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THE IMPACT OF LOCAL LABOR MARKET CHARACTERISTICS ON THE DISABILITY PROCESS

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Abstract

This report examines the impact of local labor market characteristics on three steps in the disability process: The perception of oneself as disabled; the decision to apply for benefits under the social security disability insurance program (SSDI); and the determination of disability status under SSDI. The research attempts to determine whether the elements of an individual's local economic environment play a role in the various steps of the disability process specifically above and beyond his or her own demographic characteristics and economic motivations. Among the key variables used to measure the local economic environment are the unemployment rate, the percent of families below the low income (poverty) level, rural location, occupational diversity and the percent of the unemployed exhausting their unemployment benefits. With the exception of the last variable, which is measured on a statewide basis, all variables pertain to the county of residence.

The results contradict earlier findings which were based on aggregated data. No significant effect on any of the three elements in the disability process was found for either variable measuring the dimensions of the unemployment problem. With few exceptions, results from the other labor market variables were sketchy at best. One surprising result is noted with respect to the benefit replacement ratio, the variable intended to measure the relative attractiveness of SSDI benefits.

The Impact of Local Labor Market Characteristics on the Disability Process

The Social Security Disability Insurance (SSDI) program has been characterized by large differences in application rates across States. For example, in 1978 the rate of application for DI benefits per thousand insured population ranged from 78 in Utah to 25.1 in Mississippi (table A). 1/ To some extent such differences may be attributable to differences in disability prevalence rates by State. Table B shows that, in 1976, the proportion of persons considering themselves disabled ranged from 7.5 percent in Alaska to 21.3 percent in West Virginia. 2/ "In addition the proportion considering themselves severely disabled, those most likely to apply for SSDI benefits, ranged from a low of 2.9 percent in Alaska to a high of 14.6 in West Virginia.3/"

The SSDI program has also been characterized by large differences among the States in allowance rates occuring in the disability determinations process. 4/ The variation in allowance rates may be partially explained by the differences, discussed above, in the rates of prevalence of self-assessed disability and applications for SSDI benefits. However, the rate of allowance varied both with respect to the resident insured population and with respect to the number of applications filed. In 1978, for example, the rate of allowance with respect to each States's insured population ranged from 1.4 allowances per 1,000 insured (Alaska) to 60 allowances per thousand insured (New Jersey), while the percent of applications allowed ranged from a minimum of 11.9 percent in New Mexico to a maximum of 46.0 percent in New Jersey. "This variation may be due to a variety of factors. For example, allowance-related characteristics of

Table A: Number of workers insured for disability, number of applicants and allowances, and rates per 1,000 insured by geographic division and State for 1978 1/

	Number of Insured Workers (In Thousands)	Number of Disabled Worker Applicants	Applicants Per 1,000 Insured	Number of Allowances (excl. initial claims determinations by State agencies	Allowances Per 1,000 Insured	% of applicants who receive initial claims allowances
Total 2/.....	86,785	1,184,530	13.6	334,759	3.9	28.3
New England.....	4,521	53,756	11.9	16,728	3.7	31.5
Maine.....	360	4,770	13.2	1,870	5.2	39.2
New Hampshire.....	318	3,417	10.7	953	2.7	28.0
Vermont.....	176	2,557	14.5	942	5.4	36.8
Massachusetts.....	2,071	25,521	12.3	9,316	4.5	36.1
Rhode Island.....	386	4,358	11.3	1,178	3.1	27.0
Connecticut.....	1,209	13,133	10.9	2,869	2.4	21.8
Middle Atlantic.....	14,068	202,973	14.4	57,053	4.1	28.1
New York.....	6,888	105,600	15.3	23,709	3.4	22.3
New Jersey.....	2,713	35,359	13.0	16,264	6.0	46.0
Pennsylvania.....	4,467	62,014	13.9	17,280	3.9	27.9
East North Central..	15,222	196,063	12.9	62,611	4.1	31.9
Ohio.....	3,765	49,535	13.2	17,501	4.6	35.3
Indiana.....	2,054	24,199	11.8	7,500	3.7	31.0
Illinois.....	4,253	59,959	14.1	17,731	4.2	29.6
Michigan.....	3,396	44,062	13.0	12,801	3.8	29.1
Wisconsin.....	1,754	18,308	10.4	7,078	4.0	38.7
West North Central..	6,381	68,362	10.7	24,209	3.8	35.4
Minnesota.....	1,585	11,881	7.5	4,231	2.7	35.6
Iowa.....	1,076	10,479	9.7	3,952	3.7	37.7
Missouri.....	1,822	26,443	14.6	8,935	4.9	33.5
North Dakota.....	225	2,763	12.3	683	3.0	24.7
South Dakota.....	228	2,784	12.2	870	3.8	31.2
Nebraska.....	595	5,479	9.2	2,290	3.8	41.8
Kansas.....	850	8,333	9.8	3,248	3.8	39.0
South Atlantic.....	12,398	203,791	16.4	61,147	4.9	30.0
Delaware.....	247	2,623	10.6	864	3.5	32.9
Maryland.....	1,355	19,259	14.2	4,242	3.1	22.0
Dist. of Col.....	393	4,091	10.4	1,343	3.4	32.8
Virginia.....	1,724	22,247	12.9	7,541	4.4	33.9
West Virginia.....	608	10,547	17.3	3,474	5.7	32.9
North Carolina....	2,222	31,511	14.2	11,315	5.1	35.9
South Carolina....	1,077	21,986	20.4	5,793	5.4	26.3
Georgia.....	1,869	35,124	18.8	10,712	5.7	30.5
Florida.....	2,904	56,403	19.4	15,863	5.5	28.1
East South Central..	4,759	93,248	19.6	20,634	4.3	22.2
Kentucky.....	1,103	19,939	18.1	5,614	5.1	28.2
Tennessee.....	1,692	29,476	17.4	7,378	4.4	25.0
Alabama.....	1,232	25,477	20.7	1,452	2.3	13.5
Mississippi.....	731	18,356	25.1	4,250	5.8	23.2
West South Central..	7,483	123,037	16.4	32,537	4.4	26.5
Arkansas.....	744	14,197	19.1	3,871	5.2	27.3
Louisiana.....	1,193	28,063	23.5	5,437	4.6	19.4
Oklahoma.....	963	15,855	16.5	4,236	4.4	26.7
Texas.....	4,582	64,922	14.2	19,013	4.1	29.3
Mountain.....	3,488	47,900	13.7	14,014	4.0	29.2
Montana.....	273	3,825	14.0	1,257	4.6	33.1
Idaho.....	308	3,820	12.4	951	3.1	24.9
Wyoming.....	176	1,391	7.9	389	2.2	27.9
Colorado.....	897	12,824	14.3	4,239	4.7	33.0
New Mexico.....	358	7,483	20.9	873	2.5	11.9
Arizona.....	789	10,761	13.6	3,672	4.6	33.7
Utah.....	442	3,426	7.8	1,252	2.9	36.8
Nevada.....	246	4,370	17.8	1,392	5.7	31.9
Pacific.....	18,834	172,668	15.9	39,471	3.6	22.8
Washington.....	1,370	20,103	14.7	4,383	3.2	21.8
Oregon.....	941	12,423	13.2	3,373	3.6	27.2
California.....	8,021	135,475	16.9	30,399	3.8	22.4
Alaska.....	191	1,261	6.6	275	1.4	21.8
Hawaii.....	311	3,406	11.0	991	3.2	29.1

Source: Social Security Administration, 1 percent Continuous Work History Sample and other administrative records.

1/ Numbers of insured workers as of January 1, 1978, other data for Fiscal Year 1978 in 1,000's.

2/ Includes possessions, military, etc., not listed in geographical breakdowns.

Table B.—Number of persons aged 18-64 with work disability and number per 1,000 population by degree of disability, geographic division, and State, 1976

(Numbers in thousands)

Geographic division and State	Total population	All disabled		Severely disabled	
		Number	Per 1,000 population	Number	Per 1,000 population
Total.....	123,797	16,444	133	9,288	75
New England.....	7,091	797	112	415	58
Maine.....	601	82	137	46	77
New Hampshire.....	474	54	113	26	55
Vermont.....	269	35	130	18	68
Massachusetts.....	3,382	365	108	196	58
Rhode Island.....	532	69	129	37	69
Connecticut.....	1,833	192	105	91	50
Middle Atlantic.....	21,813	2,575	118	1,531	70
New York.....	10,690	1,188	111	760	71
New Jersey.....	4,265	501	117	277	65
Pennsylvania.....	6,859	886	129	494	72
East North Central...	23,594	2,999	127	1,631	69
Ohio.....	6,179	838	136	461	75
Indiana.....	3,045	374	123	198	65
Illinois.....	6,401	778	122	428	67
Michigan.....	5,340	704	132	405	76
Wisconsin.....	2,628	305	116	139	53
West North Central...	9,385	1,138	121	566	60
Minnesota.....	2,210	268	121	119	54
Iowa.....	1,593	178	111	83	52
Missouri.....	2,710	375	138	219	81
North Dakota.....	346	39	113	17	49
South Dakota.....	374	44	119	19	52
Nebraska.....	858	83	97	36	42
Kansas.....	1,293	151	117	73	56
South Atlantic.....	19,780	3,003	152	1,820	92
Delaware.....	342	40	117	20	59
Maryland.....	2,419	265	109	146	60
Dist. of Col.....	430	67	155	43	100
Virginia.....	2,998	388	129	228	76
West Virginia.....	1,059	226	213	154	146
North Carolina.....	3,233	505	156	289	89
South Carolina.....	1,635	257	157	161	99
Georgia.....	2,884	549	190	341	118
Florida.....	4,786	707	148	436	91
East South Central...	7,749	1,377	178	854	110
Kentucky.....	1,937	361	187	216	111
Tennessee.....	2,472	428	173	265	107
Alabama.....	2,063	347	168	212	103
Mississippi.....	1,277	240	188	162	127
West South Central...	11,980	1,760	147	966	81
Arkansas.....	1,203	236	196	137	113
Louisiana.....	2,104	360	171	226	107
Oklahoma.....	1,538	254	165	131	85
Texas.....	7,135	911	128	473	66
Mountain.....	5,630	708	126	343	61
Montana.....	431	60	140	28	66
Idaho.....	467	63	135	29	62
Wyoming.....	222	25	113	11	49
Colorado.....	1,531	166	108	79	51
New Mexico.....	657	86	131	52	79
Arizona.....	1,293	184	143	91	71
Utah.....	665	80	121	33	50
Nevada.....	364	43	118	20	55
Pacific.....	16,767	2,087	124	1,161	69
Washington.....	2,050	257	125	126	61
Oregon.....	1,346	185	138	86	64
California.....	12,666	1,583	125	921	73
Alaska.....	204	15	75	6	29
Hawaii.....	502	46	92	23	46

Source: Bureau of the Census, 1976 Survey of Income and Education.

applicants, e.g., severity of medical condition or educational level or occupational skills, may vary among the States. Or, lack of uniformity of decision-making by the State disability determinations units may occur."

One recent study found a lack of uniformity in the claims process not only between States but within States. 5/ The study found an average probability of disagreement within State of about .12, while the average probability of disagreement between States was somewhat greater at approximately .16.

Some observers have suggested that the differences among States in disability prevalence and application rates are the result of differences in local labor market conditions. Two studies have shown a relationship (over time) between applications for disability benefits and the unemployment rate. 6/ A third study found a cross-sectional association between individual State unemployment rates and disability prevalence rates. 7/ Meanwhile, some critics of the State disability determinations process have suggested that the differences in allowance rates between States reflect the fact that some States take account, improperly, of local economic conditions in making disability determinations and, in effect, convert the SSDI program into an unemployment insurance program.

Prior research, which is examined more extensively below, has concentrated on three major areas. First, several studies have examined separately the impact of population characteristics (particularly demographics) on the perception of disability, application for SSDI benefits, and the determinations decision.

Second, research has evaluated the uniformity of the determinations process both between and within States. Finally, studies have addressed, through the use of aggregate data, the impact of economic conditions on the perception of disability and applications for SSDI.

This study seeks to extend the prior research by combining aspects of these studies. The prime focus of this study is to examine the impact of local labor market conditions on the perception of disability. on the decision to apply for SSDI benefits, and on the disability determination decision while controlling for individual differences in demographic characteristics and economic incentives. Of foremost interest, of course, is how the state of the local labor marker, e.g., employment opportunities, affects the probability of an allowance, either through increased applications or changes in the way that State agency examiners make disability determinations.

Previous Research

The subject matter of this report is not new. Previous research has examines various aspects of the decision to label oneself disabled, the decision to apply for SSDI benefits, and the disability determination process using data aggregated either nationally or at the State level. To date, however, no one has considered the impact of local labor market conditions on these processes based on the behavior of individuals.

Howards and Brehm examined the relationship between local labor market characteristics and the rate of self-defined disability in the population and the rate of application for social security disability benefits. 8/ Their

analysis was based on aggregated cross-sectional data at the State level. Some people have interpreted the Howards-Brehm macro-level results to empirically verify a micro-level relationship. Such an interpretation is likely to be incorrect due to problems with aggregation bias. 9/ In addition, the Howards-Brehm study did not take into account the effect of demographic differences in the composition of State workloads. The present research will test for the presence of micro-level relationships holding demographic factors and other differences constant.

In a macro-economic context the Howards-Brehm results are of interest. Among the labor market characteristics found to significantly increase the prevalence of self-reported disability were the percent of families with low income, the percent of families with social security income, and the percent of males under 65 in the labor force. The factors reducing the prevalence of self-defined disability included the proportion of families with a self-employed or unpaid family worker, the occupational diversity of the State, and the proportion of females under 65 in the labor force. The unemployment rate was not among the variables found significant to the .05 level. Local labor market factors found to have a significant impact on increased SSDI application rates included the proportion of families earnings less than $4,000 and the percent of families with social security benefit income. The percent of families with self-employed or unpaid family workers and the percent of females in the labor force, were both associated with lower rates of application. Again, the rate of unemployment did not significantly affect the rate of application for SSDI benefits on a State-wide basis.

Lando 10/ found a positive and significant relationship between State-wide rates of unemployment and the rate of severe disability within the State, the allowance rate per insured population in the State, and the rate of receipt of SSDI benefits relative to the insured population within the State. The simple regression model used, unlike that of Howards and Brehm, controls only for the southern location of the State. Again, State level data raise the annoying problem of aggregation bias.

Hambor 11/ and later Lando, Coate and Kraus 12/ examined the impact of unemployment and other variables on the number of applications within a time series model. The unemployment rate and the number of applications were measured on a national basis with four quarterly observations per year. Although the result is not directly generalizable to cross-sectional differences in the local labor market unemployment rate, both papers found significant increases in the number of applications associated with increases in the rate of unemployment.

Leonard, 13/ in a study on SSDI and labor force participation rates, employed a cross-sectional microeconomic model to examine the probability of an individual being on SSDI beneficiary rolls at a given point in time. The examination of local labor market characteristics was limited to a binary variable representing residence in an urban location. This variable, incidentally, proved to be statistically insignificant in the analysis.

Levy 14/ examined the impact of various health and economic variables on the determination process. The lack of data on local labor market characteristics precluded the inclusion of these variables in his multivariate cross-sectional

characteristics may be correlated with those of the local labor market, 15/ the coefficients obtained from the logit regression may prove to be biased.

Gallicchio and Bye 16/ examined the consistency of initial social security disability insurance decisions by the State disability determinations services. The study found a lack of uniformity both within and between States in the determination decision. The average probability of disagreement was found to be larger between States than within States; however, it was not possible to test to see if the difference was statistically significant. The authors did not attempt to link the lack of uniformity to local labor market conditions.

This study will attempt to extend the previous research and include consideration of local labor market characteristics on the disability process. The local labor market information used is intended to reflect the labor demand and economic opportunities which may affect one's decision to apply for disability benefits or which might affect the determinations made by State agency examiners in processing claims for benefits.

The Data

The data employed in this study come from the 1972 Social Security Survey of Health and Work Characteristics. 17/ Survey responses for individual respondents were merged with SSA's administrative records and local data provided from the Bureau of the Census' 1972 County-City Data Book, using social security account numbers and county of residence. The administrative records were used to obtain information as to dates of application,

determination on applications, dates of termination, beneficiary status, benefit amount, the individual's social security earnings history, etc. The Census data provided information about the local socioeconomic environment measured on a county-level basis. Since the Census data did not contain information on the exhauston of unemployment compensation benefits, this data was matched on a State level from data published in the Statistical Abstract of the United States, 1972. 18/

The expected replacement rate variable used in the analysis was computed using the 1 percent Continuous Work History Sample for disability entitlements from 1969 to 1975. The rates were based upon average indexed earnings over the lifetime and were computed according to the beneficiary's age, sex, race and the number of dependents. 19/ Each survey respondent was then assigned the median replacement rate for persons in the CWHS with the same age, sex, race, and number of dependents.

The only survey cases excluded entirely from the analysis were those with missing values on any of the dependent or independent variables. This reduced the sample size from 17,997 to 14,289 cases.

The Model

The presence of a physical or mental disease, an impairment or a functional limitation does not necessarily result in a disability. Disability represents the interaction between the impairment and a wide variety of other factors. Even with serious impairments, whether or not disability occurs will depend to

a great extent on the demographic and socioeconomic characteristics of an individual and on his or her family situation. Successful adapation to an impairment will depend on an individual's age, education, occupational history and skills, and work attitudes and motivations. Adaptability will also be affected by family support and the availability and utilization of community services, e.g., special education, physical restoration, and vocational retraining. Finally, elements of the individual's economic environment such as employer attitudes and practices, the availability of alternative jobs and the general state of the local labor market may also affect the extent to which a significant impairment results in a disability.

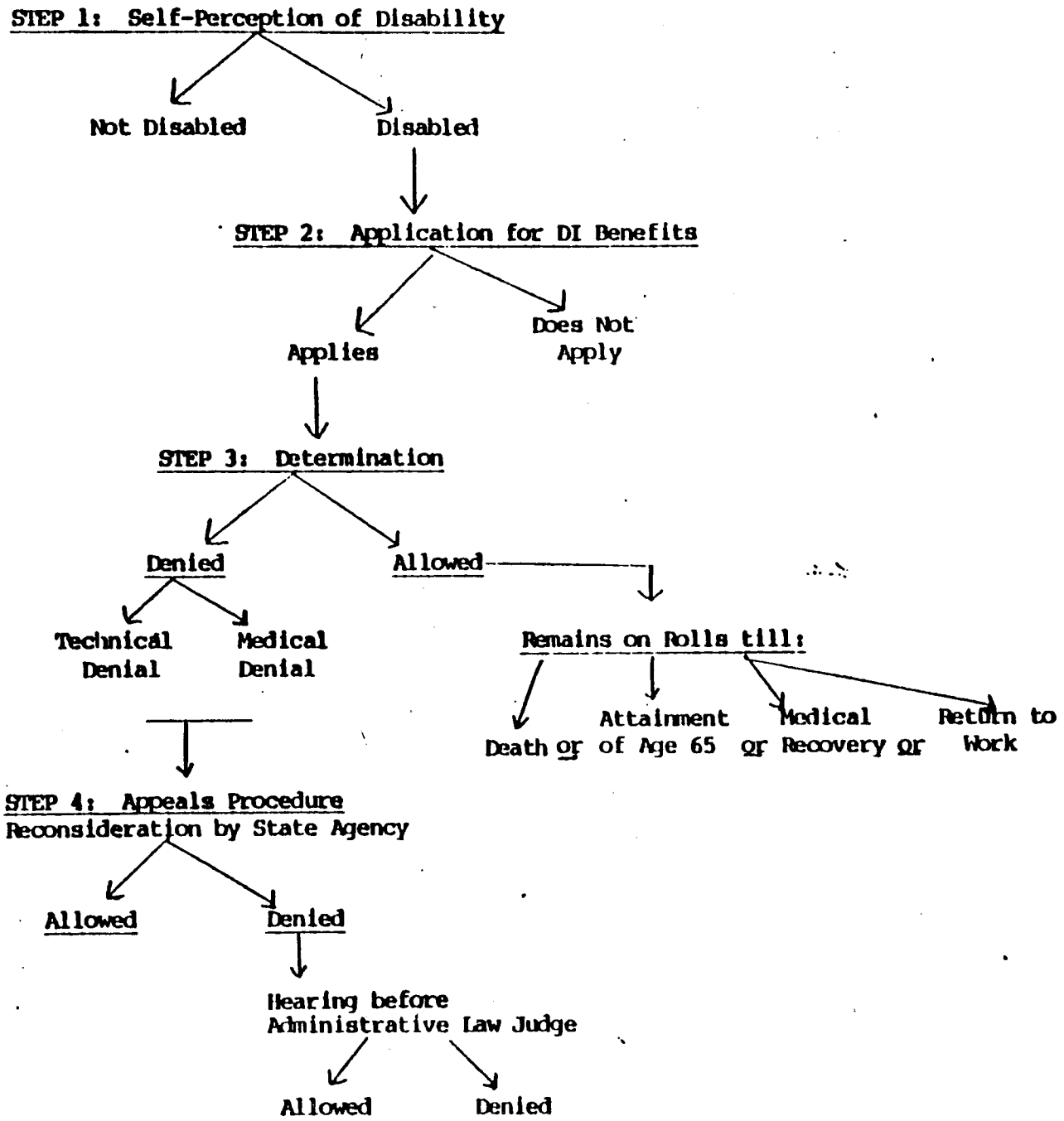
The disability process is treated here as a series of rational decisions made by an individual (after full consideration of the factors mentioned above) with the interaction of the institutional structure of the State determinations process. The conditional probability model of decisions which is postulated is illustrated in figure 1.

The first decision made by the individual is whether to consider him/herself disabled. That decision represents not only the presence of a disease or a functional limitation, but a combination of the health problem with other factors including age, education, occupation and economic opportunity. In this study, the respondent's perception of disability was based on questions pertaining to the existence of a limitation in the amount or kind of work, or housework, the respondent is able to perform as a result of impaired health. A separate analysis examines the propensity among those who considered themselves disabled to label their disability as "severe." 20/

The second decision for the individual is whether or not to apply for disability insurance benefits. This decision depends on the level of functional capacity possessed by the individual, his stock of human capital (as measured by education level, prior labor force experience, and occupation), perceived economic opportunity, knowledge of the SSDI program, and the economic incentives associated with the receipt of benefits.

The third decision in the disability process is the determination of whether the applicant is allowed or denied disability benefits. The social security district office determines whether the individual is technically eligible for DI benefits, that is insured for disability. To be insured in the event of disability the individual must be both fully insured 21/ and insured for disability. 22/ The actual disability determination is made by the Disability Determinations Service (DDS) operating in each State. This determination is a three part process. First, the applicant is checked to ascertain whether he/she is working at a level of earnings, representing "substantial gainful activity" (SGA). 23/ Then the applicant's impairment is checked to determine whether the individual is unable "to engage in any substantial gainful activity by reason of a medically determinable physical or mental impairment which can be expected to result in death or which has lasted or can be expected to last a continuous period of not less than 12 months." 24/ If the individual's medical condition meets or equals in severity the signs, symptoms and physical manisfestations for specific impairments in the "medical listings" contained in SSA regulations, the claimant is determined to be disabled and allowed benefits.

FIGURE 1.--The Disability Process



If the applicant fails to meet or equal the listings, his ability to perform his pervious work is examined. If he is able to perform such work, he is denied DI benefits; if he is unable to perform his earlier work, vocational factors may be considered to determine whether the individual is able to do any other work. These vocational factors include age, education, occupation and work experience. Social security regulations allow the DDS to make a finding of disability in cases where the applicant "Has long-time work experience (35-40 years or more) limited to arduous, unskilled, physical labor; and has little education; and has a significant impairment in that it prevents performance of the previous kind of work; and has not demonstrated ability to to lighter work." 25/

For persons who are denied, appeals procedures are available. The denied claimant may request a reconsideration in which the application is reviewed by the same State agency, but by a different claims examiner. If still denied, the claimant may request a hearing before an administrative law judge (ALJ). The ALJ is a federal employee, and makes his decision entirely independently of the State agency. Unfortunately, data are not available to allow examination of the appeals process in the context of the current research.

Once allowed onto the disability insurance rolls, a beneficiary may receive benefits until he/she dies or attains age 65, or is terminated for medical recovery or as a result of return to employment which represents "substantial gainful activity " The decision to remain on the rolls is a result of many factors including, of course, one's health. One major deterent to leaving the DI rolls may be a lack of employment opportunities as a result of poor labor market conditions.

The Variables

The independent variables in this analysis were chosen to represent parameters in the model of the disability process and include elements representing human capital accumulation, health, economic incentives and economic opportunity. Since it is not possible to measure all of these concepts directly, proxies were chosen for some of them. Because the impact of certain variables may differ according to one's sex (e.g., marital status, and the presence of children), the analysis was done separately for men and women. 26/

Labor Market Variables

The prime interest of this report is testing for the existence of relationships between an individual's perception of disability, application for and allowance of SSDI benefits and the characteristics of the local labor market. Five variables were chosen to represent various aspects of the local labor market. These variables include the county-level unemployment rate, the percent of persons in the State exhausting unemployment benefits, the percent of families in the county living below the low income level, a measure of occupational diversity in the county and a dummy variable representing residence in a rural location. The five variables are intended to reflect the economic opportunity, employment prospects and job mobility factors associated with the local labor market. Because the vector of local labor market variables is meant to proxy the single concept of economic opportunity, the entire vector will be tested for significance together in addition to the usual individual tests of significance. A likelihood ratio test is employed for this purpose.

A description of the construction of each of the local labor market variables and the anticipated effect of the variables in the model follows.

UNEMPLOYMENT RATE - This variable was chosen as a proxy for economic opportunity in the area. Low unemployment rates are likely to reflect more job opportunities and encourage the continuation of employment. High unemployment rates are associated with severe competition for limited job openings and may discourage job seeking by workers with some impairment while encouraging reliance upon income maintenance programs including SSDI. High unemployment is expected to result in an increased probability of considering oneself disabled and of applying for SSDI benefits. On the other hand, the Social Security Handbook states that "An individual will not be considered under a disability...where: The work the individual could do, does not exist in the local area; or there are no existing job openings..." 27/ Thus, the disability determination process should not be affected by the unemployment rate, although many critics believe it is. The employment rate is measured in percent on the county level for the year 1970.

PERCENT EXHAUSTING UNEMPLOYMENT BENEFITS - This variable is intended to measure the extent of chronic unemployment in the locality. The effect of this variable is expected to be the same as the unemployment rate, but perhaps of a greater magnitude. The variable is measured at the State level for the year 1970. These data were not available on a more local level.

PERCENT OF FAMILIES WITH LOW INCOME - This local labor market variable intended to measure economic opportunities and the relative attractiveness of SSDI benefits. The variable is anticipated to increase the probability of self-perceived disability and application for SSDI benefits. No effect is anticipated for the determinations process. The variable is measured in percent of households below poverty in the county of residence in 1972.

RURAL LOCATION - Alternative job opportunities for persons whose impairment prevents them from doing their previous jobs are likely to be more limited in a rural area. Available jobs in rural areas tend to be farm-related or blue collar in nature, offering limited basis for adaptation to an impairment. Access to public transportation is limited in rural areas making it difficult to travel to alternative job locations. These factors are expected to result in increases in the probabilities of labeling oneself disabled and of applying for benefits. No effect is anticipated on the probability of allowance. The variable is specified as a dummy variable with a "1" assigned to persons residing on farms and in the country and a "0" assigned to those living in towns, cities and suburbs.

OCCUPATIONAL DISPERSION - Local labor markets which are diverse in the types of occupations available are likely to offer more opportunity for an individual to adapt to his/her impairment. This is particularly true in areas with a high concentration of white-collar employment, which provide job alternatives that are less arduous in nature. A large proportion of white-collar employment is likely to reduce the incidence of occupational

disease and accidents by virtue of the type of industry. The variable is expected to reduce both the probabilities of perceiving oneself as disabled and of applying for SSDI benefits. No effect is anticipated on determinations. The variable is measured by the percent of employees in the county whose jobs fall into the professional, managerial sales, or clerical categories.

Individual Characteristics

In order to assess the impact of local labor market characteristics independently of other factors it is necessary to consider in the analysis an individual's own characteristics which affect the ability to adapt to an impairment and the individual's own economic incentives. This was accomplished by using a multivariate technique which allows one to control for these individual characteristics. Variables were included to measure the individual's own human capital accumulation, health, and economic incentives. Among the variables included to measure these concepts were: age, race, education, marital status, number of children, a functional capacity index, spouse's earnings, asset income, other unearned income, the expected rate of replacement of predisability earnings by SSDI benefits and a dummy variable representing the individual's occupation. Variables which are intended to measure individual's characteristics or motivations in the self-defined disabled and application equations but are not known to the claims examiner have been dropped from the analysis of the determinations process. In the determinations equation the age variable has been segmented at age 55 and a dummy variable representing age 55

and over has been added to allow more precise testing of the effect of age and the consideration of vocational factors.

A description of the construction of the variables representing individual characteristics and discussion of the anticipated effect follows:

AGE - Age has been included to reflect several effects including the human capital effect and a health effect. There are two human capital effects represented by age: one's labor market experience and one's position on the age-earnings profile. Generally, older persons have longer work histories which endow them with skills and experience that enable them to adapt more easily to a potentially disabling condition. This "experience" effect is likely to reduce the probability of labeling oneself disabled and applying for SSDI benefits. On the other hand, aging is associated with a position further along one's earnings cycle and an individual's nearing his/her retirement. As one nears retirement, investments in additional training or a change in occupation which might be necessary to cope with an impairment or functional limitation result in smaller returns to the individual. This discourages potential adaptation to the impairment and raises both the probability of labeling oneself disabled and the probability of applying for SSDI benefits. There are also health effects associated with increasing age such as higher incidence rates of disabling conditions and the deterioration of one's capacity associated with progressive diseases. To the extent that the health effects associated with aging are not captured by the health measure employed in this analysis, one might expect the age variable to raise the probabilities of considering oneself disabled and of applying for SSDI benefits. The total effect of the age variable on self-perception

of disability and applications is indeterminate however, due to the countervailing impact of the components.

Age is expected to increase the probability of being allowed SSDI benefits for two reasons: for older persons the disability determination takes into account not only medical factors but vocational factors as well; and, all other things being equal, health is generally poorer at older ages. The variable used in this report is a continuous measure of age in years as of survey date in 1972. In the determinations equation the continuous variable measuring age was segmented into two continuous variables at age 65 and a dummy variable representing age of 55 years or more was added to measure the differential impact of age and the consideration of vocational factors for older workers.

RACE - Differences in occupation and labor force attachment are found between races. Whether the occupational differences result from occupational choice or perhaps through occupational discrimination, they result in varying risks of accident, impairment or disease. The labor force attachment differentials are due to the occupational differences and other socioeconomic factors including, perhaps, labor market discrimination. Due to these factors, racial minorities are expected to have a higher probability of considering themselves disabled and a higher probability of applying for SSDI benefits. In the determinations process, race, with other factors held constant, should not affect the outcome. The

race variable is a binary variable with a "1" assigned to whites and a "0" assigned to nonwhites.

EDUCATION - Higher educational attainment is associated with larger stocks of human capital, more job mobility (including greater occupational choice and a larger number of alternative job opportunities), stronger labor force attachment, and smaller risk of certain disabling conditions linked to occupation and/or lifestyle. These factors should operate to reduce the probability of labeling oneself disabled and applying for benefits.

In the determinations process education may be considered as a vocational factor among older workers, with lower educational attainment raising the probability of an allowance. In this report, education is measured by number of years of schooling completed and is expected to be negatively related to the disability variables being studied here.

MARITAL STATUS - Being married has several effects on the probabilities of considering oneself disabled and applying for benefits. Moreover, the effects vary by sex. For men, being married should increase attachment to the labor force thus reducing the probability both of perceiving oneself as disabled and of applying for SSDI benefits. Married women, on the other hand, are likely to have lesser attachment to the labor force spending more time as homemakers and perhaps raising children. As a result, for women we would expect marital status to increase the probability of perceiving oneself as disabled and of applying for SSDI benefits. For married persons of both sexes, the presence of a spouse means that there is a household

member who would be able to enter the labor force or increase their hours of work in order to allow the impaired persons to reduce work hours or to leave the labor force entirely. This substitution of workers is particularly likely when the impaired individual's earnings capacity is affected, and might be expected to increase the probability of labeling oneself as disabled and of applying for SSDI benefits. Finally, the disability program provides benefits for dependent spouses 28/ thus raising the value of the benefit package and of the economic incentives to label oneself disabled and apply for DI benefits. The net effect of the marital status variable is indeterminate in both the self-defined disability and the applications models. The disability decision process should not be affected by marital status for persons of either sex. Marital status is expressed as a dummy variable where being married with spouse present is assigned a "1" and all other living arrangements, as a reference group, are assigned a "0."

NUMBER OF CHILDREN - The presence of dependent children in a family will have an effect similar to that of being married. For men, attachment to the labor force is stimulated thus reducing the likelihood of perceiving oneself as disabled and of applying for SSDI benefits. For women, the opposite effect is expected; children raise the value of home production and reduce labor force attachment. Regardless of sex, the presence of dependent's benefits will increase the value of the benefit package along with the probability of application for benefits. The net effect of the presence of children is indeterminate in the self-perception and

application model for men, while it is expected to increase both probabilities for women. No effect is anticipated on the probability of allowance for persons of either sex. The number of children in the family under age 18 is used to measure this variable.

FUNCTIONAL CAPACITY - Poor health raises the probabilities of considering oneself disabled, of applying for and of being allowed benefits. An index was chosen as an objective measure of health to control for the actual severity of the medical condition. Controlling for functional capacity will allow the effects of other variables to be measured more directly. The variable is measured by the Duchnok Functional Index 29/ using a scale from 0 to 10. High values of the index represent poorer health.

SPOUSES EARNINGS - Spousal earnings are expected to produce an income effect and reduce the labor force attachment. The income effect associated with higher levels of spousal earnings is expected to raise the probabilities of perceiving oneself disabled and of applying for SSDI benefits. Since the claims examiner does not have access to this information, the spouse's earnings are not expected to affect the determinations process and thus the variable was excluded from that analysis. The variable is measured in thousands of dollars carried to three decimal places.

ASSET INCOME - Higher levels of asset income produce an income effect and may cause individuals to supply less labor. This effect may lead to an "early retirement decision" with a greater propensity to consider oneself disabled and apply for benefits. On the other hand, large amounts of asset

income are likely to be correlated with high earnings levels resulting in lower expected rates of replacement and less risk of occupational disability thus reducing the probability of considering oneself disabled and applying for SSDI benefits. Thus the effect of asset income is of indeterminate sign in the self-perception and application equations. Because the claims examiners does not know asset income the variable should not affect the determinations process and was not included in that equation. Asset income is measured in thousands of dollars received in 1971 carried to three decimal places.

OTHER UNEARNED INCOME - Sources of unearned income other than asset income include pensions (both private and public), unemployment compensation, public assistance payments, etc. Receipt of unearned income produces an income effect which reduces an individual's labor supply and labor force attachment, and, therefore, increases the likelihood of considering oneself disabled and applying for DI benefits. The receipt of disability benefits, other than SSDI, raises the total benefit package and increases the probability of application. Of course, this variable may be paritally tautological in nature because some of the transfer payments may be received only because an individual considers himself/herself disabled or because low SSDI benefits make one eligible for needs-tested programs. This may bias the coefficients on this variable. The unearned income variable is measured in thousands of dollars received in 1971, carried to three decimal places. It excludes any SSDI benefits received.

EXPECTED RATE OF REPLACEMENT - The expected rate of replacement of predisability earnings by SSDI benefits is intended to measure the relative value of the benefit package and the individual's economic incentives to apply for benefits. The expected rate of replacement should raise the probability of application. It should, therefore, also increase the probability that an individual perceives himself/herself as disabled in order to apply for benefits. The variable is not known by the claims examiner and was not expected to have any effect on the determination process and was not included in that analysis. The variable is measured as the ratio (in percent) of expected SSDI benefits relative to predisability earnings.

OCCUPATION - An individual's occupation might be expected to have several different effects on the disability process. The risk of accident and work-related disease is related to occupation. The extent to which an individual's impairment restricts work activity on his/her present employment, and the ease with which one is able to adapt to his/her handicap also vary with the type of occupation. Finally, an individual's attachment to the labor force is determined, to some extent, by occupation. White-collar workers should be less likely to perceive an impairment as being disabling and to apply for DI benefits. The impact of occupation on the possibility of allowance is clear, at least for older workers. Due to the consideration of vocational factors for older workers, white-collar workers would be less likely to be allowed SSDI benefits. The variable is specified as a binary variable with a value of "1" for persons with white-collar

predisability occupations, and a value of "0" for all other occupations. Where the predisability occupation was not known, e.g., among the nondisabled, current occupation was used for this analysis.

The Estimation

The model, which is a conditional probability model, was estimated by the application of a multivariate logit technique to each of the dependent variables indicating whether one labeled himself disabled, whether the individual applied for SSDI benefits, and whether the applicant was allowed disability benefits. The logit technique employed is a maximum likelihood estimator and an independent error structure allows each equation to be estimated individually. 30/ The effects of local labor market factors on the self-perception of disability was examined using the entire sample. Additional analysis was done to determine whether the disabled individual thought that his/her disability was severe. This analysis included only those in the sample who indicated that they considered themselves to be disabled.

The relationship betwén local labor market factors and the decision to apply for SSDI benefits was examined only for that part of the population who considered themselves to be disabled. A second analysis was done examining the application decision among persons who thought they were severely disabled in order to assess the differential impact of the perceived level of disability. The fact of application during calendar years 1970 or 1971 was determined from information in the Master Beneficiary Record, other disability determination records and from responses to the survey.

The individual was considered an applicant if any of these sources indicated an application had been processed in 1971 or 1972. In order to limit the analysis to potential applicants only persons who considered themselves disabled, but were not disability insurance beneficiaries (DIB) as of December 1970, were included in the analysis.

The third relationship of the model, that representing the effects of local labor market factors on the determination process, was limited to those applicants who, according to the summary earnings record, were insured for disability benefits in 1971. The fact of allowance of SSDI benefits, was determined from the Master Beneficiary Record (MBR) and from other administrative claims processing records. Exclusion of persons who were not insured eliminated technical denials from the sample. This exclusion limited the relationship being studied to disability decision factors that were subject to the discretion of the examiners adjudicating disability claims in the Disability Determinations Services. Here again a separate analysis was done for the applicants who labeled themselves severely disabled.

Because earlier research has employed aggregated data and has been estimated with nonconditional models, it is clear that the results in this paper are not directly comparable with the earlier analyses. The results obtained in the present analysis measure the existence of micro-level relationships across individuals conditioned on their being in the relevant populations. The correct micro-level unconditioned effects may be obtained by multiplying the conditional probability obtained by the probability that the individual is in

the relevant population. The aggregate results, on the other hand, evaluate macro-level relationships measured for different reference populations.

The Results

The results of the logit estimation appear in table 1 at the end of this report. Table C, below, is a summary of those variables found to have a significant effect on any of the specific relationships studied and shows the direction of the relationship found.

Self-Perception of Disability

The analysis showed that when other factors were held constant, the local labor market variables, taken individually, did not have much of an impact on whether or not an individual considered him/herself disabled. Local area factors such as rural location, the local unemployment rate and the rate of exhaustion of unemployment benefits had no significant impact for members of either sex on the decision to consider oneself disabled (table C). In fact only two local labor market variables were found to have a significant impact on the perception of disability. The percent of families below the low income level was found to have a significant effect, but only for men, and the variable had the anticipated effect of increasing the probability of perceiving oneself disabled. The occupation dispersion measure was also found to be significant, but only among the women. The variable, measured as percent of jobs in the area which are white collar, reduced, as one would expect, the probability of

TABLE C.—Summary of the demographic, economic and local labor market variables found to be significantly related to, and the direction of the relationship on, self-perception of disability, application for SSDI benefits and allowance of benefits

	(1) Self-perceived disability (Among the entire population)		(1a) Self-perceived severe disability (Among persons self-perceived to be disabled)		(2) Application for DI benefits 1970-1971 (Among persons self-perceived to be disabled)		(2a) Application for DI benefits 1970-1971 (Among persons self-perceived to be severely disabled)		(3) Allowance to receive DI benefits (among 1970-1971 applicants with insured status)		(3a) Allowance to receive DI benefits (among severely disabled 1970-1971 applicants with insured status)	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Age			+	+	+	+	+	+				
Age (Under 55)											+	
Age (55+)									-		-	
Age Dummy 1/									+		+	
Race 2/			+	+	+							
School	-	-	-	-			+		+		+	
Marital Status 3/	-	-	-				+					
Number of children		-			+				-		-	
Functional capacity	+	+	+	+	+	+	+	+	+	+	+	+
Spouse's earnings						-		-				
Asset income												
Other unearned income	+	+	+	+	+	+						
Expected rate of replacement			-	-								
Occupation	-	+		-				+			-	
Unemployment rate												
Percent families low income	+		+	+								
Rural location				+								
Occupational dispersion		-		+				-				
Percent exhausting unemployment benefits												

1/ For age over 55 reference group is under age 55.

2/ For nonwhites reference group is whites.

3/ For married spouse present reference group is other arrangements.

4/ For white-collar occupation reference is other occupations.

perceiving oneself disabled. Taken together the vector of local labor market variables, as a proxy for economic opportunity, was found to have a significant impact on both men and women.

Among the variables found to have a significant impact on the perception of disability for men were education, marital status, functional capacity limitation, other unearned income, occupation, and the local labor market variable measuring percent of families low income. For men, educational attainment was associated with lower probabilities of perceiving themselves disabled.

Marital status was found to reduce the probability of a man perceiving himself disabled. The result indicates that, for men, the effect of marital status on labor force attachment outweighs the effect of the spouse as a possible substitute worker.

The functional capacity index, included to control for the level of functional capacity limitation, or the severity of the actual impairment, showed that persons with more severe impairments or who are in poorer health were significantly more likely to consider themselves disabled. Unearned income (other than asset income and SSDI payments) included all transfer payments and may include some which are paid only to the disabled. As a result, this variable may be somewhat tautological, though not purely so. The presence of unearned income increased the probability of a male considering himself disabled. The variable indicating whether an individual's occupation was white collar was also found to be significant for men. As expected those with white-collar occupations were less likely to perceive themselves as disabled.

For the women, schooling, marital status, number of children, functional capacity, other unearned income, occupation and, as discussed previously, occupational dispersion were found to significantly affect the perception of disability. Schooling and marital status had the same effect for the women as it did for the men; both variables reduced the probability of considering oneself to be disabled.

For women, the number of children was found to reduce the probability of perceiving oneself disabled. This finding was contrary to theoretical expectations given the higher value of home production in a household with children.

The degree of limitation in functional capacity increased the probability of considering oneself disabled, as did the amount of other unearned income. Both effects are consistent with the postulated model, and are the same result as found for the males. The effect of occupation on women was exactly opposite to that obtained for men. Women in white-collar occupations had a greater probability of perceiving themselves as disabled. The perversity of this result is strengthened when one notes that, for women, the occupational dispersion variable (i.e., the percent of jobs in the local labor market which were white collar in nature) had the anticipated sign and decreased the probability of labeling oneself disabled. It appears that, for women, the type of industry operating in the area has a strong influence on the perception of disability, and one quite different from their own occupational category.

It is evident that there are distinct differences between men and women in the factors contributing to self-perception of disability. Although the level of self-perception of disability, as measured by the constant term, did not differ significantly between men and women, the impact and magnitude of other variables did differ between the two sexes. Although the entire vector of local labor market variables had a significant impact for both men and women, individually different variables affected each sex. For men the only individual labor market variable which had a significant impact was the percent of families low income, while the occupation dispersion variable was the sole significant local labor market variable for women. The number of children was found to have a significant effect for the women but not for the men. Men whose occupation was white collar in nature were less likely to consider themselves disabled. Women, on the other hand, were more likely to consider themselves disabled if they were white collar workers.

Severity of Disability

Additional analysis was performed to ascertain which factors determine who among those with some disability considered themselves severely disabled, i.e., unable to work or unable to work regularly. Although the entire vector of local labor market variables, taken together as a proxy for economic opportunity, was found to significantly affect the self-perception of severe disability for both men and women, the results with respect to the individual local labor market variables were mixed. Neither the unemployment rate nor the percent of persons exhausting unemployment benefits had a significant impact on

the self-perception of a severe disability for either men or women. However, the percent of families in the county with low incomes significantly increased the probability of perceiving oneself as severely disabled for both men and women. Although not significant for men, living in a rural area and the degree of occupational dispersion in the area both raised the probability of women perceiving themselves to be disabled. The effect of occupational dispersion was, therefore, contrary to theoretical expectations and to the effect found in the earlier section for self-perceived disability of any degree.

Among men, increasing age was associated with a significantly higher probability of considering one's disability to be severe. Nonwhite males were significantly more likely to label themselves severely disabled.

Higher educational attainments and being married each reduced the probability for men of being severely disabled. These results are consistent with the results obtained in the first equation. Functional capacity limitation, as expected, increased the probability of having a disability which was considered severe.

For men, unearned income also increased the probability of labeling oneself severely disabled. The presence of other sources of income may provide more incentive for an individual not to work and allow one to restrict activity to a greater extent given the same level of functional capacity or impairment.

Surprisingly, men with higher expected replacement rates under SSDI were much less likely to consider themselves severely disabled than men with lower

replacement rates. No explanation for such a finding can be offered here. A priori, one might expect the opposite relationship since SSDI replacement rates are inversely related to predisability earnings which in turn tend to be lower among those with severe disabilities. Perhaps multicollinearity between the replacement rate and age, sex, and number of dependents (marital status and number of children) caused this perverse result.

The only local labor market variable found to have a significant impact for men was the percent of families in the area who were low income. This variable had the anticipated effect.

For the women, age and race were significant, both raising the probability of perceiving oneself to be severely disabled. Higher educational attainments reduced the probability of labeling one's disability severe. The effect of all three variables was the same as for the men.

The functional capacity index indicated that women who were more limited in their ability to function had a greater probability of perceiving themselves to be severely disabled. Other unearned income also raised this probability for the women. In contrast, the expected rate of replacement under SSDI reduced the probability of women of perceiving themselves disabled. The effect of the variable is counter intuitive for reasons which were previously discussed. Again, each of these variables had the same effect as on the men.

For women, occupation had a significant role in determining whether one considered herself disabled. Women whose occupation was categorized as white

collar were less likely to consider themselves severely disabled. This is expected since white collar occupations generally have smaller risks of occupational linked diseases and accidents. It is interesting to note that this result contrasts with the finding earlier in this paper that women in white collar occupations were more likely to consider themselves disabled to some degree than persons in other type occupations.

For women, the examination of local labor market variables produced three variables which had a significant effect on their perception of being severely disabled. These variables included the percent of families with low income, living in a rural location and the amount of occupational diversity in the area. As anticipated, the first two variables raised the probability of being severely disabled. The last variable also increased the probability of women being disabled, an effect quite different from that which was anticipated and opposite the effect this variable had for women in the analysis of the self-perception of being disabled to some degree.

There was no significant difference between men and women in the self-perception of being severely disabled as measured by the constant term. There were, however, differences between the sexes in the variables which had an effect on the perception of a disability as being severe. Where the percent of families with low income was the only significant labor market variable for men, this variable and two others (rural location and occupational dispersion) had a significant impact for women. Although being married reduced the likelihood of being severely disabled for men, the variable had no effect on the women.

Finally, while the individual's occupation had no effect on the severity of disability for men, women whose occupation was of a white collar nature were found to have a lower probability of being severely disabled.

The Application Decision

The decision to apply for SSDI benefits was examined among two separate populations: those with some degree of disability and the severely disabled. Subtle differences in the factors which were associated with the decision to apply were found. In general, however, few of the independent variables chosen for study here produced a significant effect on the application decision for either group (columns 5-8 of table 1). The results show that virtually none of the individual local labor market variables affected the application decision, and that taken together the entire vector of local labor market variables did not significantly affect applications for men or women, all disabled or severely disabled. In fact, the only labor market variable found to have a significant effect on applications was the occupational dispersion variable. That variable was found to reduce the probability of application, but only among women who were severely disabled. It is interesting to note the impact of this variable is opposite to that which had been hypothesized.

Increasing age significantly increased the probability of applyign for SSDI benefits for both groups of men; those who were disabled to some degree and those who were severely disabled. This probably reflects the continuing deterioration of one's health over time and may also reflect the use of the SSDI program as an early retirement for persons in poor health.

Race also had a significant impact on the applications decision for men but only for all persons with some degree of perceived disability. For this group, nonwhites had a higher probability of application. Neither educational attainment nor marital status significantly impacted on applications for men with some degree of disability, but among the severely disabled men both higher levels of education and being married served to increase the probability of an application for SSDI benefits.

One would expect persons with greater educational attainment to be less likely to apply for benefits and more likely to adapt to even a severe impairment. It is possible that, when other variables such as age and occupation are taken into account, educational level may reflect the effect of knowledge or awareness of the DI program. The impact of being married on the application decision of severity disabled men is also counterintuitive; especially when controlling for the presence of spouses benefits in the construction of the replacement rate variable. One would expect married men, regardless of severity, to be more strongly attached to the labor force than their nonmarried counterparts.

The presence of children in the family significantly increased the probability of applying for SSDI benefits among the group of men who had some perceived level of disability. The SSDI program pays additional benefits to dependents and the presence of children would raise the relative attractiveness of the program. This finding is consistent with economic theory which holds that the presence of children in the household will raise home productivity and distort

the work-leisure decision in favor of leisure (home time). The increased value of leisure, other factors being the same, will result in a more attractive SSDI program and may tend to raise applications, at least among this group of men. Nevertheless, the number of children had no significant effect on applications among severely disabled men.

Functional capacity limitations significantly raised the probability of applications for men with lower levels of functional capacity irrespective of their perceived severity of disability.

The presence of other sources of unearned income did not significantly affect the application decision among severely disabled men, although it did increase the probability of application among all disabled men. The implications of this finding seem clear: The total value of the benefit package only affects persons whose impairment is marginal in nature. Persons with severe disabilities appear to act not out of economic motives, but out of the inability to work.

Few of the variables tested in this model had a significant impact on women in the decision to apply for SSDI benefits. Increasing age and lower levels of functional capacity each served to increase the probability of application for both groups of women. Both effects are consistent with a priori expections, and the impact of these variables was the same as for the men.

For women, the earnings of the spouse reduced the probability of application for SSDI among both the total disabled and the severely disabled samples. This

result is contrary to the a priori expectations of the model. Perhaps the result is attributable to a different effect: because married women tend to take a secondary position in the labor force to their husbands, and because the higher earnings of the primary worker place less emphasis on the earnings of this individual, the need for replacement of the potential applicant's earnings may be less. This will reduce the probability of application among women. Men did not alter their application behavior based on their spouse's earnings, a finding supporting the primary worker notion.

Both one's occupation and the occupational dispersion of the local labor market were found to affect the application decision among severely disabled women. The probability of an application was increased when the woman's own occupation was white collar in nature, but the probability of an application was reduced in areas with a concentration of white-collar employment.

The difference in the level of applications by sex, as measured by the constant term, was not significant for either the groups including all disabled or those including only the severely disabled. There were, however, differences in the impact of individual variables according to sex. The probability of an application was significantly altered among men with some perceived level of disability by three variables: race, the number of children and unearned income. None of these variables affected the probability of application for women. The fact that this group of men were more likely to apply for SSDI benefits if there were children in the household while women were not affected is curious. One would anticipate the effect of children on women to be

greater, other things held constant. Perhaps women with children, who have higher probabilities of being out of the labor force, do not believe that they would meet the insured status requirements and hence do not apply.

Both groups of women, those who perceived themselves to be severely disabled and those who perceived themselves to be disabled to some degree, were found to have a significantly lower probability of application associated with higher levels spousal earnings. Men, however, were not significantly affected by the earnings of their spouse, regardless of the severity of their disability.

Higher probabilities of application for SSDI benefits among severely disabled men were associated both with being married and greater educational attainment. Neither variable affected the women. Severely disabled women, though, were affected by their predisability occupation and the occupational dispersion in the area while men were not.

Allowance of Disability Benefits

There are two reasons an individual may be denied SSDI benefits: technical reasons and medical reasons. The technical reasons are nondiscretionary and are not of interest in this analysis. In order to eliminate these institutional factors and analyze only the discretionary process of the State agencies, the analysis eliminated applicants who, according to the data on their Summary Earnings Record, were not insured for disability at the time of onset. The effect measured in this analysis pertains only to the decision of the State agency personnel, excluding the effect of these variables on the probability of a technical denial.

Few variables were found to have a significant impact on the determination process. None of the individual local labor market variables significantly altered the probability of being allowed disability benefits, nor did the vector of these variables when tested together for significance. Perhaps somewhat surprising, it was found that age had a significant impact only for the two groups of men, and not for either group of women and the individuals occupation was significant only for severely disabled men. Both of these variables were expected to have a significant impact due to the consideration of vocational factors in the determinations process. Such a result may reflect fewer women with a work history of many years of arduous unskilled labor, particularly when years of work are often lost to childbearing.

For men, being age 55 or over was found to significantly increase the probability of being allowed DI benefits. Such a result is consistent with the consideration of vocational factors. A second age variable, the continuous measure of age, was found to be significantly negative. The two variables together show an increase in the probability of allowance at age 55, but the probability declines with each additional year beyond 55. This result holds both among all disabled men and severely disabled men. No explanation for the decline in allowance with age for persons over 55 can be offered here.

Educational attainment was positively related to the probability of allowance, for both groups of men. This result seems counterintuitive because special consideration is allowed older applicants for adverse vocational factors including, but not limited to, lower educational attainment.

The presence of children reduced the probability of allowance for men, and for both the total disabled and severely disabled groups. This is a surprising result because no special consideration is supposed to be given to the presence of dependents in the determinations process. Note, however, that for the sample of men with some perceived level of disability the number of children was found to increase the probability of an application for SSDI while the probability of allowance is significantly lower. If the increased probability of an application for these men is found among the marginally impaired, and this receives some support from the fact that the increased probability of application was not found among the severely disabled men, the reduced probability of allowance for this group may be consistent with a properly operating determinations process which disallows unqualified applicants. For the severely disabled sample of men there was a similar reduction in the probability of allowance while there was no significant increase in the probability of application associated with the number of children. It is possible that this variable actually captures an age effect since younger applicants are generally those having children and generally have lower probabilities of allowance.

As was anticipated, functional capacity limitation was found to have a significant impact on the probability of allowance for both groups of men. A predisability occupation which was classified as white collar reduced the probability of allowance among the severely disabled men. The result is consistent with the consideration of vocational factors among older applicants.

Functional capacity limitation was the only variable which had a significant effect on the probability of allowance among the groups of women. As expected lower levels of functional capacity were associated with higher probabilities of allowance.

There was no significant difference in the level of allowance between men and women as measured by the constant term. The magnitude and importance of the effects of the variables differed somewhat by sex. Where several variables including age, educational attainment and the number of children were found to be significant variables in the allowance regressions for both groups of men, but none were found to be significant for either group of women. The individual's occupation played a significant role in determining the probability of allowance, but only for severely disabled males.

Conclusion

The foregoing research shows that, after individual differences in human capital attainment, economic incentives and demographic characteristics are taken into account, the effect of local labor market characteristics on self-perceived disability status, on deciding to apply for SSDI benefits and on the likelihood of being allowed such benefits is rather varied and inconsistent. The entire vector of local labor market variables, serving as a proxy for the concept of local economic opportunities, was found to be significant only in the self-perception of disability and self-perception of severe disability equations, while individual labor market variables were significant in all but the allowance equations.

Although some macro-level analyses, cited elsewhere in this report, have found the unemployment rate to be significant in predicting application rates, no significant micro-level relationship was detected in the present research on either the self-perception of disability, the decision to apply for benefits or the likelihood of being allowed benefits. While these results might cause one to believe that local unemployment does not affect the disability process, it is also important to point out that unemployment rates in 1970, those used in this study, were relatively low. The national unemployment rate began 1970 at a level which had been constant over the previous 4 years and rose throughout the next 2 years (1970 and 1971: the application years in question) before peaking in January 1972 and beginning a decline. 31/ Between December 1969 and January 1972 the unemployment rate more than doubled; rising from 2.8 percent to 5.9 percent. Thus the unemployment rate as measured here may not be representative of the period analyzed due to the great fluctuation in the unemployment rate over this period. Ideally the unemployment rate would be measured more closely to the time of the individual's application allowing only a slight lag time to account for the period between unemployment and application due to the 5-month waiting period for SSDI benefits.

The percent of persons exhausting unemployment benefits was included to help measure the chronic nature of unemployment in the area. The variable did not significantly alter the probabilities associated with any part of the disability process. State level data for this variable may not be adequate to represent the local characteristic.

The percent of families under the low income level was found to be significant for men in the equation determining who among the general population considered themselves disabled, and for both sexes in the equation determining who, among the disabled, which was intended to measure economic opportunity and upward mobility, was found to increase the prevalence of disability among these groups.

The variables which were included to capture employment opportunity and job mobility were a rural location dummy variable and a measure of occupational dispersion. The results from these variables were mixed. Rural location was found to be significant only in the equation representing the self-perception of severe disability. The variable was significant only among the women and was found to increase the probability of perceiving one's disability as severe. The occupational dispersion of the local labor market affected only the women and in different ways. It was found to reduce the probability of labeling oneself disabled, but it increased the probability of considering the disability to be severe. It also reduced the probability of application for severely disabled women.

One additional result of this paper relates not to the impact of local labor market factors, but to the attractiveness of the SSDI program as measured by the expected benefit replacement ratio, i.e., benefit amounts relative to pre-disability earnings. Contrary to expectations, this study did not find any relationship between the variable used to capture the expected replacement

ratio and the decision to apply for benefits. In fact, the study found that higher expected replacement rates reduced the probability that those with some work limitation considered their disability to be severe. It may be that the replacement rate variable used in this report does not adequately reflect an individual's economic incentives.

The foregoing research tends to suggest earlier findings from both time series and cross-sectional, but aggregated, data with respect to the impact of the local labor market on the disability process do not evolve from micro-level relationships. Further research on the subject, using additional and more current data, is necessary prior to drawing strong conclusions about the effect of local labor market factors on disability and the SSDI program.

TABLE 1.—Estimated coefficients from the logit analysis

	Self-perception of disability		Self-perception of severe disability		Applicants for DI 1970-1971 among the nonbeneficiary disabled population		Applicants for DI 1970-1971 among the nonbeneficiary severely disabled population		Allowance to DI 1970-1971 among the insured disabled applicant population		Allowance to DI 1970-1971 among the insured severely disabled applicant population	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Constant	1/-2.9039 (5.30)	-1.6976 1/(4.07)	1/-2.4514 (3.71)	1/-1.5238 (2.94)	1/-3.7189 (5.11)	-5.0377 (6.97)	1/-2.9469 (3.54)	1/-3.8358 (4.92)	2/-2.6132 (2.09)	-1.4110 (.60)	2/-3.4522 (2.11)	-.3784 (.15)
Age	.0069 (1.26)	-.0054 (1.44)	1/.0279 (4.05)	1/.0166 (3.46)	1/.0217 (2.86)	1/.0461 (6.46)	1/.0162 (1.79)	1/.0376 (4.88)	——	——	——	——
Age (under 55)	——	——	——	——	——	——	——	——	.0221 (1.24)	-.0256 (.68)	1/.0390 (1.66)	-.0279 (.71)
Age (55+)	——	——	——	——	——	——	——	——	2/-.1179 (2.04)	-.0314 (.36)	1/-.1670 (2.51)	-.0890 (.72)
Age Dummy 55+	——	——	——	——	——	——	——	——	2/7.8399 (2.17)	.7957 (.14)	1/11.3680 (2.69)	1.1496 (.52)
Race	-.1705 (1.40)	-.1101 (.96)	1/.4236 4.03)	1/.4112 (2.84)	1/.2744 (1.77)	-.0027 (.00)	.1659 (.96)	-.0098 (.00)	-.2053 (.62)	-.2208 (.45)	-.5472 (1.51)	-.3196 (.63)
School	1/-.0339 (3.06)	1/-.0901 (7.00)	1/-.1207 (9.16)	1/-.0836 (5.55)	-.0204 (1.46)	.0153 (.91)	2/.0351 (2.11)	.0158 (.87)	1/.0669 (1.95)	.0348 (.54)	2/.0751 (1.98)	.0409 (.62)
Marital status	1/-.7618 (7.48)	1/-.3350 (3.74)	1/-.9257 (7.34)	-.1791 (1.62)	.0341 (.26)	.0728 (.58)	1/.5043 (3.25)	.1769 (1.30)	-.0467 (.17)	-.1330 (.37)	.2021 (.60)	-.2086 (.56)
Number of children	-.0238 (.68)	2/-.0848 (2.19)	.0256 (.54)	.0368 (.69)	1/.0952 (1.89)	.0475 (.60)	.0807 (1.28)	.0483 (.57)	2/-.1763 (2.19)	.0107 (.00)	1/-.2411 (2.59)	.0291 (.10)
Functional capacity index	1/.7378 (38.91)	1/.7712 (40.62)	1/.4798 (20.27)	1/.3757 (17.62)	1/.2579 (10.50)	1/.2182 (8.40)	1/.1176 (3.94)	1/.1675 (5.78)	1/.3154 (5.22)	1/.4852 (4.79)	1/.2741 (3.89)	1/.3854 (3.56)
Earnings of spouse	.0076 (.70)	.0026 (.43)	.0133 (.83)	.0080 (.91)	-.0159 (.82)	1/-.0751 (4.87)	-.0072 (.30)	1/-.0773 (4.60)	——	——	——	——
Asset income	-.0245 (1.13)	-.0032 (.24)	-.0199 (.71)	-.0168 (.89)	-.0286 (.82)	.0020 (.10)	-.0676 (1.39)	.0455 (1.01)	——	——	——	——
Other unearned income	1/.1623 (6.77)	1/.1278 (4.95)	1/.2627 (4.46)	1/.1600 (3.27)	1/.0779 (.48)	-.0119 (.17)	-.0051 (.82)	-.0253 (.20)	-.0104 (1.23)	-.2057	-.0287 (.47)	-.2706 (1.58)
Replacement rate	.0057 (.91)	.0038 (1.56)	1/-.0093 (1.79)	1/-.0052 (1.68)	-.0036 (.63)	-.7023 (.17)	.0036 (.49)	-.0012 (.24)	——	——	——	——
Occupation	1/-.2411 (2.83)	1/.4270 (7.45)	-.0913 (.78)	1/-.4381 (4.29)	.0371 (.28)	.1440 (1.07)	.0933 (.58)	1/.2880 (1.89)	-.3117 (1.11)	.4298 (1.10)	1/-.7821 (2.41)	.4423 (1.07)
Unemployment rate	.0191 (.89)	.0221 (1.00)	.0335 (1.26)	.0144 (.54)	.0377 (1.30)	-.0190 (1.58)	.0152 (.44)	-.0290 (.82)	.0129 (.20)	-.0926 (.77)	.0592 (.77)	-.0373 (.30)
Percent families low income	2/.0126 (2.28)	.0004 (.00)	1/.0188 (2.83)	1/.0142 (1.92)	.0011 (.14)	-.0110 (1.28)	-.0055 (.69)	-.0148 (1.39)	-.0012 (.10)	.0102 (.30)	.0040 (.22)	.0025 (.00)
Rural	.0344 (.37)	-.0612 (.42)	.1333 (1.20)	1/.3775 (3.07)	-.1020 (.82)	-.1124 (.77)	-.0690 (.47)	-.1034 (.67)	.3073 (1.17)	-.6461 (1.16)	.2515 (.83)	-.7196 (1.23)
Occupational dispersion	.0002 (.00)	1/-.0153 (3.45)	.0002 (.00)	2/.0117 (2.12)	-.0050 (.81)	-.0104 (1.56)	-.0064 (.88)	1/-.0133 (1.84)	-.0063 (.48)	-.0113 (.52)	.0034 (.22)	-.0121 (.52)
Percent exhaustion unemployment benefits	.0025 (.57)	-.0000 (.00)	-.0015 (.28)	-.0092 (1.63)	-.0033 (.53)	.0062 (.92)	.0024 (.33)	.0036 (.50)	-.0070 (.49)	-.0195 (.82)	-.0087 (.53)	-.0264 (1.08)
N-Total	7,092	7,197	3,318	3,439	2,912	3,276	1,403	2,268	440	188	354	162
N with attribute	3,318	3,439	1,797	2,434	592	475	483	413	254	89	227	86

† statistics (absolute values) appear in parenthesis below coefficient.

1/ significant to .10 level, 2 tailed test (1.645).

2/ significant to .05 level, 2 tailed test (1.960).

3/ significant to .01 level, 2 tailed test (2.326).

Technical Note

In carrying out its responsibility for collecting and analyzing data on the disabled, the Social Security Administration conducted a survey in mid-1972, using the 5-percent sample from the 1970 Decennial Census to identify both disabled and nondisabled adults. The 1972 Survey of Disabled and Nondisabled Adults was designed primarily to update earlier estimates of the extent and severity of disability in the population derived from the earlier general survey of the disabled conducted by the Social Security Administration in 1966.

In addition, the survey examined factors associated with the development and duration of disability by comparing persons who were currently disabled, previously disabled, and nondisabled. The study focused on adjustments to disability and examined economic, medical, and social consequences of disability for the disabled person and his family. The survey provides information on:

-- the severity and prevalence of disability by demographic, social, economic, and occupational characteristics;

-- factors affecting coping mechanisms and the nature of adaptation to impairment and disability--such as work adjustments, rehabilitation, and dependency;

-- factors affecting application for and receipt of wage-replacement and income-maintenance benefits from social security and other public and private program;

-- evaluation of disability program provisions and of proposals for legislative and policy changes on disability and work experience requirements.

Study Design

The data were collected and processed by the Bureau of the Census. Survey estimates are based on a sample of 18,000 interviewed persons selected from the 1970 5-percent Census sample. Of these 18,000 persons, 11,700 were selected as the disabled sample from all those persons who indicated they were disabled before October 1969 on the 1970 Census questionnaire. A mail screening in 1971 of the remaining persons resulted in two other sample groups--5,100 nondisabled persons and 1,200 recent onset cases.

Noninterview reason	Number of persons
Total	2,850
Unable to contact	1,240
Temporarily absent	100
Refused	620
Moved outside 357 primary sample unit	650
Miscellaneous	240

In general, the sample was a stratified multistage cluster design comprised of 357 sampling areas that included every county and some independent cities in the United States. The disabled persons were selected from all 357 strata; the nondisabled and recently disabled groups were chosen from a special subset of 105 strata. The sample was designed to represent the noninstitutionalized civilian population of the United States aged 18-64 as of April 1970.

Definition of Disability

Disability is defined in this study as a limitation in the kind or amount of work (or housework) resulting from a chronic health condition or impairment lasting 3 months or longer. The disability classification was based on the extent of the individual's capacity for work, as reported by the respondent in a set of work-qualification questions. Data on employment and on functional capacities--such as mobility, activities of daily living, personal care needs, and functional activity limitations--were also collected to evaluate further the nature and severity of disability.

The severity of disability was classified by the extent of work limitations as:

Severely disabled--unable to work altogether or unable to work regularly.

Occupationally disabled--able to work regularly but unable to do the same work as before the onset of disability, or unable to work full time.

Secondary work limitations--able to work full time, regularly, and at the same work but with limitations in the kind or amount of work they can

perform, women with limitations in keeping house but not in paid work are included as having secondary work limitations.

Match with Social Security Records

To enhance the usefulness of household interview data in the analysis, the information obtained by interviews was combined with selected data available from the Master Beneficiary Record (MBR) and other administrative records maintained by the Social Security Administration. The MBR consists of individual records prepared for each person allowed social security disability insurance benefits. For each beneficiary, the MBR contains information showing the date of onset of the disability, the date of application for benefits, and the date of entitlement to cash benefits as well as the amount of subsequent benefit payments.

Survey respondents who had applied for but denied benefits were identified from the Determination Card File, a computer record prepared for every processed claim for disability benefits. The Determination Card shows the date the individual's disability was alleged to have begun and the date an application for benefits was filed. Up to six D-cards from the period 1965 to 1974 were matched to each survey respondent.

The data used to compute expected replacement rates for DI worker beneficiaries also came from administrative records; the Continuous Work History Sample (CWHS) matched to the MBR and IBIF records. The CWHS data is a 1-percent sample of all social security numbers issued. 32/

Estimation Procedure 33/

When probabilities are estimated by least squares, the resulting estimates, though unbiased, are inefficient. Furthermore, the random disturbances can no longer be assumed to be normally distributed, and the standard hypothesis-testing technique are inappropriate. Because the dependent variable is dichotomous, the standard measure of predictive power, R^2, also is inappropriate.

Finally, there is no certainty that the estimated probabilities will fall within the closed $[0,1]$ interval; although most probabilities should clearly do so, interpretation of those falling outside this interval are very difficult to accomplish. For these reasons, least squares is clearly an inappropriate estimation procedure.

The model presented here is estimated by a logit maximum likelihood procedure that yields consistent and efficient estimates. 34/ Given P_t probability of success $= e^{x_t\beta}/1+e^{x_t\beta}$ and $Q_t = 1/1+e^{x_t\beta}$ the likelihood function can be written as follows:

$$\underline{L}(\beta) = \left(\prod_{t\varepsilon\theta_1} e^{x_t\beta}/1+e^{x_t\beta}\right)\left(\prod_{t\varepsilon\theta_2} 1/1+e^{x_t\beta}\right) \text{ where}$$

x_t is a row vector of independent variables,

β is a column vector of coefficients,

θ_1 is the set of all observations, such that a success is observed, and

θ_2 is the set of all observations such that a failure is observed.

By maximizing this function, one can obtain parameter estimates. If a coefficient on a variable is positive, the interpretation is that, if that variable increases with the others held constant, then the probability of allowance increases. This specification is attractive because the logarithm of the odds ratio is a linear function of the independent variables, that is, $\ln P/Q = x\beta$. The coefficients can be interpreted as the marginal effects of a change in x on this dependent variable. The negative of the expected values of the second derivatives of the logarithm of the likelihood function, evaluated at the maximum, will yield the asymptotic standard errors of the estimated coefficients. In this way, tests of significance of the independent variables can be constructed.

Footnotes

1/ Unpublished program data based on the 1-percent Continuous Work History Sample and other administrative records.

2/ Lando, Mordechai E., "Prevalence of Work Disability by State, 1976," Social Security Bulletin, May 1979, Vol. 42, No. 5, pages 41-44.

3/ Severe disability is defined as the inability to work at all or the inability to work regularly.

4/ Individual agencies in each State, known as Disability Determinations Services, process claims and make disability decisions using federal guidelines. The determinations decision may be reviewed by the Social Security Administration's Office of Disability Operations. The federal review may not reverse a State finding that no disability exists, but may reverse an allowance to disability benefits on the basis of evidence in the applicants file.

5/ Gallicchio, Sal and Bye, Barry, "Consistency of Initial Disability Decisions Among and Within State," Staff Paper No. 39, Office of Research and Statistics, Social Security Administration, March 1981.

6/ Hambor, John C., "Unemployment and Disability: An Economic Analysis with Time Series Data," Staff Paper No. 20, Office of Research and Statistics, Social Security Administration, 1975 and Lando, M. E., Coate, M. B., and Kraus, R., "Disability Applications and the Economy," Social Security Bulletin, October 1979, Vol. 42, No. 10, pages 3-10.

7/ Lando, Mordechai E., op. cit.

8/Howards, Irving and Brehm, H. P., "The Ecology of Disability: Analysis of State Population and SSDI Program Administration Characteristics as They Relate to State Rates of Disability," Mimeo, University of Massachusetts, Amherst, February 1977. Final report to Social Security Administration on Contract No. 71-3380.

9/ For a discussion of aggregation bias see, for example: Theil, Henri, Principles of Econometrics, John Wiley and Sons, New York, 1971.

10/ Op. cit.

11/ Op. cit.

12/ Ibid.

13/ Leonard, Jonathan S., "The Social Security Disability Program and Labor Force Participation," NBER Working Paper No. 392, August 1979.

14/ Levy, Jesse M., "Demographic Factors in the Disability Determination Process: A Logistic Approach," Social Security Bulletin, March 1980.

15/ For example, a measure of one's labor force experience may be a function of past and present labor market characteristics including the demand for labor as measured by the unemployment and/or employment rates.

16/ Op. cit.

17/ A technical description of the 1972 Survey of the Disabled appears in the technical note at the end of this report.

18/ Source of unemployment compensation data: U.S. Bureau of the Census, Statistical Abstract of the United States, 1972, 93rd edition, Washington, D.C., 1972, pages 294-295.

19/ The median replacement rate data from the CWHS can be found in table 0, page 24, "Replacement of Earnings of the Disabled Under Social Security: Levels and Trends 1967-75," ORS Research Report No. 53, June 1980.

20/ The definition of disability and severity of disability may be found in the technical note at the end of this paper.

21/ To be fully insured an individual must have obtained 1 quarter of coverage for each elapsed year since attainment of age 22 or 1951 whichever is later.

22/ To be insured in the event of disability an individual must have earned at least 20 quarters of coverage in the 40 calendar quarters prior to the onset of this disabling condition, or one-half the number of quarters elapsed since attainment of age 21 if under 30 years of age, subject to a minimum of 6 quarters.

23/ A monetary level of measuring substantial gainful activity (SGA) has been in use since shortly after the program began. The amount is adjusted periodically. Operationally, and for purposes of processing claims in 1980, earnings of $300/month are presumed to demonstrate ability to engage in SGA. Similarly, monthly earnings of $190 or less are presumed not to represent ability to engage. For amounts in-between, the determination depends on the facts of the individual case. During the early 1970's, the period under analysis, month earnings of $140 were presumed to represent SGA, while monthly earnings of $90 or less are presumed not to represent SGA.

24/ Social Security Handbook, Sixth Edition, 1978, section 507, page 95.

25/ Social Security Handbook, Sixth Edition, 1978, section 609, page 104.

26/ Preliminary estimates on the pooled sample of men and women showed sex to be significant in all equations.

27/ Social Security Handbook, section 611, pages 104-105.

28/ Dependent's benefits are payable to aged spouses and mothers with dependent children under age 18, to children under 18, and to children 18 to 22 while full time students.

29/ Sandra Duchnok, "A Measure of Functional Capacity," ORS Working Paper No. 4, March 1979, Social Security Administration, Department of Health and Human Services.

30/ Further discussion of the logit technique and it's appropriateness for this analysis appear in the technical note at the end of this paper.

31/ Source: Bureau of Labor Statistics, Employment and Earnings and Monthly Report on the Labor Force, 1970-1972.

32/ Further information on the CWHS and IBIF can be obtained in the Appendix to: Muller, L. S. and Lando, M. E., "Replacement of Earnings of the Disabled Under Social Security: Levels and Trends 1969-1975," ORS Research Report No. 53, June 1980.

33/ The source of the following brief discussion of the logit technique is: Levy, Jesse M., "Demographic Factors in the Disability Determination Process: A Logistic Approach," Social Security Bulletin, March 1980.

34/ See Peter Schmidt and Robert Strauss, "The Prediction of Occupation Using Multiple Logit Models," International Economic Review, June 1976, pages 484-485.

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