all three provisions. The next largest group (26 percent) knew about the TWP and the EPE. The third largest group (20 percent) knew only about the TWP. Smaller groups were aware of other combinations: 3.5 percent said they knew about the TWP and extended Medicare coverage and not the EPE, 2.5 percent said they knew about the Medicare extension only, and two groups of approximately 1 percent each knew only about the EPE or about the EPE and extended Medicare but not the TWP. Alternative specifications of work incentives, for example, entering major combinations rather than individual work incentive provisions, were tried without any material change in the results. This is considered indicative that the results of the model are robust.

This information suggests that knowledge of the TWP increases the tendency to go back to work. Also, knowledge of the EPE does not further increase that tendency. If, beyond that, one also knows about the extended Medicare provision, the increase in

tendency is reduced. The findings lend credence to the notion that the EPE and extended Medicare coverage provisions are disincentives to work. It may be that, although the Social Security Administration sees these provisions as extensions of time on the rolls, beneficiaries see them as the events leading to termination from the program. At the beginning of the EPE, one's benefits stop, if one is working above substantial gainful activity (SGA). Once the extended period of eligibility is over, the beneficiary is terminated from the program. Once the period of extended Medicare is over, health coverage or financial support from the Disability Insurance program stops, the individual must be self-supporting and covered by health insurance or buy into the Medicare program. The vision of these provisions as an end to benefits and, ultimately, termination from the program may be so overwhelming that it crowds out any consideration that these provisions actually extend benefits. Whether such provisions are incentives or disincentives ultimately rests with how the beneficiary decides to view the situation.

Discussion and Summary

The results of this research suggests that a disincentive effect may be built into certain work incentive provisions of the DI program. The positive effect of knowledge of the trial work period provisions is almost neutralized by knowledge of the extended period of eligibility and extended Medicare coverage. This finding could explain the results in another study¹¹ that examined information in the folders of New Beneficiary Survey respondents about the TWP and the EPE. In that study, it was estimated that after about 10 years of entitlement, about 8 percent started a period of trial work. Of those who started, about 79 percent took full advantage of the provision and completed a TWP. But, of those who completed a TWP, only 44 percent were ultimately terminated from the program for SGA.

Those findings can also be viewed as suggestive of disincentive features inherent in the EPE and extended Medicare coverage provisions. Although it is also possible that the work attempts simply were not successful (that is, the beneficiary finding

it difficult to complete the EPE and terminate from the program because of SGA), the results in this study point to provisions that discourage beneficiaries. The fact that no benefit is paid during the EPE in months in which earnings exceed the SGA amount (\$500 per month) and all eligibility for DI benefits ends with the completion of the EPE creates a sharp and precipitous drop in monthly income from full benefit to none. According to economic theory, this represents a considerable disincentive not only to finishing the TWP but to even begin work. Furthermore, the eventual loss of Medicare coverage which, for some beneficiaries, is worth as much as cash benefits, adds to a feeling of future financial insecurity and discourages work. And so, coupled with the daily strains of the medical condition, the tendency of the beneficiary to remain working is lessened.

The encouraging news is that the vocational rehabilitation efforts seem to have a positive effect on the tendency for beneficiaries to start working. Job placement efforts, which can be viewed as being directly connected to getting a job and perhaps nearly tautological in relation to working, were found to have a dramatic effect on the tendency to work, with this tendency being increased by a factor of 4.4. However, the service was offered only to a very small segment (about 2 percent) of the beneficiaries.

Physical therapy, which is offered to a much larger group (about 1 in 5 beneficiaries received this service), also appeared to have a positive and significant effect on return to work. Vocational training and general education also showed positive and significant impacts on the tendency to return to work.

Additional research in the area of vocational rehabilitation is planned, though the NBF survey offers limited opportunities to examine issues of cost effectiveness as the survey contains no information on the costs of VR services and who paid for them. Perhaps indirect measures, such as evaluating outcomes representing prolonged and

Table 4.—Percent of beneficiaries who knew of various combinations of work incentive provisions and percent reporting that it influenced their decision to return to work

Work incentive provision	Percent aware of provision	Did work incentive provisions influence you?		
		Total	Yes	No ¹
Any work incentive.....	100.0	100.0	14.1	85.9
Only aware of—				
Trial work period.....	20.5	100.0	22.4	77.6
Extended period of eligibility.....	1.2	100.0	8.3	91.7
Extended Medicare coverage.....	2.3	100.0	4.3	95.7
Trial work period and extended period of eligibility.....	26.4	100.0	14.8	85.2
Trial work period and extended Medicare coverage.....	3.4	100.0	2.9	97.1
Extended period of eligibility and extended Medicare coverage.....	1.2	100.0	16.7	83.3
Trial work period, extended period of eligibility, and extended Medicare coverage.....	45.1	100.0	11.5	88.5

¹Includes missing responses.

successful return to work, will yield results proving to have a high probability of being cost effective. The curious results found with respect to the lack of work incentives associated with the EPE and extended Medicare coverage provisions also need to be addressed. This may require additional data collection from claims folders to obtain more specific information about program interactions. Future research utilizing the NBF will continue to analyze the first work episode. In particular, research is planned that will examine the effect of vocational rehabilitation and knowledge of work incentive provisions on the ability of beneficiaries to sustain work.

⁸At the time the disability/work module for the NBF was designed, a decision was made not to ask respondents to assess their health status at earlier points in time due to potential recall errors.

⁹Questions from the NBF pertaining to knowledge of work incentive provisions are reprinted in Appendix B.

¹⁰Questions from the NBF pertaining to knowledge of work incentive provisions are reprinted in Appendix B.

¹¹L. Scott Muller, "Disability Beneficiaries Who Work and Their Experience Under Program Work Incentives," *Social Security Bulletin*, Vol. 55, No. 2 (Summer), 1992, pp. 2-19.

Notes

¹John C. Hennessey and Janice M. Dykacz, "Projected Outcomes and Length of Time in the Disability Insurance Program," *Social Security Bulletin*, Vol. 59, No. 9 (September), 1989, pp. 2-41.

²John C. Hennessey and L. Scott Muller, "Work Efforts of Disabled-Worker Beneficiaries: Preliminary Findings from the New Beneficiary Followup survey," *Social Security Bulletin*, Vol. 57, No. 3 (Fall), 1994, pp. 42-51.

³*Ibid.* Additional information on the NBF add-on frame, disability/work module, and the selection criteria can be obtained from that article.

⁴D.R. Cox, "Regression Models and Life Tables," *Journal of the Royal Statistical Society, Series B*, 1972, 34, pp. 187-220.

⁵*SAS Technical Report P-217, SAS/STAT Software: The PHREG Procedure*, SAS Institute, 1992.

⁶For additional information on estimating standard errors by the half-sample technique see, *The 1982 New Beneficiary Survey Users' Manual*, Washington, DC: Office of Research and Statistics, Social Security Administration, p. 43.

⁷John C. Hennessey and L. Scott Muller, "Work Efforts of Disabled-Worker Beneficiaries: Preliminary Findings from the New Beneficiary Followup Survey," *Social Security Bulletin*, Vol. 57, No. 3 (Fall), 1994, pp. 42-51.

Technical Appendix A

Survival analysis was originally invented to analyze the time to failure of such things as electronic parts or time to death of individuals in a situation where the observation period ends before all of the failures have been observed. Throwing out those cases where no failure has been observed (the censored cases) leads to a bias toward those cases with a shorter time to failure. By correctly specifying the likelihood function, one can avoid such bias. These techniques have been carried over into applications in the social sciences. In our case, we are analyzing the time to the start of work. Our censoring occurs when the individual either dies, retires, or the survey was taken.

The Cox proportional hazards regression model is widely used in the analysis of survival data to explain the effect of explanatory variables on survival times. For our situation, we are analyzing the time to start work. Each member of the population is assumed to follow a "tendency to work" curve over time, $h_i(t)$, normally called the hazard function. It is assumed that each hazard function can be expressed as

$$h_i(t) = h_0(t) \times e^{z_i \beta}$$

where $h_0(t)$ is an unspecified baseline hazard function, z_i is the vector of measured explanatory variables for the i^{th} individual, and β is the vector of unknown regression parameters associated with the explanatory variables.

Cox¹ introduced the partial likelihood approach that allows for the estimation of the parameters, β without specifying the unknown baseline hazard, $h_0(t)$ and accounts for censored survival times. Suppose that a random sample of individuals yields a sample with k observed lifetimes and $n-k$ censored times. If we order the failure time as $t_1 < t_2 < \dots < t_k$, we can construct the risk set, $R(t_i)$, to be the set of individuals alive and not retired and uncen-

sored just prior to time, t_i . Cox defines the following "likelihood function" for estimating β in the absence of knowledge of $h_0(t)$:

$$L(\beta) = \prod_{i=1}^k \left(\frac{e^{x_i \beta}}{\sum_{l \in R_i} e^{x_l \beta}} \right)$$

where x_i is the regression vector associated with the beneficiary who started work at time t_i . Although this is not a likelihood function in the usual sense (that is, it is not the probability of some observable stated outcome under the stated model), the validity has been discussed by Cox² who suggests that, for the purposes of inference about β , $L(\beta)$ can be treated as an ordinary likelihood function and under suitable conditions, maximization of $L(\beta)$ leads to an estimate that is asymptotically normally distributed with a covariance matrix that can be consistently estimated using the usual matrix of partial derivatives of $\log(L(\beta))$. In the case where the times include ties, as is our case, because of such things as rounding, there are strategies for adjusting the estimation procedure. These strategies are discussed in Lawless.³

The Cox partial likelihood approach also allows for the introduction of time-dependent explanatory variables (that is, one whose value for any given individual may change over time). A large number of variables in this analysis are time dependent. All of the vocational rehabilitation (VR) variables start at the time they received the VR service. All of the work incentive provisions start at the time they said they found out about the provision. The marital status of an individual changes over time. In the case of time-dependent variables, the vector of explanatory variables now becomes a function of time, $x = x(t)$. The hazard function is now of the form

$$h(t) = h_0(t) \times e^{x(t) \beta}$$

The partial likelihood function now becomes

$$L(\beta) = \prod_{i=1}^k \left(\frac{e^{x_i(t_i) \beta}}{\sum_{l \in R_i} e^{x_l(t_i) \beta}} \right)$$

Notes

¹D.R. Cox, "Partial Likelihood," *Biometrika*, 62, 269-276, 1975.

²SAS Technical Report P-217, SAS/STAT Software: The PHREG Procedure, SAS Institute, 1991.

³J.F. Lawless, *Statistical Models and Methods for Lifetime Data*, New York: John Wiley & Sons, 1982.

Appendix B

Now I would like to ask about any rehabilitation services you may have received. This may include such things as job or vocational training, job counseling, job placement, physical therapy, and special or general education.

142. Did you receive any rehabilitation services after 1980?

Yes 1

(SKIP TO Q. 148) No 2

I would like to ask you some questions about Kinds of rehabilitation services that you may have received.

(ASK QQ. 144 - 147 FOR ANY SERVICES ANSWERED "YES" IN Q. 143)

143. Did you receive (REHABILITATION SERVICES)?	143. Who provided this (SERVICE)? Was it a:	145. Did this service begin before the first job you started after receiving disability benefits?	146. In what year did you first begin to receive this service?	147. Do you think these services helped make you able to return to work or continue working?
a. physical therapy Yes 1 No 2	state govt. agency 1 private agency 2 some other source? 4	Yes 1 No, no job 2 Already working when benefits began 3	YEAR	Yes 1 No 2
b. job or vocational training? Yes 1 No 2	state govt. agency 1 private agency 2 some other source? 4	Yes 1 No, no job 2 Already working when benefits began 3	YEAR	Yes 1 No 2
c. job counseling? Yes 1 No 2	state govt. agency 1 private agency 2 some other source? 4	Yes 1 No, no job 2 Already working when benefits began 3	YEAR	Yes 1 No 2
d. general education? Yes 1 No 2	state govt. agency 1 private agency 2 some other source? 4	Yes 1 No, no job 2 Already working when benefits began 3	YEAR	Yes 1 No 2
e. assistance in job placement? Yes 1 No 2	state govt. agency 1 private agency 2 some other source? 4	Yes 1 No, no job 2 Already working when benefits began 3	YEAR	Yes 1 No 2
f. some rehabilitation service? Yes 1 No 2 SPECIFY:	state govt. agency 1 private agency 2 some other source? 4	Yes 1 No, no job 2 Already working when benefits began 3	YEAR	Yes 1 No 2

148. Are you aware of any work incentive provisions in the Social Security disability programs that allowed you to test your ability to work?

Yes 1

(SKIP TO Q. 154) No 2

CHECKPOINT M:

WAS R WORKING WHEN (HE/SHE) FIRST BEGAN TO RECEIVE DISABILITY BENEFITS

["YES" TO Q. 73, PAGE 21]?

YES (GO TO INTRODUCTION BEFORE Q. 149)

NO (SKIP TO INTRODUCTION BEFORE Q. 151)

Now I would like to ask about the incentive provisions.

(ASK Q. 150A AND Q. 150B ABOUT ANY PROVISIONS ANSWERED "YES" IN Q. 149.)

149. Are you aware of (INCENTIVE PROVISION):	150A. When did you first become aware of (INCENTIVE PROVISION):	150 B. Did this incentive provision influence your decision to look for work, or to take a job, or to continue working?
a. trial work period which allows you to work for a period of time without losing benefits? Yes 1 No 2	Month Year	Yes 1 No 2
b. extended period of eligibility which provides for automatic reinstatement of your benefits if work attempt fails? Yes 1 No 2	Month Year	Yes 1 No 2
c. extended Medicare coverage? Yes 1 No 2	Month Year	Yes 1 No 2
d. some other provisions? Yes 1 No 2 (SPECIFY):	Month Year	Yes 1 No 2

(ALL SKIP TO Q. 153)

Now I would like to ask about the incentive provisions.

(ASK QQ. 152a-152d ABOUT ANY PROVISIONS ANSWERED "YES" IN Q. 151.)

151. Are you aware of (INCENTIVE PROVISION):	152.A. Were you aware of (INCENTIVE PROVISION) when you began to look for work after getting disability benefits?	152.B Were you aware of this incentive provision when you began your first job after getting disability benefits?	152c. When did you first become aware of this incentive program?	152. d. Did this incentive provision influence your decision to look for work or to take a new job?
a. trial work period which allows you to work for a period of time without losing benefits? yes 1 no 2	yes 1 no 2 did not look for work 3	yes 1 no 2 did not look for work or have a job 3	(MONTH) (YEAR)	yes 1 no 2
b. extended period of eligibility which provides for automatic reinstatement of your benefits if work attempt fails? yes 1 no 2	yes 1 no 2 did not look for work 3	yes 1 no 2 did not look for work or have a job 3	(MONTH) (YEAR)	yes 1 no 2
c. extended Medicare coverage? yes 1 no 2	yes 1 no 2 did not look for work 3	yes 1 no 2 did not look for work or have a job 3	(MONTH) (YEAR)	yes 1 no 2
d. some other provision? yes 1 no 2 SPECIFY:	yes 1 no 2 did not look for work 3	yes 1 no 2 did not look for work or have a job 3	(MONTH) (YEAR)	yes 1 no 2