

## *Job Patterns of Disabled Beneficiaries*

by John C. Hennessey\*

This article presents basic findings about the job patterns of disabled-worker beneficiaries covered under the Social Security Administration's Disability Insurance (DI) program as reported in the New Beneficiary Follow-up survey. Beneficiaries are asked retrospective questions about labor-force participation from the time of their first entitlement to disability benefits to the time of the interview.

Twelve percent of those persons who enter the DI program as nonworking beneficiaries start a job during their entitlement to benefits. The mean time to the start of the job was 3.4 years. Of those who start a job, 50 percent end the job before the end of their entitlement. Most of these persons leave the job for health-related reasons and, for most of them, the employer does not play a major role in their decision to stop working. For those who end the first job and are employed in subsequent jobs, the percentage who recover while still in the job decreases as the number of jobs increases.

---

\*Disability Research Staff, Office of Research, Evaluation and Statistics, Social Security Administration.

*Acknowledgments:* The author wishes to thank Evan Schechter, L. Scott Muller, and Janice Dykacz of the Disability Research Staff, Office of Research, Evaluation and Statistics, for their extensive comments and help throughout the revisions of this article.

In the "Status of the Social Security and Medicare Programs: A Summary of the 1995 Annual Report," the Social Security Board of Trustees state:<sup>1</sup>

The Federal Disability Insurance (DI) Trust Fund, which pays disability benefits, is projected to be exhausted in 2016. The Board believes that the long-range deficit of the DI Trust Fund should be addressed. . . .

Changes in our society, the workforce and our economy suggest that adjustments in the program are needed to control long-range program costs. Also, incentives should be changed and the disability decision process improved in the interests of beneficiaries and taxpayers.

The report presents information about the financial status of the Disability Trust Fund. It compares the rate of income for each fund with its estimated cost rate.

The income rate for DI is slightly higher than the cost rate only until 2004, after which the annual shortfall of tax income is projected to increase slowly over the entire 75-year period.

The importance of the need for action is also emphasized in the report:

During the past 5 years there has been a trend of deterioration in the long-range financial condition of the Social Security and Medicare programs and an acceleration in the projected dates of exhaustion in the related trust funds. . . .

But to some extent, the increasingly adverse projections have come from unforeseen events and from the absence of prompt action in response to clear warnings that changes are necessary. These adverse trends can be expected to continue and indicate the

possibility of a future retirement crisis as the U.S. population begins to age rapidly. We urge that concerted action be taken promptly to address the critical public policy issues raised by the financing projections for these programs. Action should be taken to continue and extend survey and other data development efforts and to improve modeling capability regarding the income and health circumstances of future retirees. Such information is critical to the legislative and regulatory activity that will be required for both public and private income security and health care programs in future years.

Much attention has been paid to the aggregate costs of DI awards as a key factor in the increase in total Social Security Administration (SSA) program costs. In fact, a major "reengineering" project in disability claims is currently under way that is aimed at restructuring the decision process.<sup>2</sup> Another key factor related to the DI awards population that also increases program costs is the length of stay in the program. Beneficiaries who stay on the rolls for a long time contribute more to program cost than those who stay for a short time. Therefore, if new beneficiaries stay on the rolls longer, then the number of beneficiaries on the rolls in any given year will increase and yearly costs will rise, even if the number of yearly awards remains constant.

### ***Work Attempts***

One of the ways in which beneficiaries leave the DI program is by working at a job at a level of sustained employment that is termed substantial gainful activity (SGA). Some beneficiaries, although they have a chronic disabling condition, are able to reenter the labor force and earn enough money to be deemed able to support themselves without the aid of DI benefits. An earlier study<sup>3</sup> found that fewer than 3 percent of DI beneficiaries ever terminate from the program because of work. Even though this percentage is small, their termination has a potential for substantial savings to the DI Trust Fund. This large effect is due to two factors. First, as work terminations shorten the length of stay on the rolls, savings will accrue over those years in which the beneficiary does not receive benefits. Second, the earnings by the beneficiary generates income for the trust funds.

Given the stringent requirements for admission to the DI program, it is not surprising that few beneficiaries leave the program via attaining SGA. However, the proper mix of work incentives, vocational rehabilitation, and other interventions, could maximize the savings to the DI Trust Fund, while, at the same time, help individuals return to a productive life-style.

A successful work termination is predicated on several factors. First, the beneficiary must locate and start a job. Second, this job must pay wages at a high enough level that, after impairment-related work expenses (IRWE), the pay is above the SGA level.<sup>4</sup> Third, the beneficiary must continue to work at that level long enough to successfully complete the trial work period (TWP), and the extended period of eligibility (EPE).

The TWP, one of the main work incentives in the DI program, allows the beneficiary to work for 9 months while maintaining eligibility for benefits.<sup>5</sup> If the beneficiary successfully completes a TWP (that is, he/she works for 9 months and earns more than \$75 each month, after deducting disability costs), the beneficiary then starts an EPE. This is a 36-month period,<sup>6</sup> which basically provides for automatic reinstatement of their monthly benefit in any month where their work is not above the SGA level, after deducting IRWE costs.<sup>7</sup> At the end of the EPE, if the beneficiary is working above the SGA level, then benefits are terminated. This type of termination is referred to as a work recovery.

To foster work terminations, it is important to understand the interplay between the work incentive features of the DI program and the work attempts of the beneficiaries. This article provides a general description of the job patterns of beneficiaries during their entitlement to DI benefits. It is part of a series of articles that use the data from the New Beneficiary Follow-up (NBF) survey to analyze the work efforts of DI beneficiaries. Two previous articles in this publication have reported earlier findings from the NBF. The first article<sup>8</sup> presented preliminary findings from the Disability Work Module of the survey. Basic information about such things as vocational rehabilitation, work incentives, and employer workplace accommodations were presented. The second article<sup>9</sup> discussed the effects of vocational rehabilitation efforts and work incentive program provisions on the ability of beneficiaries to return to work.

The Disability Work Module of the NBF was designed to gather information about work that cannot be directly obtained from administrative data systems. The data set consists of 4,031 beneficiaries who are in the NBF and an Add-On sample of those who said that they were not working at the time of award of benefits. Details for this same sample were reported in the previous articles. The NBF data were merged with data from the Master Beneficiary Record (MBR) of the Social Security Administration. The MBR records contain, among other things, the dates of benefit entitlements, terminations, and reentitlements.

### ***The Approach: A Dynamic Analysis***

After much thought, it was decided that a dynamic analysis of the work patterns of DI beneficiaries during their first DI entitlement period would be an appropriate overall strategy for a series of articles. This approach views the situation as a process that evolves over time. The labor-force participation process of disabled persons during the first period of entitlement to DI benefits is seen as a dynamic process of transitions from one status to another (chart 1). At the start, the individual is awarded DI benefits. Over time, several labor-force events can occur: starting a job, ending a job, reaching age 65 and converting to the retirement program coverage (a retirement termination), or terminating DI program benefits because of recovery (a recovery termination). The recovery can be for reasons of

medical improvement or the successful completion of an EPE (a work termination). A retirement termination or a recovery termination marks the end of the first entitlement period.

Each possible transition from one status to another plays a role in the structure of the entire process. The basic elements or building blocks of the process are the forces of transition or tendencies from one status to another (chart 1).

For example, in an earlier article,<sup>10</sup> the forces of transition or tendencies from "entitled to DI benefits" to the next possible situation were analyzed. See chart 2 for the extraction of these tendencies. As mentioned in the earlier article, the analysis assumes that, at any point in time after entitlement to DI benefits, a beneficiary who is younger than age 65 could medically recover or go back to work. Thus, a "work tendency" and a "recovery tendency" compete with each other. If both tendencies are low at a particular point in time, then the probability of either event occurring at that time will be low. If both tendencies are high, then the probability of one of the events occurring 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.

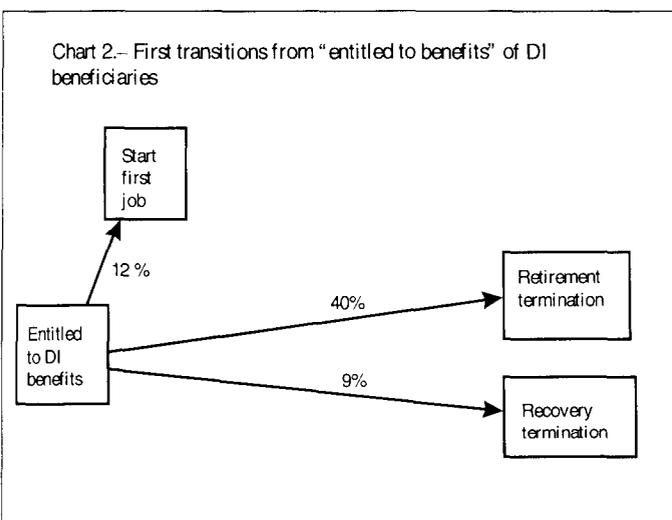
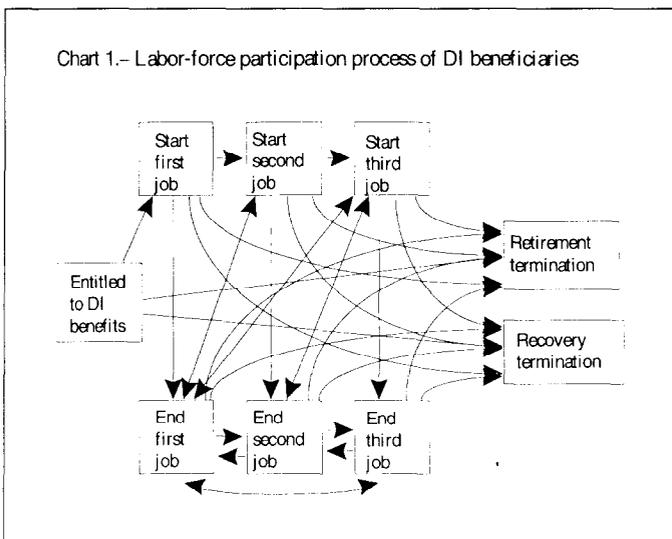
The strength of these tendencies can vary over time and can also vary with age, education, and level of vocational rehabilitation (VR), and so forth. Policy questions can be framed in the context of this view of the process. For example, in order to assess the effectiveness of a VR program, several analyses can be done. The tendency to start a first job for those who have had VR can be compared with the same tendency for those who have not had VR. Also, the tendency to leave the first job for those who had VR can be compared with the same tendency for those who have not had it. One would hypothesize that, for those who have had VR, the former tendency is stronger and the latter tendency is weaker, as compared with those who have not had VR.

However, starting a first job does not necessarily mean success. For example, the beneficiary could quickly end the first job and remain on the rolls until retirement. If the ultimate goal of a VR program is to increase the number of recovery terminations, then one must consider all possible paths from entitled to DI benefits to recovery termination, and analyze the effect of VR efforts on the tendencies of the transitions along each path.

The analysis in the earlier article focused on only the first step toward a recovery termination. It is important to first analyze the forces of each possible transition. Then, one can bring these forces together to create an overall description of the entire process. A dynamic analysis focuses on a study of the way in which various factors affect the process. It is in stark contrast to a static, cross-sectional approach, where one studies the relationships that exist between various factors at a given point in time. As mentioned by Tuma and Hannan:<sup>11</sup>

... despite its apparent complexity, [dynamic analysis] can actually simplify the study of complicated problems. In at least one crucial respect, the study of change is simpler than the study of relationships at a point in time. In cross-sectional data, everything often seems to depend on everything else. The apparent density and complexity of webs of causal relations pose a formidable obstacle to ... analysis. ... Dynamic models and methods are no more complex in most instances and often they are simpler.

Dynamic models are simpler because they provide a conceptual structure for the analysis of a process. The structure provides the means to identify the basic elements of the process. The effects of various factors on these basic elements then become simpler to analyze. After the analysis of the basic elements, one can then put together an overall picture of the entire process. The planned series of articles will consist of the identification and analysis of the various elements of the labor-force participation of DI-worker beneficiaries during their first period of entitlement to DI benefits. Since the job patterns during the second or third periods of entitlement could be different from the first period of entitlement, we decided to focus our series of articles on the first entitlement period.



## Job Patterns as a Dynamic Process

If we wish to foster work terminations, we need to understand the pattern of transitions from one job situation to another that increases the force of transition from working beneficiary to recovery termination. As seen in chart 1, some beneficiaries will make one transition from entitlement to benefits to the start of the first job, stay with that job, and eventually move directly to a work termination. Others will switch back and forth from working beneficiary to nonworking beneficiary several times before eventually moving to a work termination. Some beneficiaries will start a second job while they still have their first job. There are beneficiaries who will make their transitions in a short period of time, and then others who will take a significantly longer time. If, for example, the force of transition from the start of the first job to a recovery termination is stronger than the force of transition from the start of the second or third job to a recovery termination, then there are implications relative to where we spend our vocational rehabilitation dollars and where to put our most intensive work incentive efforts.

## Event Histories in the NBF

The Disability Work Module of the NBF was designed to gather retrospective event history data for each beneficiary from the time of their first entitlement to the time of the interview. For our analysis of the first entitlement period, we extracted the events beginning from the first entitlement to DI benefits and ending with either the end of the first entitlement period or the time of the NBF interview, whichever came first. For the 4,031 beneficiaries in the sample, 5,955 transitions took place. As the MBR does not distinguish between work and medical terminations, these two types of terminations are combined into one category—recovery terminations (chart 1).

## First Event After Entitlement

Chart 2 shows the first transitions made by DI beneficiaries for the period under study. Forty percent remain nonworking beneficiaries until they reach age 65 and their DI benefits are converted to retirement benefits; an additional 9 percent medically recover from their chronic impairment; 12 percent start a job (these are the potential candidates for a work recovery); and the remaining group, about 39 percent, continue as nonworking beneficiaries up until the interview and are still in the DI program at that time.

## First Job

Chart 3 shows the transition steps of the 12 percent of DI beneficiaries who attempted work. The numbers on the arrows give the percentage distribution of events or first job holders. About 19 percent of the beneficiaries do not change their status up to the time of the interview and, therefore, are not represented in the chart. For those persons holding a first job,

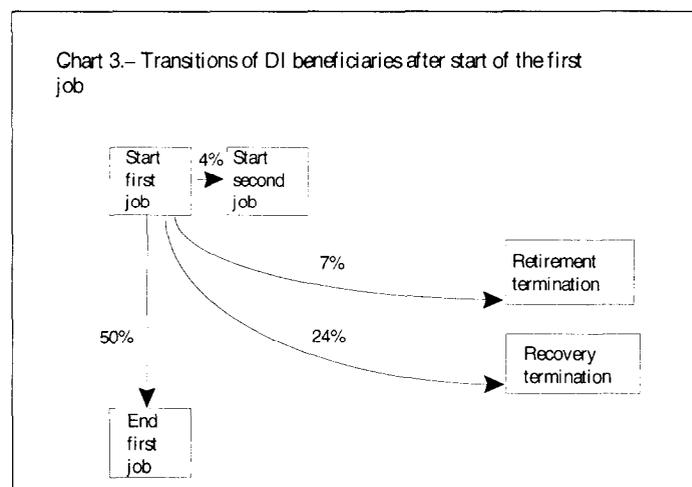
24 percent recovered, either medically or by engaging in SGA, and left the DI program. This figure is higher than the 9-percent recovery rate shown in chart 2 for those who did not start a job. It is apparent that those beneficiaries who are able to start a job have a better chance of recovering than those who never work. However, 50 percent are not able to sustain the job through their entire entitlement period. Finally, a small percentage (4 percent) start a second job, while still maintaining their first job.

## Type of First Job

Beneficiaries who said that they started a first job were asked the type of business or industry the job was in. Their responses were then categorized according to the Alphabetical Index of Industries and Occupations (AIIO).

The distribution of the type of industry of the first job, as seen in chart 4, is evenly spread across the categories of (1) manufacturing; (2) wholesale and retail trade; (3) personal services (financial, insurance, real estate, business, repair, entertainment, and recreation services); and (4) professional and related services. About 20 percent of the first jobs were contained in each of the categories. A few jobs, 6.9 percent, are in the transportation sector; a small number of jobs are in the construction industry. As expected, DI beneficiaries are employed in jobs that require less physical activity.

Almost four-fifths of the jobs are in the private sector (chart 5). The remaining fifth, or 20 percent of the jobs, are distributed between government agencies (Federal, State, or local), and nonprofit, charitable, or tax-exempt organizations. Respondents were asked the type of work they did and the job title was categorized by the AIIO. The largest category, as seen in chart 6, is technical, sales, and administrative support (28.6 percent). The next largest occupational category is the operators, fabricators, and laborers (23 percent). The managerial/professional category contains about 15.8 percent of the first jobs. The service category contains roughly the same percentage. The farming, forestry, and fishing occupations contain the smallest percentage of all reported categories.



The amount of time spent working in the first job is displayed in chart 7. The left half of the chart gives the distribution of the number of hours worked per week. More than half of the respondents reported that they worked between 35 and 50 hours per week. The right half of the chart shows the number of weeks worked per year. Over half indicated that they worked between 37 and 52 weeks out of the year. This is an unexpected finding; given that the beneficiaries have serious medical impairments, one might expect more part-time work hours to be reported.

### Reasons for Leaving the Job

As mentioned earlier, 50 percent of those beneficiaries who started a job during their initial entitlement period also ended their job before terminating from the DI program. These respondents were asked the reason they left this job. Table 1 shows the percentage distribution of the respondents who stated that the given reason (as seen in the table) was their main reason for leaving the job. Health problems were given most frequently, by 35.4 percent of the first job holders; 15 percent said that they lost their job; and an additional 6 percent said that business was bad. Very few respondents said that their leaving the job had anything to do with either receiving or applying for retirement or disability benefits. About 13 percent gave economic reasons for leaving—the job did not pay enough, to get a better job, and so forth.

For those persons who mentioned health problems as one of their reasons for leaving, more detailed questions about the health problems were asked. The respondents were asked if their doctor or employer decided that they had to leave the job because of their health. Table 2 shows that 35.4 percent of DI beneficiaries said that they alone made the decision to leave.

Chart 4.—Percentage distribution of the first job held by DI beneficiaries, by type of industry

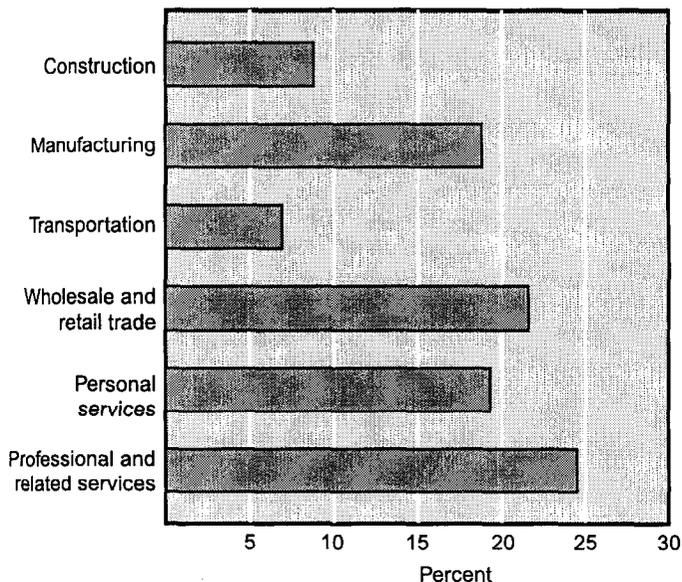


Chart 5.—Percentage distribution of the first job held by DI beneficiaries, by type of organization

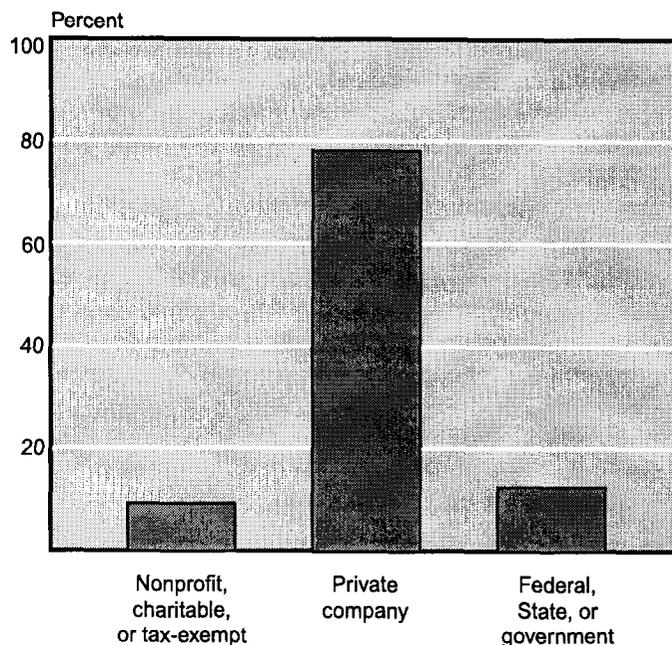


Table 1.—Percentage distribution of DI beneficiaries who chose given reason as the main reason for leaving the job

Reason	Percent
You lost your job.....	15.0
Business was bad.....	6.0
The job did not pay enough.....	4.3
You did not like your job.....	2.0
Transportation problems.....	.7
You moved.....	2.8
To get SSA retirement benefits.....	.1
To get DI benefits under Social Security.....	.2
To avoid having DI benefits discontinued.....	.4
To keep your Medicare coverage.....	.3
To get a pension.....	.04
To care for others.....	1.1
You got a better job.....	8.7
Your spouse's health changed.....	1.8
You wanted to retire or were tired of working.....	2.9
You reached the mandatory retirement age.....	.1
You had health problems.....	35.4
To go back to school.....	1.0
Disagreements with employer.....	5.4
Job was temporary/seasonal.....	3.8
You could not handle the job (other than health problem).....	1.0
The business closed or was sold.....	2.2
Poor working conditions.....	.6
The job ended.....	1.6
To get a permanent, more secure job/to operate own business.....	1.5
You had an accident that caused an injury.....	.4
Change in family/personal life (pregnancy, marriage, death, divorce).....	.4
Other.....	.4

Nearly 23 percent said that the doctor alone decided and 19.8 percent said that they and their doctor made the decision together. Only 6 percent stated that their employer alone made the decision. Almost 7 percent said that they, their doctor, and employer were involved in making the decision. According to this survey, the employer did not play a major role in the decision to stop work for most DI beneficiaries who started working.

The same group of persons were then asked about various ways in which their health made them unable to do the job (table 3). Each question was asked separately with a yes or no response. Over 60 percent stated that their health would not allow them to keep pace with the work. Almost 60 percent said that they could not do the kind of work they were doing previously. About half of the respondents said that the job was making their health conditions worse. Also, 50.2 percent reported that they could not work as many hours as needed. In addition, 31 percent of those persons who left their job said that their health would allow them to work another kind of job, and 24.6 percent said that they could do a similar job but work fewer hours. Further, 23.7 percent of those beneficiaries who left their job said that they lost employer-provided health insurance coverage when they did so.

### Events After Leaving the First Job

Beneficiaries who leave the first job before a recovery termination can start a second job while in beneficiary status. Perhaps time on a first job is needed as a learning experience for most beneficiaries, so that a second job attempt is more likely to result in a recovery termination than a first job.

According to the NBF survey, for those DI beneficiaries who leave their first job, about 10 percent make a subsequent transition to a recovery termination (chart 8). This percentage is close to that for those persons who do not start a job but who experience a recovery termination (9 percent). On one hand, this is a considerable drop from the recovery rate of 24 percent for those who start a first job (chart 3). On the other hand, about 7 percent of those who end their first job convert to the retirement program. This is considerably smaller than the 40 percent who retire without having a first job (chart 2).

Table 2.—Percentage distribution of DI beneficiaries who stated that they left their job because of a decision made by their doctor, employer, or themselves

Decision maker	Percent
Doctor, employer, and self.....	6.7
Doctor and employer only.....	3.1
Doctor and self only.....	19.8
Doctor only.....	22.8
Employer and self only.....	4.2
Employer only.....	6.0
Self only.....	35.4

Chart 6.—Percentage distribution of the first job held by DI beneficiaries, by type of occupation

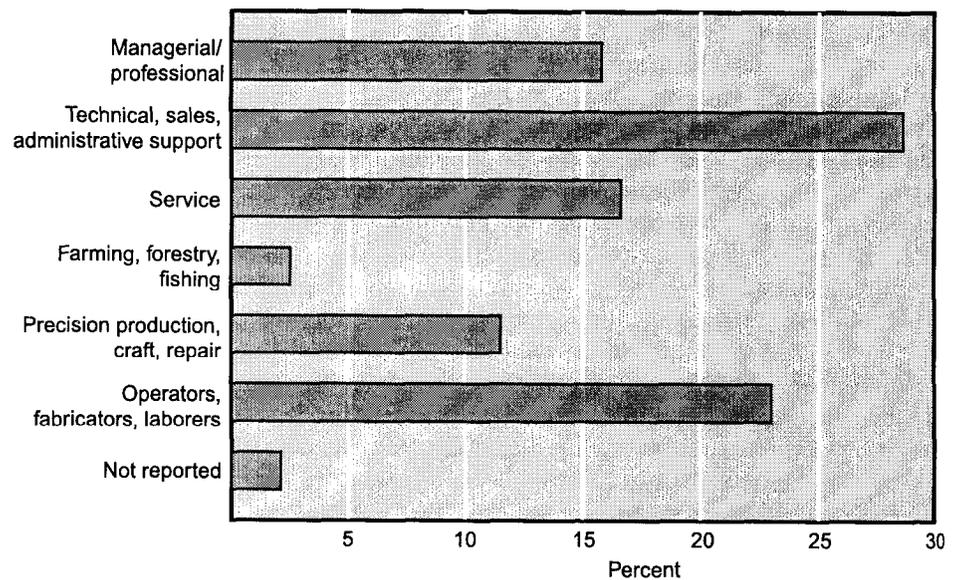


Chart 7.—Amount of time DI beneficiaries spent on the first job

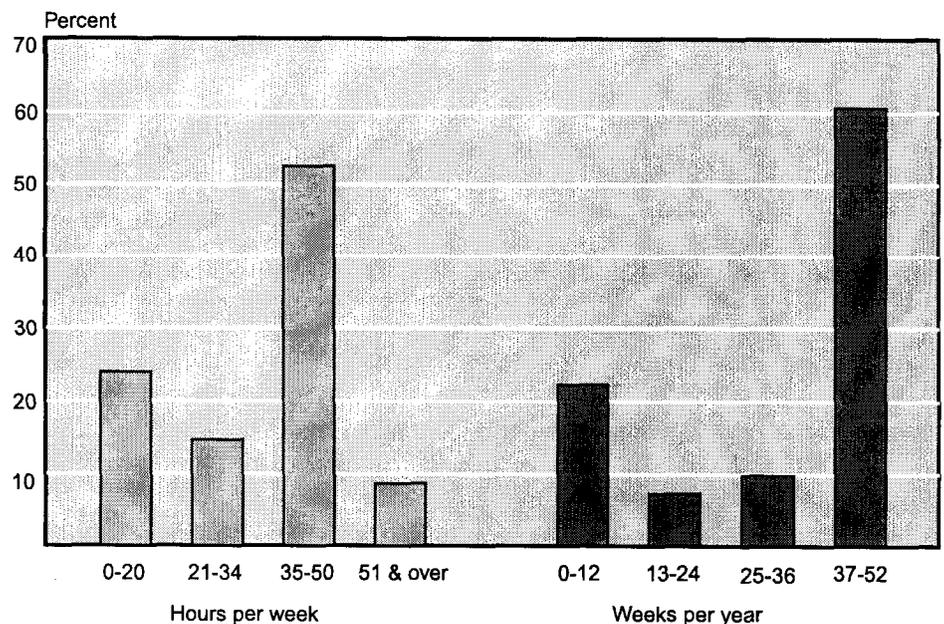


Table 3.—Percent of DI beneficiaries responding yes to given reasons for which health conditions prohibited them to work

Reason	Percent responding yes
You had difficulties getting to and from work.....	17.7
You could not work as many hours as needed.....	50.2
You were absent too much.....	19.2
You could not do the kind of work you were doing earlier.....	57.5
You could not keep pace with the work.....	63.3
Your health problems lowered the productivity of other workers.....	15.9
The working conditions on the job were making your health problems worse.....	50.0
Your medical expenses were increasing the cost of your employer's health insurance plan.....	5.1

Nearly half (about 48 percent) of the beneficiaries who end a first job start a second job next (chart 8). The remaining beneficiaries who leave their first job have no further events up to the time of the interview.

### Subsequent Jobs

Chart 9 shows that 56 percent of the DI beneficiaries who start a second job end the job before retiring, recovering, or starting another job, as compared with the 50 percent who ended the first job (chart 3). For those who start a second job, only 10 percent make their next transition to a recovery termination. This percentage is less than half of the comparable 24 percent who recover next after the start of the first job (chart 3). Clearly, second jobs are less likely to be successful in terms of continued work and/or program outcomes than the first job. For those who start a second job, about 6 percent subsequently retire. This is similar to the 7 percent who retire after starting their first job, as shown in chart 3.

For comparison, chart 10 presents the subsequent transitions for those who start a third job. Seventy-four percent end the third job, 5 percent recover, and 2 percent retire. Thus, as the number of the jobs increase from job number one to job number three, the percentage whose next transition is to a recovery termination decreases, and the percentage of beneficiaries who subsequently end the job increases.

### Mean Time for Events

The overall length of time a beneficiary stays in the DI program has a direct impact on the cost of the beneficiary to the program. The longer a beneficiary remains on the rolls, the longer amount of time monthly benefits must be paid to that individual. In like manner, the length of time on the first job, second job, and so forth, has a direct bearing on vocational rehabilitation costs if we plan to provide vocational support during the time that the beneficiary has a job. The length of time on the various jobs also affects the probability of a work recovery and benefit termination since they must work through

Chart 8.— Transitions of DI beneficiaries after ending the first job

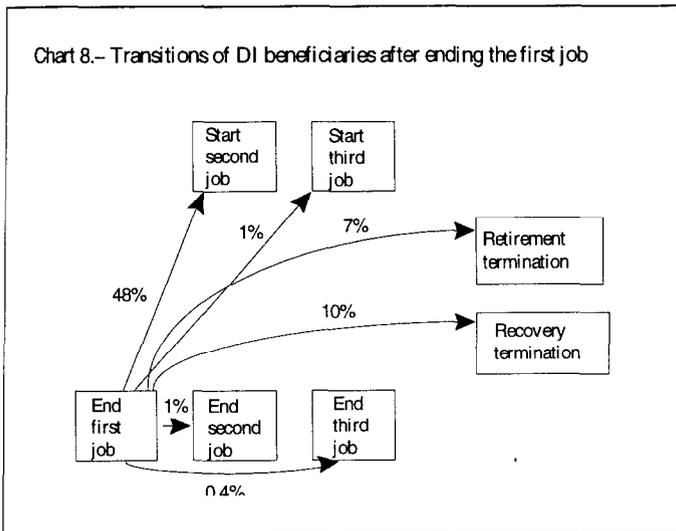


Chart 9.— Transitions of DI beneficiaries after starting a second job

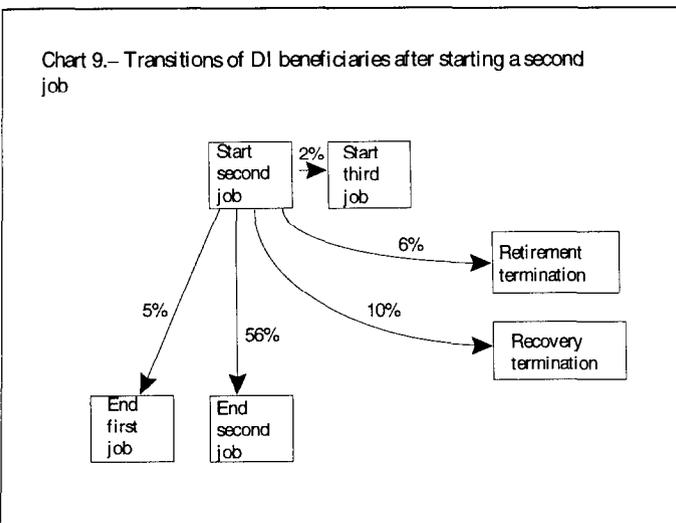


Chart 10.— Transitions of DI beneficiaries after starting a third job

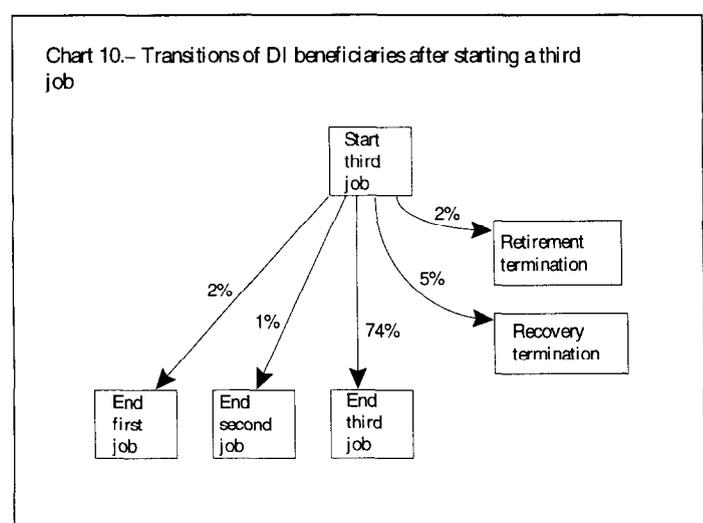


Chart 11.- Mean times for DI beneficiary transitions from "entitled to benefits"

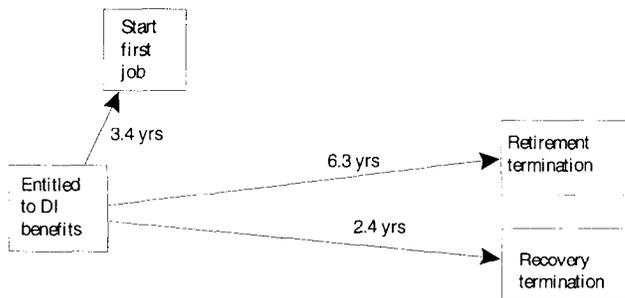


Chart 12.- Mean times for DI beneficiary transitions from start of first job

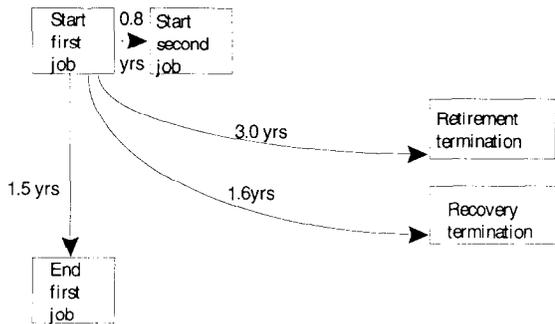
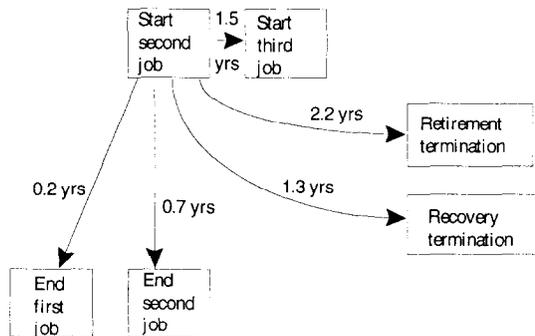


Chart 13.- Mean times for DI beneficiary transitions from start of second job



the trial work period and extended period of eligibility. Also, if a beneficiary works for 9 months at the SGA level, then the VR costs are reimbursed to the provider.

Chart 11 presents the mean times for each of the events described above. The chart shows that, for those beneficiaries who went from entitlement right to recovery, with no work occurring in between, the mean time on the DI rolls was 2.4 years. For those who went from entitlement to retirement without any other event in between, the mean time on the rolls was 6.3 years. This length of time seems minimal until one considers that the interviews took place about 9 years after the start of benefits. Thus, the maximum length of time on the rolls would be about 9 years. Other beneficiaries who would remain on the rolls for more than 9 years with no work attempts until retirement are not observed to do so. The mean time from entitlement to the start of the first job is 3.4 years.

Chart 12 presents the mean times for those beneficiaries who start a first job while entitled to benefits. If they next end the job, the mean time to do so is 1.5 years, well beyond the length of the TWP. This is about the same as the mean time from the start of the first job to recovery for those who recover next, 1.6 years, which is just about the total length of the TWP together with the EPE. In chart 13, we see that the mean length of the second job for those who start and end their second job while entitled is about half the mean length of the first job, 0.7 years.

## Conclusion

The New Beneficiary Follow-up survey provides data for a 9-year period after benefit entitlement. From the survey, we estimate that only 12 percent of DI beneficiaries start a job while entitled to benefits. This should not be surprising since the definition of entitlement to DI benefits includes a requirement that one cannot work for at least 1 year.

This article presents some findings about the job patterns of DI beneficiaries. The findings suggest that those persons who start a first job have an increased chance of recovering. But, if they stop working and then start working again, the chance of recovery and the length of the job declines with each subsequent attempt. Thus, these preliminary findings indicate that the first job attempt after entitlement has the largest chance of leading to successful outcomes in general and specifically to a recovery.

Most working beneficiaries leave their jobs for health-related reasons. The basic fact is that DI beneficiaries have serious health problems and, for some of them, the severity increases over time, further limiting their capacity to work. On one hand, the survey finds that the employer does not play a major role in the decision for beneficiaries to stop work. On the other hand, a rather small number of beneficiaries, 15 percent, stated that they lost their job (table 1). Perhaps support services could be provided to help these beneficiaries either retain their first job or help them start a second job that could be successful.

## Notes

---

<sup>1</sup> 1995 Summary Report of the Board of Trustees, Internet:  
<http://www.ssa.gov>.

<sup>2</sup> See Disability Process Redesign, Internet:  
[http://www.ssa.gov/programs/disability/DPRT\\_intro.html](http://www.ssa.gov/programs/disability/DPRT_intro.html).

<sup>3</sup> L. Scott Muller, "Disability Beneficiaries Who Work and Their Experience Under Program Work Incentives," *Social Security Bulletin*, Vol. 55, No. 2, Summer 1992.

<sup>4</sup> *Disability*, U.S. Department of Health and Human Services, Social Security Administration, SSA Publication No. 05-10029, ICN 456,000, Internet:  
<http://www.ssa.gov/programs/disability/publications/disability.html>.

<sup>5</sup> Ibid.

<sup>6</sup> The EPE was originally established as a 15-month period in 1980. It was lengthened to 36 months in 1988. Most beneficiaries in this study had an EPE of 15 months.

<sup>7</sup> See note 4.

<sup>8</sup> John C. Hennessey and L. Scott Muller, "Work Efforts of Disabled-Worker Beneficiaries," *Social Security Bulletin*, Vol. 57, No. 3, Fall 1994.

<sup>9</sup> John C. Hennessey and L. Scott Muller, "The Effect of Vocational Rehabilitation and Work Incentives on Helping the Disabled-Worker Beneficiary Back to Work," *Social Security Bulletin*, Vol. 58, No. 1, Spring 1995.

<sup>10</sup> See note 8.

<sup>11</sup> Nancy B. Tuma and Michael T. Hannan, *Social Dynamics: Models and Methods*, Academic Press, 1984.