CHAPTER III

The Empirical Results

In Chapter II a model was developed to analyze the wage effects of disability. The model consisted of two equations:

1) A wage determining equation

$$\ln Y_t = \alpha_0 + \alpha_1 X + \alpha_2 S + \alpha_3 exp_1 + \alpha_4 exp_1^2 + \alpha_5 exp_2 + \alpha_6 exp_2^2 + \alpha_7 MS$$

2) A wage growth equation

$$\Delta \ln Y = \beta_0 + \beta_1 X + \beta_2 K + \beta_3 K\chi + \beta_4 S + \beta_5 exp + \beta_6 MS$$

The above two equations were fit econometrically to empirically test the theory put forth in this thesis. The results are presented in this chapter.

The regressions were fit by Ordinary Least Squares (OLS) and should exhibit the ideal properties. The choice of using the OLS method was based on the assumption that S_t (time spent investing) is zero at the time period for which the estimates are made. This is a reasonable assumption to make as the data employed was of older men (50 to 64 years of age). Had the sample been more inclusive in terms of age, or been of younger men, it would have been necessary to correct for heteroskedastic disturbances by using a Generalized Least Squares technique. In the case of heteroskedasticity, Ordinary Least Squares yields unbiased, but inefficient estimates.[1]

For the purpose of estimation, the sample was stratified by race, a

practice common to labor economics literature. Previous literature has shown that the magnitudes of the coefficients for the wage determining variables (e.g. schooling, experience, health, etc.) differ by race. In addition to stratifying by race, regressions were fit for disabled and non-disabled persons separately. The regressions were run in a stepwise manner and several steps are reported to enable one to assess the interactions between disability and the parameters in the model.

The Data

The data employed in the empirical analysis was the 1966 to 1971 National Longitudinal Survey (NLS) or men aged 45 to 59. This survey followed a national cross-sectional sample of 5020 men who were aged 45 to 59 in 1966. Under the auspices of the Bureau of the Census in 1966, 1967, 1968, 1969 and 1971, the same group of individuals was surveyed and the survey data are linked across time. The 1971 survey contains the information on health and disability, and that survey provides the primary data used in this thesis, although the data from other years is used in the wage growth analysis. While the sample was intended to represent prime age males, by the time of the 1971 survey, the age of those in the survey was 50 to 64 making this a sample of older aged males nearing retirement age. It is important to view the empirical results with caution due to the aging effects of this sample.

The original sample contained 5020 observations of which approximately half were lost for the purposes of this research due to missing observations. Any case which did not report a wage rate was dropped, with the exception of those listing a specific disability and unable to work as the reason for not being in the labor force. These persons (less than 100 cases) were given an imputed wage rate of zero on the

assumption of unemployability due to disability.[2]

It was necessary to draw different samples for the wage determining equation and the wage growth equation due to limitations in the data. Sample I was employed in the estimation of the wage determining equation. It includes all cases in the 1971 survey except those with missing values for any of the variables employed in the analysis. Also deleted from Sample I were any individuals who claimed to be disabled in 1966 or 1969, but were no longer disabled in 1971. These cases offered no data to segment the earnings function for the amount of time disabled and to control for the magnitude of the past disability. The second sample was employed in the wage growth model and includes all cases in Sample I except those who were disabled prior to 1966 and those with missing values for the additional variables employed (i.e. weeks worked from 1966 to 1971). It was necessary to eliminate those persons disabled prior to 1966 because there is no data to determine whether the impact of the disability is increasing or diminishing over this period. Thus, Sample II will assess the impact of becoming disabled, as well as determining the wage growth effects. The mean characteristics of individuals in Sample I and Sample II are presented in Tables 1 and 2, respectively.

In addition it was possible to separate the disabled individuals into two categories: those whose limitation hinders the activity, and those whose limitation prevents the activity. Those individuals who are considered hindered by their limitation have a condition that <u>at least</u> restricts the performance of the activity. Those whose limitation prevents the activity can not perform that particular activity at all. The latter group is a subset of the former, and individuals whose limitation (s) simply hindered activity were eliminated from the limitation prevents

TABLE 1

MEAN CHARACTERISTICS OF MEN IN SAMPLE I

LIMITATION PREVENTS ACTIVITY

	ALL MEN			DISABLED			NON-DISABLED		
	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK
HOURLY RATE OF PAY 1971 ($)	3.91	4.41	2.78	2.54	2.90	1.77	4.47	5.01	3.22
LOG HOURLY RATE OF PAY (¢)	5.39	5.58	4.95	4.01	4.33	3.33	5.96	6.09	5.66
AGE (1971)	56.21	56.18	56.26	57.34	57.38	57.27	55.74	55.70	55.82
YEARS OF SCHOOLING	9.15	10.18	6.79	8.10	9.27	5.57	9.58	10.55	7.32
RACE (% BLACK)	30.38	0	100	31.53	0	100	29.90	0	100
MARITAL STATUS (% MARRIED)	84.95	89.32	74.94	79.85	84.76	69.20	87.06	91.16	77.45
NON-DISABLED EXPERIENCE	38.52	37.43	41.03	34.58	33.16	37.67	40.15	39.15	42.50
DISABLED EXPERIENCE	2.53	2.57	2.44	8.66	8.95	8.02	0	0	0
NUMBER OF OBSERVATIONS	2851	1985	866	834	571	263	2017	1414	603

TABLE 1, continued

MEAN CHARACTERISTICS OF MEN IN SAMPLE I

LIMITATION HINDERS ACTIVITY

	ALL MEN			DISABLED			NON-DISABLED		
	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK
HOURLY RATE OF PAY 1971 ($)	3.90	4.39	2.77	2.58	2.94	1.81	4.48	5.01	3.21
LOG HOURLY RATE OF PAY (¢)	5.38	5.57	4.94	4.06	4.37	3.38	5.96	6.08	5.66
AGE (1971)	56.22	56.18	56.30	57.33	57.32	57.35	55.73	55.69	55.82
YEARS OF SCHOOLING	9.15	10.18	6.80	8.14	9.32	5.67	9.59	10.55	7.32
RACE (% BLACK)	30.38	0	100	31.48	0	100	29.90	0	100
MARITAL STATUS (% MARRIED)	84.86	89.15	75.03	79.84	84.46	69.78	87.06	91.16	77.45
NON-DISABLED EXPERIENCE	38.44	37.33	40.98	34.50	33.08	37.70	40.16	39.15	42.49
DISABLED EXPERIENCE	2.62	2.67	2.52	8.62	8.92	7.97	0	0	0
NUMBER OF OBSERVATIONS	2900	2019	881	883	605	278	2017	1414	603

TABLE 2

MEAN CHARACTERISTICS OF MEN IN SAMPLE II

LIMITATION PREVENTS ACTIVITY

	ALL MEN			DISABLED			NON-DISABLED		
	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK
HOURLY RATE OF PAY 1971 ($)	4.43	4.94	3.19	3.38	3.69	2.61	4.55	5.09	3.26
LOG HOURLY RATE OF PAY 71 (¢)	5.89	6.01	5.58	5.06	5.19	4.77	5.98	6.11	5.68
HOURLY RATE OF PAY 1966 ($)	3.16	3.55	2.21	2.79	3.07	2.11	3.20	3.61	2.22
WAGE CHANGE 1966-1971 ($)	1.27	1.39	.98	.59	.62	.50	1.35	1.48	1.04
LOG WAGE CHANGE 1966-1971 (¢)	.26	.25	.29	-.45	-.44	-.46	.35	.33	.37
AGE (1971)	55.85	55.83	55.91	57.33	57.30	57.40	55.68	55.66	55.73
YEARS OF SCHOOLING	9.59	10.50	7.42	8.60	9.51	6.39	9.71	10.61	7.53
RACE (% BLACK)	29.38	0	100	29.08	0	100	29.42	0	100
MARITAL STATUS (% MARRIED)	87.98	91.53	79.46	85.71	87.77	80.70	88.25	91.97	79.32
NON-DISABLED EXPERIENCE	40.02	39.08	42.26	40.40	39.43	42.79	39.98	39.05	42.20
DISABLED EXPERIENCE	.24	.25	.23	2.32	2.36	2.23	0	0	0
WEEKS WORKED 1966-1971	245.52	246.79	242.45	211.29	215.79	200.32	249.48	250.40	247.27
NUMBER OF OBSERVATIONS	1889	1334	555	196	139	57	1693	1693	498

TABLE 2, continued

MEAN CHARACTERISTICS OF MEN IN SAMPLE II

LIMITATION HINDERS ACTIVITY

	ALL MEN			DISABLED			NON-DISABLED		
	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK
HOURLY RATE OF PAY 1971 ($)	4.42	4.94	3.18	3.39	3.74	2.53	4.54	5.09	3.26
LOG HOURLY RATE OF PAY 71 (¢)	5.88	6.01	5.57	5.07	5.22	4.71	5.98	6.10	5.68
HOURLY RATE OF PAY 1966 ($)	3.15	3.55	2.20	2.83	3.13	2.08	3.19	3.60	2.21
WAGE CHANGE 1966-1971 ($)	1.27	1.39	.98	.56	.61	.45	1.36	1.49	1.04
LOG WAGE CHANGE 1966-1971 (¢)	.26	.25	.28	-.45	-.43	-.50	.35	.34	.38
AGE (1971)	55.87	55.84	55.93	57.39	57.32	57.56	55.68	55.77	55.73
YEARS OF SCHOOLING	9.59	10.50	7.41	8.77	9.71	6.43	9.69	10.60	7.53
RACE (% BLACK)	29.34	0	100	28.77	0	100	29.42	0	100
MARITAL STATUS (% MARRIED)	88.03	91.60	79.43	86.32	88.74	80.33	88.24	92.27	79.32
NON-DISABLED EXPERIENCE	40.02	39.08	42.27	40.15	39.33	42.87	40.00	39.05	42.20
DISABLED EXPERIENCE	.25	.26	.25	2.27	2.28	2.26	0	0	0
WEEKS WORKED 1966-1971	245.38	246.71	242.19	212.69	217.50	200.77	249.47	250.40	247.26
NUMBER OF OBSERVATIONS	1905	1346	559	212	151	61	1693	1195	498

regressions. The difference is in the magnitude of the disability. From Tables 1 and 2 it becomes apparent that, on the average, those prevented from performing the activity earn lower wages and have smaller wage growth than those who are hindered in the activity.

For both samples the average wage for the non-disabled is higher than for the disabled. As past studies have shown, on the average, disabled persons are less educated, and, in this sample, the disabled have about 1.5 years less schooling. Perhaps this is attributable to the occupational segregation of workers with less human capital to jobs more likely to cause disabling conditions. Education may, on the other hand, increase one's efficiency at producing safety or health. The disabled individuals are, on the average, older than the non-disabled persons and have had more potential years in the labor market. From the data in Sample II, it is evident that disabled persons worked, on the average, 37 fewer weeks over the five year period from 1966 to 1971. In addition to being lower, wages of disabled persons grew more slowly, both absolutely and relatively, than did wages for the non-disabled. Persons who were not disabled saw an average wage increase of $1.35 or about 42 percent between 1966 and 1971, while disabled persons' wages increased only $ .58 or slightly less than 21 percent. Thus, even correcting for differences in the initial wage rate, persons becoming disabled realized only one half the wage growth of those not becoming disabled.

The black - white differentials are well known. The blacks earned substantially less than whites; the average wage for all blacks was 63 percent of the wage for all whites. Part of this differential is due to differences in educational attainment between the two races, and part is due to the fact that blacks worked fewer weeks per year than whites.

The remaining disparity may be caused by many unmeasured influences including, among other things, labor market discrimination. Of special interest are the wage growth differentials between blacks and whites. In all categories, blacks had larger relative (percentage) growth in wages between 1966 and 1971 than did the whites. Since we are examining individual wage growth from longitudinal date the cohort effect will be minimized. The larger percentage growth rate may perhaps, be attributable to higher rates of investment among blacks, to the anti-discrimination legislation and affirmative action programs of the late 1960's and early 1970's, or to changes in labor demand over this period. Since blacks, on the average, have lower stocks of human capital than whites, and shorter expected lifetimes, it is not likely that the rate of investment in human capital for blacks is higher than that of whites. Instead it appears that institutional changes have occurred.

Disability and health in general, are concepts which are very difficult to quantify. The National Longitudinal Survey attempted to obtain a measure of the magnitude of disability by asking for a self-report on 13 activity limitations. The disabled respondent was asked if his particular disability hindered, prevented, or had no effect on each of 13 activities.[3] Since exact measures of one's disability are not available, the disability measure (δ) employed in the model developed in this thesis was approximated by a vector of 13 dichotomous variables, where each variable took the value one if the disability hindered the individual in that activity, and zero if not. A separate run was made with the limitation taking the value one only if the disability prevented the activity. Tables 3 and 4 give the number and percentage of persons with a disability which limits each of the 13 activities for samples I and II,

TABLE 3

NUMBER AND PERCENT OF PERSONS WITH LIMITATIONS

SAMPLE I

		LIMITATION PREVENTS ACTIVITY			LIMITATION HINDERS ACTIVITY		
		TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK
LIMIT 1	WALKING	431 15.1	284 14.3	147 17.0	463 16.0	302 15.0	161 18.3
LIMIT 2	USING STAIRS	457 16.0	306 15.4	151 17.4	526 18.1	351 17.4	175 19.9
LIMIT 3	STANDING	366 12.8	242 12.2	124 14.3	539 18.6	360 17.8	179 20.3
LIMIT 4	SITTING	216 7.6	145 7.3	71 8.2	295 10.2	204 10.1	91 10.3
LIMIT 5	KNEELING OR CROUCHING	376 13.2	257 12.9	119 13.7	514 17.7	350 17.3	164 18.6
LIMIT 6	LIFTING 10 OR MORE POUNDS	189 6.6	109 5.5	80 9.2	327 11.3	192 9.5	135 15.3
LIMIT 7	CARRYING HEAVY WEIGHTS	272 9.5	187 9.4	85 9.8	692 23.9	467 23.1	225 25.5
LIMIT 8	REACHING	178 6.2	120 6.0	58 6.7	256 8.8	178 8.8	78 8.9
LIMIT 9	HANDLING OR FINGERING	127 4.5	83 4.2	44 5.1	176 6.1	115 5.7	61 6.9
LIMIT 10	SEEING	181 6.4	102 5.1	79 9.1	214 7.4	123 6.1	91 10.3
LIMIT 11	HEARING	176 6.2	129 6.5	47 5.4	201 6.9	144 7.1	57 6.5
LIMIT 12	DEALING WITH PEOPLE	73 2.6	53 2.7	20 2.3	109 3.8	75 3.7	34 3.9
LIMIT 13	OTHER	14 0.5	8 0.4	6 0.7	65 2.2	46 2.3	19 2.2
TOTAL (ANY OF THE ABOVE)		834 29.3	571 28.8	263 30.4	883 30.5	605 30.1	278 31.7

TABLE 4

NUMBER AND PERCENT OF PERSONS WITH LIMITATIONS

SAMPLE II

		LIMITATION PREVENTS ACTIVITY			LIMITATION HINDERS ACTIVITY		
		TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK
LIMIT 1	WALKING	79 4.2	54 4.0	25 4.5	87 4.6	58 4.3	29 5.2
LIMIT 2	USING STAIRS	101 5.3	71 5.3	30 5.4	116 6.1	82 6.1	34 6.1
LIMIT 3	STANDING	88 4.7	60 4.5	28 5.0	115 6.0	77 5.7	38 6.8
LIMIT 4	SITTING	40 2.1	27 2.0	13 2.3	57 3.0	38 2.8	19 3.4
LIMIT 5	KNEELING OR CROUCHING	88 4.7	63 4.7	25 4.5	109 5.7	77 5.7	32 5.7
LIMIT 6	LIFTING 10 OR MORE POUNDS	38 2.0	25 1.9	13 2.3	63 3.3	39 2.9	24 4.3
LIMIT 7	CARRYING HEAVY WEIGHTS	79 4.2	53 4.0	26 4.7	158 8.3	108 8.0	50 8.9
LIMIT 8	REACHING	32 1.7	22 1.6	10 1.8	53 2.8	37 2.7	16 2.9
LIMIT 9	HANDLING OR FINGERING	19 1.0	13 1.0	6 1.1	33 1.7	22 1.6	11 2.0
LIMIT 10	SEEING	31 1.6	18 1.3	13 2.3	41 2.2	25 1.9	16 2.9
LIMIT 11	HEARING	35 1.9	28 2.1	7 1.3	44 2.3	33 2.5	11 2.0
LIMIT 12	DEALING WITH PEOPLE	15 0.8	13 1.0	2 0.4	28 1.5	20 1.5	8 1.4
LIMIT 13	OTHER	2 0.1	2 0.1	0 0.0	21 1.1	16 1.2	5 0.9
TOTAL (ANY OF THE ABOVE)		196 10.4	139 10.4	57 10.3	212 11.1	151 11.2	61 10.9

respectively. From the tables it becomes evident that many disabled persons, as one might expect, suffer from more than one activity limitation. For example, the loss of an arm is likely to limit a person in lifting, carrying, reaching and handling or fingering, yielding a positive response to limits 6, 7, 8, and 9 respectively. The large correlations between limitations are likely to cause multicollinearity problems.[4] The stepwise regression technique is likely to alleviate, but not altogether eliminate, this problem.

Few large differences occur in the incidence of limitations according to race. Overall, blacks seem to suffer more frequently from those disabilities which are associated with physical activity, while whites suffer from disabilities associated with white collar employment (e.g. hearing, dealing with people, etc.). This circumstance may be caused by differences in occupational status between the races. The occupational differences may be attributable, in part, to the vast educational differences and perhaps due to discrimination. Conditions which may be considered disabling to a worker in one occupation may not be "disabling" to a worker in a different occupation.

The only major differences in the presence of the various limitations by race appear to occur in lifting (limit 6) and sight (limit 10). In both cases the proportion of blacks suffering the limitation exceeds that of the whites almost two to one. It is interesting to note that these limitations may be handicaps which are more easily corrected by medical care than certain of the other limitations. A lifting limitation (limit 6) may be caused by a hernia or chiropractic back problems, while a sight problem (limit 10) may be caused by glaucoma, cataracts, diabetes, or simply a need for corrective lenses. Each of these conditions can be

corrected by an investment in health care. However, given the lower wage rate for blacks, this investment may yield a smaller return for blacks relative to whites, explaining the large difference in the proportion afflicted by the limitation.

Wage Estimating Equation

The wage estimating equation is:

$$\ln Y_t = \alpha_0 + \alpha_1'\underline{X} + \alpha_2 S + \alpha_3 exp_1 + \alpha_4 exp_1^2 + \alpha_5 exp_2 + \alpha_6 exp_2^2 + \alpha_7 MS$$

where:

α_0 = $\ln E_0$

$\underline{X}$ = A vector of dichotomous variables respresenting activity limitations

α_1' = Vector of coefficients of activity limitations showing magnitude of disability effect on wage

S = Schooling

α_2 = Rate of return to schooling

exp_1 = Pre-disability experience

exp_2 = Post-disability experience

MS = Marital status (1 = married)

The specification of the dependent variable is the natural logarithm of the wage rate in cents per hour (dollars time 100). For persons who were unable to work, the dependent variable was set equal to zero. The vector $\underline{X}$ is specified in terms of 13 dichotomous variables and takes on a value of one if the person is prevented or hindered in each activity. Schooling is measured by highest grade completed; no adjustment has been made for quality of schooling. Experience prior to disability is

computed as total possible labor market experience by a method similar to that employed by Mincer:[5]

Experience = Age - School - 5 - Disabled Experience

Experience while disabled is taken directly from the survey; every individual claiming to be disabled was asked the length of his disability. This segment is given a value of zero for non-disabled persons.

The results of the regression analysis of the wage determination equation are given in Regression Tables 1 to 10. The regressions are stratified first by race, and second by the disabled or not disabled dimension. Results are reported separately for those whose limitation hindered the particular activity and those whose limitation prevented the activity.

Whites

The regression results for all whites are presented in Regression Tables 1 and 2. For both sets of regressions, 'limitation prevents activity' (regression 1) and 'limitation hinders activity' (regression 2), the rate of return to schooling is about six percent, and highly significant. This is somewhat less than 10 to 11 percent rate of return to schooling found by Mincer.[6] The differential is probably due to the difference in the two samples: Mincer employed a sample of the entire population while the present research employs a sample of older men. It may also be an indication of a decline in the rate of return to schooling over the 12 years between Mincer's data and the 1971 NLS survey. There does not appear to be a large health - education correlation for whites since the rate of return to schooling drops only 1.5 percent from about 7.5 percent to 6.0 percent with the inclusion of the health variables.

Stratifying the sample by disabled and non-disabled increases the

REGRESSION NUMBER 1
WAGE ESTIMATING EQUATION - ALL WHITES
LIMITATION PREVENTS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.07537 (5,808)		0.06152 (5.214)		0.05973 (5.055)
EXPERIENCE	-0.24127 (8.098)		-0.21573 (7.923)		-0.21590 (7.937)
EXPERIENCE^2	0.00261 (6.828)		0.00246 (7.047)		0.00246 (7.060)
DISABLED EXPERIENCE	-0.21105 (17.175)		-0.10648 (8.032)		-0.10771 (8.125)
DISABLED EXPERIENCE^2	0.00116 (2.873)		-0.00032 (0.846)		-0.00028 (0.725)
LIMIT 1 WALKING		-1.61442 (16.191)	-0.91009 (7.457)		-0.90364 (7.498)
LIMIT 2 USING STAIRS		-1.32482 (13.280)	-0.55774 (4.692)		-0.54925 (4.632)
LIMIT 3 STANDING		-0.75976 (6.946)	-0.06765 (0.568)		-0.06225 (0.523)
LIMIT 4 SITTING		-0.94451 (7.114)	-0.04247 (0.310)		-0.05291 (0.385)
LIMIT 5 KNEELING		-0.82846 (7.822)	-0.01439 (0.126)		-0.01278 (0.114)
LIMIT 6 LIFTING		-1.48345 (10.232)	-0.53721 (3.607)		-0.53724 (3.611)
LIMIT 7 CARRYING		0.16845 (1.392)	0.41265 (3.588)		0.41549 (3.686)
LIMIT 8 REACHING		-1.57413 (11.389)	-0.54873 (3.740)		-0.54051 (3.686)
LIMIT 9 HANDLING		-1.75347 (10.675)	-0.67199 (3.802)		-0.67550 (3.825)
LIMIT 10 SIGHT		-1.22626 (8.121)	-0.45572 (2.914)		-0.44496 (2.847)
LIMIT 11 HEARING		-0.21854 (1.566)	0.36337 (2.677)		0.35251 (2.597)
LIMIT 12 DEAL W PEOPLE		-1.27264 (6.180)	-0.67253 (3.409)		-0.64986 (3.293)
LIMIT 13 OTHER		-0.52656 (1.025)	-0.14056 (0.300)		-0.11545 (0.247)
MARITAL STATUS		0.39088 (3.693)		0.21379 (2.213)	0.21379 (2.213)
CONSTANT	10.48190		10.00132		9.82904
R^2	.250		.386		.388
F STATISTIC	133.268		70.423		67.106
DEGREES OF FREEDOM	1979		1966		1965
STANDARD ERROR	1.44490		1.30687		1.30558

REGRESSION NUMBER 2
WAGE ESTIMATING EQUATION - ALL WHITES
LIMITATION HINDERS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.07408 (5.678)		0.06256 (5.418)		0.06044 (5.223)
EXPERIENCE	-0.22039 (7.533)		-0.17729 (6.817)		-0.17811 (6.855)
EXPERIENCE^2	0.00233 (6.205)		0.00200 (5.995)		0.00201 (6.028)
DISABLED EXPERIENCE	-0.20569 (16.774)		-0.07125 (5.483)		-0.07234 (5.570)
DISABLED EXPERIENCE^2	0.00122 (3.043)		-0.00060 (1.645)		-0.00056 (1.539)
LIMIT 1 WALKING		-1.73466 (17.812)	-0.52627 (4.047)		-0.51881 (3.993)
LIMIT 2 USING STAIRS		-1.69449 (18.287)	-0.48472 (3.698)		-0.48594 (3.711)
LIMIT 3 STANDING		-1.48501 (15.593)	-0.13426 (1.044)		-0.13085 (1.018)
LIMIT 4 SITTING		-1.43718 (12.574)	-0.04824 (0.363)		-0.05966 (0.449)
LIMIT 5 KNEELING		-1.46799 (15.336)	-0.09979 (0.784)		-0.09966 (0.784)
LIMIT 6 LIFTING		-2.08879 (18.951)	-0.92896 (6.490)		-0.93160 (6.525)
LIMIT 7 CARRYING		-1.50205 (16.278)	-0.36438 (3.134)		-0.35464 (3.051)
LIMIT 8 REACHING		-1.78914 (15.427)	-0.36562 (2.523)		-0.36187 (2.499)
LIMIT 9 HANDLING		-1.78362 (12.549)	-0.29648 (1.711)		-0.30087 (1.738)
LIMIT 10 SIGHT		-1.31206 (9.371)	-0.06639 (0.420)		-0.04944 (0.313)
LIMIT 11 HEARING		-0.49948 (3.724)	0.37562 (2.756)		0.36719 (2.696)
LIMIT 12 DEAL W PEOPLE		-1.36519 (7.722)	-0.17242 (0.903)		-0.16436 (0.861)
LIMIT 13 OTHER		-0.51797 (2.339)	0.44352 (2.068)		0.44788 (2.090)
MARITAL STATUS		0.35988 (3.390)		0.21459 (2.281)	0.21459 (2.281)
CONSTANT	10.10722		9.25123		9.09590
R^2	.237		.408		.409
F STATISTIC	126.524		79.288		74.597
DEGREES OF FREEDOM	2013		2000		1999
STANDARD ERROR	1.46662		1.29198		1.29063

REGRESSION NUMBER 3
WAGE ESTIMATING EQUATION - DISABLED WHITES
LIMITATION PREVENTS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.11855 (2.890)		0.07201 (1.818)		0.07177 (1.805)
EXPERIENCE	-0.18949 (3.300)		-0.21815 (3.996)		-0.21825 (3.985)
EXPERIENCE^2	0.00146 (1.834)		0.00197 (2.587)		0.00197 (2.583)
DISABLED EXPERIENCE	-0.13616 (3.740)		-0.12556 (3.620)		-0.12560 (3.615)
DISABLED EXPERIENCE^2	-0.00021 (0.247)		-0.00026 (0.333)		-0.00026 (0.324)
LIMIT 1 WALKING		-1.15686 (5.676)	-0.71246 (3.258)		-0.71079 (3.226)
LIMIT 2 USING STAIRS		-0.81947 (4.026)	-0.40706 (1.893)		-0.40501 (1.870)
LIMIT 3 STANDING		-0.19769 (0.954)		-0.00977 (0.045)	-0.00889 (0.045)
LIMIT 4 SITTING		-0.51717 (2.204)	-0.05433 (0.228)		-0.05390 (0.221)
LIMIT 5 KNEELING		-0.21809 (1.061)	0.10810 (0.532)		0.10968 (0.531)
LIMIT 6 LIFTING		-1.02010 (3.936)	-0.54007 (2.051)		-0.54043 (2.048)
LIMIT 7 CARRYING		0.73885 (3.407)	0.54564 (2.586)		0.54725 (2.566)
LIMIT 8 REACHING		-1.10843 (4.465)	-0.49958 (1.923)		-0.49762 (1.908)
LIMIT 9 HANDLING		-1.27431 (4.396)	-0.63448 (2.004)		-0.62654 (1.998)
LIMIT 10 SIGHT		-0.62742 (2.315)	-0.33621 (1.212)		-0.33391 (1.198)
LIMIT 11 HEARING		0.37266 (1.517)	0.51095 (2.099)		0.50855 (2.080)
LIMIT 12 DEAL W PEOPLE		-0.91808 (2.602)	-0.61656 (1.766)		-0.61296 (1.747)
LIMIT 13 OTHER		-0.34637 (0.396)	-0.28531 (0.344)		-0.27944 (0.336)
MARITAL STATUS		0.24511 (0.844)		0.03835 (0.138)	0.03800 (0.138)
CONSTANT	8.87557		10.28430		10.25200
R^2	.118		.213		.211
F STATISTIC	16.321		10.093		8.999
DEGREES OF FREEDOM	565		553		551
STANDARD ERROR	2.43904		2.30407		2.30821

REGRESSION NUMBER 4
WAGE ESTIMATING EQUATION - DISABLED WHITES
LIMITATION HINDERS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.10910 (2.754)		0.06474 (1.748)		0.06345 (1.698)
EXPERIENCE	-0.17336 (3.158)		-0.17867 (3.513)		-0.17898 (3.513)
EXPERIENCE^2	0.00126 (1.665)		0.00145 (2.045)		0.00145 (2.059)
DISABLED EXPERIENCE	-0.13105 (3.708)		-0.12450 (3.799)		-0.12473 (3.799)
DISABLED EXPERIENCE^2	0.00025 (0.305)		0.00002 (0.010)		0.00003 (0.045)
LIMIT 1 WALKING		-1.34460 (6.935)	-0.46955 (2.065)		-0.46848 (2.055)
LIMIT 2 USING STAIRS		-1.38544 (7.137)	-0.49282 (2.147)		-0.49343 (2.146)
LIMIT 3 STANDING		-1.06509 (5.365)	-0.14000 (0.621)		-0.13815 (0.612)
LIMIT 4 SITTING		-1.01184 (4.897)	-0.06777 (0.295)		-0.06939 (0.300)
LIMIT 5 KNEELING		-1.04673 (5.305)	-0.11237 (0.501)		-0.11229 (0.500)
LIMIT 6 LIFTING		-1.71111 (8.361)	-0.89520 (3.651)		-0.89185 (3.565)
LIMIT 7 CARRYING		-1.23387 (5.319)	-0.41899 (1.746)		-0.41760 (1.736)
LIMIT 8 REACHING		-1.37095 (6.478)	-0.35574 (1.409)		-0.35438 (1.401)
LIMIT 9 HANDLING		-1.35177 (5.431)	-0.28661 (0.958)		-0.28474 (0.942)
LIMIT 10 SIGHT		-0.79113 (3.194)		-0.01970 (0.089)	-0.01965 (0.071)
LIMIT 11 HEARING		0.00454 (0.195)	0.40108 (1.745)		0.40312 (1.684)
LIMIT 12 DEAL W PEOPLE		-1.01139 (3.378)	-0.21992 (0.665)		-0.21359 (0.642)
LIMIT 13 OTHER		-0.16269 (0.431)	0.28361 (0.750)		0.28920 (0.760)
MARITAL STATUS		0.16855 (0.601)		0.07911 (0.303)	0.07911 (0.303)
CONSTANT	8.64122		10.35525		10.29992
R^2	.109		.244		.242
F STATISTIC	15.840		12.489		11.144
DEGREES OF FREEDOM	599		587		585
STANDARD ERROR	2.43468		2.24264		2.24628

REGRESSION NUMBER 5
WAGE ESTIMATING EQUATION - NON-DISABLED WHITES

VARIABLE	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.06669 (12.938)		0.06432 (12.563)
EXPERIENCE	0.02461 (0.781)		0.01686 (0.641)
EXPERIENCE^2	-0.00033 (0.986)		-0.00024 (0.719)
MARITAL STATUS		0.24951 (5.535)	0.24951 (5.535)
CONSTANT	4.93513		4.89406
R^2	.189		.205
F STATISTIC	110.464		92.250
DEGREES OF FREEDOM	1410		1409
STANDARD ERROR	0.48374		0.47874

rate of return to schooling somewhat for each group. The rate of return to schooling for the disabled whites loses its significance and differs only slightly from the rate for non-disabled individuals. The slight difference between disabled and non-disabled individuals is not unexpected. The mean level of schooling for disabled persons is lower than the mean level of schooling for non-disabled persons, and past studies have indicated a diminishing marginal gain from additional years of school, which is reflected in lower rates of return to higher educational levels.

The coefficients on the experience terms are highly significant in all regressions except the non-disabled sample. The shape of the earnings profile is perverse except for non-disabled whites. Rather than the inverted U shape earnings profile found by Mincer and others, the earnings profile for the entire sample is U shaped with a minimum at 44 years of experience; the disabled sample has the same shape with a minimum at 55.5 years of experience in the regression for limitation prevents activity and a minimum at 62 for limitation hinders activity. This, of course, does not consider the amount of time disabled, which will lower the earnings profile at any point. Although the coefficients are not significant, for non-disabled whites the earnings profile appears to be of normal shape and peaks at 38 years of experience, or about 55 years of age. The lack of significance of the experience coefficients for the non-disabled individuals, and the U shaped earnings profile for the entire white sample may be due to the lack of variation in experience for the sample. It is also important to note that the sample was 50 to 64 years old in 1971 which yields an arithmetic average of 57 years. Mincer [7] found the earnings profile began to turn down, depending on educational level, between 50 and 60 years of age. Hence a downward sloped profile

might be expected.

To understand the nature of the earnings profile it is desirable to trace the profile of an individual. Graph 1 shows the earnings profile for an individual from 45 to 60 years of age who is white, married and has 10 years of school. From age 50 a comparison is made of the difference between the non-disabled individual and an individual with the same characteristics who is prevented from lifting (limit 6). Plotting the profiles from all three regressions (all, disabled, non-disabled) the pattern is clear; the disabled individual's wage rate drops off the non-disabled profile and continues to depart as the time spent disabled increases. As predicted, disabled experience causes one to slow investment over time, and the wage differential will increase.

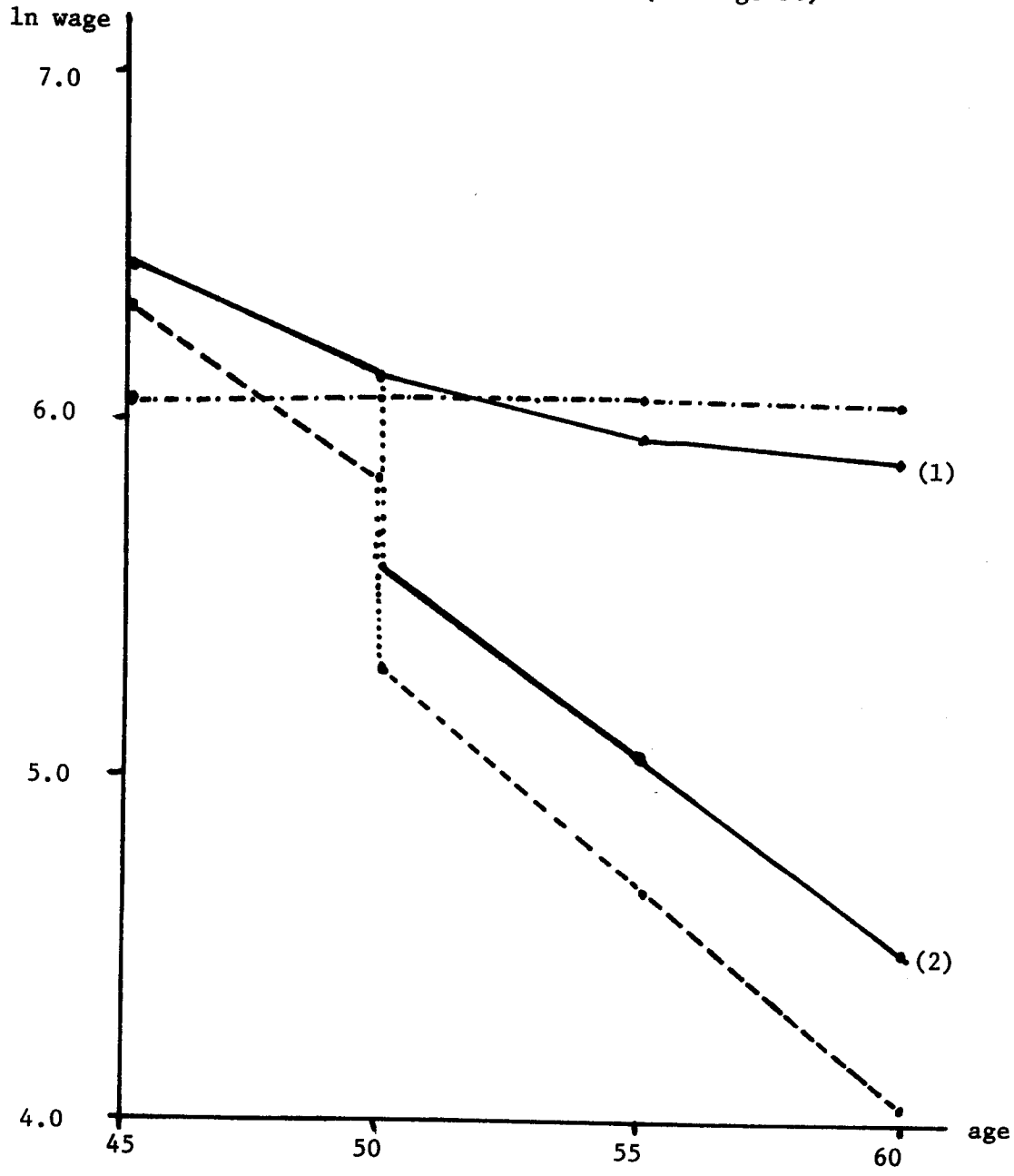
In the regressions for all whites, being unable to walk (limit 1) and unable to use stairs (limit 2), each caused by the limitation of the use of one's legs, appear to be the most disabling conditions in terms of wage loss. Lifting (limit 6), reaching (limit 8) and handling (limit 9) also seem to lead to large wage losses, although carrying (limit 7), an activity which also requires the use of one's arms, is significantly positive in the 'prevents' regression (regression 1) and significantly negative in the 'hinders' regression (regression 2).

It is possible to analyze the impact of a disabling condition upon the wage of the typical non-disabled individual. The average wage for non-disabled whites is $5.01 per hour. At that wage, suppose an individual is blinded (i.e. is prevented from seeing, limit 10); the log of the wage is reduced .44496 or the wage rate falls immediately to $3.21; with time that wage rate will decline further due to the experience effect. If the same individual were only hindered in sight rather than blinded,

GRAPH 1

LINEAR APPROXIMATION OF WAGE PROFILE (IN LOGS)

(White married male with 10 years of school becoming unable to lift (limit 6) at age 50)



(1) Non-disabled (regression 1)
(2) Disabled (regression 1)
Non-disabled (regression 3)
Disabled (regression 5)

one would expect a smaller wage loss, and that loss is only 24 cents or a decline in the wage to $4.77.

Consider an extremely disabling condition which confines one to a wheelchair. This disability is likely to manifest itself in limitations such as walking (limit 1), using stairs (limit 2), standing (limit 3) and perhaps kneeling (limit 5). If one is prevented from performing all of these activities the wage rate is substantially reduced, from $5.01 to $1.09. The same combination of disabling conditions in which the magnitude of these conditions is not as great (perhaps one is not confined to a wheelchair bur rather requires crutches or a walker, or is easily tired by these activities) will result in a smaller reduction of the wage, to $1.46.

Finally consider the chronic health problem arthritis. This condition generally results in one's being hindered in using one's hands or fingers (limit 9). This reduces the average wage by $1.30 to $3.71. If the affliction is particularly bad andoone is also hindered in reaching, the wage is further reduced to $2.58.

One might expect the limitations preventing one from performing each activity to have a larger direct impact on wages; however, this is not always the case. In many instances, including limitations which hindered as well as prevented activities, showed larger wage losses than did only limitations preventing the activity. The prime example of this phenomenon is carrying (limit 7) which is significantly negative in the 'limitation hinders activity' regression but is significantly positive in the 'limitation prevents activity' equation. Lifting (limit 6) has about twice the magnitude of wage loss for one who is hindered, as compared to one who is prevented from performing the activity. Although

the effect is not as great, standing (limit 3), kneeling (limit 5) and sitting (limit 4) reduce wages more if one is hindered than if one is prevented from performing the activity. One conceivable explanation for the previously mentioned effect is occupational status. For many of the limitations, a white collar worker is likely to be only hindered in his employment, whereas the blue collar worker may be prevented from employment; thus given the same relative wage loss, white collar workers will suffer larger absolute losses.

Included separately in regression 3 (disabled whites, limitation prevents activity), only two limitations are positive: hearing (limit 11) and carrying heavy weights (limit 7). The hearing limitation (limit 11) is not significant at conventional levels; however the carrying heavy weights limitation (limit 7) is statistically significant, and this result is difficult to explain. Perhaps those persons were manual laborers who were forced to retrain and change employment, which increased their earnings. Included separately the limitations causing the largest losses are handling or fingering (limit 9), walking (limit 1), reaching (limit 8) and lifting (limit 6). In the full equation these four limitations maintain dominance in terms of wage loss. The limitations of hearing (limit 11), carrying (limit 7) and kneeling (limit 5) are all positive, although only hearing and carrying reach conventional levels of significance.

In regression 4 (disabled whites, limitation hinders activity) only hearing (limit 11) has a positive sign when the limitations are included separately in the school - earnings equation. The effect of the hearing limitation is not, however, significant. In the full equation only hearing (limit 11) and "other" limitation (limit 13) are positive, and only

"other" limitation (limit 13) is significant beyond the .1 level. The marginal impairment attributed to "other" limitations does not seem to adversely affect wages. It is very likely that psychosomatic ailments are captured in "other" limitations which hinder activity.

There appears to be a large health - education correlation among the disabled white individuals. As the limitations are included in the stepwise manner the rate of return to schooling drops from 12 percent to seven percent in regression 3, and from 11 percent to six percent in regression 4. This negative correlation between the disability variables and schooling may be further evidence of occupational differences (i.e. those with higher education enter occupations which are less risky) or that persons with more education are better producers of 'health'.

Being married increases the wage rate for whites, although the effect is not significant. This may be due to a sorting process in which those with a higher wage potential choose to get married. Perhaps the wife's human capital stock enters the husband's production function and increases his efficiency at producing human capital. Finally, the husband may substitute wage earning time for leisure (i.e. home production) if the wife is more productive in the home. This will increase the husband's labor force time and consequently his investment in on-the-job training.

The impact of marital status on the magnitude of disability is not clear. In about one half of the limitations marital status increases the wage loss and in the other half, marital status decreases the loss. There is no clear tendency for a spouse to reduce the magnitude of disability through assistance in the production of health capital, or to increase the magnitude of disability by causing labor market withdrawal

through a secondary worker effect.

Blacks

The results of the wage determining equation for blacks appear in Regression Tables 6 - 10. In the regressions including all blacks (regressions 6 and 7), the rate of return to schooling is about 3.5 to four percent, a rate substantially smaller than the rate of return for whites. In the stratified regressions, disabled blacks receive a higher rate of return to schooling (six percent) than do the non-disabled (three percent), although the result for disabled persons is not significant.

None of the coefficients on non-disabled experience are statistically significant, and it is therefore difficult to draw inferences on the shape of the earnings profile. The coefficients on disabled experience are significant in all regressions. In the regressions for all blacks the coefficients on disabled experience are negative and the coefficient on that term squared is positive. The magnitudes of the coefficients indicate that after becoming disabled, a person's earnings decline to a minimum at approximately 35 years of disabled experience. In order to project the experience - earnings relationship, an age - wage rate profile is plotted on Graph 2. This profile is for a black married male with seven years of schooling who became disabled at 50 years of age. The disability prevents this individual from lifting (limit 6); this is the same limitation as employed in the analysis of the whites. The earnings profile demonstrates the fact that the wages for blacks are on the slow decline due to the age of the sample and, that disability does in fact cause the profiles to separate and depart with the disabled individual earning substantially less.

Entering the limitations individually yields negative and

REGRESSION NUMBER 6
WAGE ESTIMATING EQUATION - ALL BLACKS
LIMITATION PREVENTS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.05432 (2.660)		0.03726 (1.988)		0.03658 (1.951)
EXPERIENCE	-0.10960 (1.691)		-0.03503 (0.579)		-0.03454 (0.571)
EXPERIENCE^2	0.00089 (1.173)		0.00012 (0.164)		0.00011 (0.148)
DISABLED EXPERIENCE	-0.32473 (15.168)		-0.18663 (7.717)		-0.18592 (7.686)
DISABLED EXPERIENCE^2	0.00439 (4.443)		0.00279 (2.927)		0.00280 (2.935)
LIMIT 1 WALKING		-1.50806 (9.507)	-0.95921 (5.050)		-0.95366 (5.019)
LIMIT 2 USING STAIRS		-1.17675 (7.560)	-0.32259 (1.688)		-0.31378 (1.640)
LIMIT 3 STANDING		-0.61413 (3.662)	0.11982 (0.613)		0.10933 (0.559)
LIMIT 4 SITTING		-1.22983 (6.212)	-0.29448 (1.332)		-0.29372 (1.329)
LIMIT 5 KNEELING		-0.78570 (4.639)	0.03352 (0.173)		0.02927 (0.152)
LIMIT 6 LIFTING		-0.53330 (2.686)	-0.17509 (0.915)		-0.18168 (0.950)
LIMIT 7 CARRYING		-0.06766 (0.362)	0.20693 (1.104)		0.20561 (1.098)
LIMIT 8 REACHING		-1.59488 (7.408)	-0.79531 (3.218)		-0.79030 (3.198)
LIMIT 9 HANDLING		-1.17632 (4.766)	-0.26558 (1.026)		-0.26206 (1.008)
LIMIT 10 SIGHT		-1.18595 (6.230)	-0.38916 (1.951)		-0.39132 (1.962)
LIMIT 11 HEARING		-1.25730 (5.312)	-0.72713 (3.133)		-0.72407 (3.120)
LIMIT 12 DEAL W PEOPLE		-1.85479) (5.249)	-1.36215 (4.060)		-1.33391 (3.964)
LIMIT 13 OTHER		0.54764 (0.861)	1.08944 (1.816)		1.12193 (1.868)
MARITAL STATUS		0.22826 (1.861)		0.12190 (1.091)	0.12190 (1.091)
CONSTANT	8.13036		6.65005		6.56011
R^2	.361		.467		.467
F STATISTIC	98.718		43.163		40.963
DEGREES OF FREEDOM	860		847		846
STANDARD ERROR	1.52475		1.39206		1.39190

REGRESSION NUMBER 7
WAGE ESTIMATING EQUATION - ALL BLACKS
LIMITATION HINDERS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.06017 (2.944)		0.04476 (2.451)		0.04372 (2.390)
EXPERIENCE	-0.11576 (1.772)		-0.06250 (1.066)		-0.06091 (1.024)
EXPERIENCE^2	0.00098 (1.279)		0.00055 (0.807)		0.00053 (0.758)
DISABLED EXPERIENCE	-0.31558 (14.882)		-0.15530 (6.954)		-0.15407 (6.617)
DISABLED EXPERIENCE^2	0.00415 (4.188)		0.00202 (2.230)		0.00204 (2.184)
LIMIT 1 WALKING		-1.59010 (10.303)	-0.60183 (3.007)		-0.59821 (2.989)
LIMIT 2 USING STAIRS		-1.41241 (9.453)	-0.35297 (1.706)		-0.34115 (1.634)
LIMIT 3 STANDING		-1.42542 (9.549)	-0.16922 (0.809)		-0.17587 (0.827)
LIMIT 4 SITTING		-1.09266 (6.054)	0.30850 (1.422)		0.29972 (1.381)
LIMIT 5 KNEELING		-1.38340 (9.016)	-0.22825 (1.081)		-0.24311 (1.140)
LIMIT 6 LIFTING		-1.67119 (10.605)	-0.92421 (5.116)		-0.94057 (4.716)
LIMIT 7 CARRYING		-1.36609 (9.128)		0.01789 (0.030)	0.01789 (0.089)
LIMIT 8 REACHING		-1.74825 (9.224)	-0.67640 (2.688)		-0.66591 (2.641)
LIMIT 9 HANDLING		-1.40311 (6.574)	-0.10030 (0.400)		-0.10342 (0.412)
LIMIT 10 SIGHT		-1.23912 (6.701)	-0.47343 (2.443)		-0.46930 (2.420)
LIMIT 11 HEARING		-1.09439 (4.976)	-0.28475 (1.236)		-0.28531 (1.234)
LIMIT 12 DEAL W PEOPLE		-1.41104 (5.073)	-0.47817 (1.575)		-0.46381 (1.526)
LIMIT 13 OTHER		0.22566 (6.140)	2.22122 (5.785)		2.19503 (5.707)
MARITAL STATUS		0.18524 (1.518)		0.16285 (1.493)	0.16285 (1.493)
CONSTANT	8.18338		7.00277		6.86169
R^2	.352		.487		.487
F STATISTIC	96.683		50.137		44.989
DEGREES OF FREEDOM	875		863		861
STANDARD ERROR	1.54787		1.37746		1.37727

REGRESSION NUMBER 8
WAGE ESTIMATING EQUATION - DISABLED BLACKS
LIMITATION PREVENTS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.13154 (2.130)		0.06969 (1.153)		0.06439 (1.060)
EXPERIENCE	-0.06760 (0.493)		0.03172 (0.237)		0.02701 (0.200)
EXPERIENCE^2	0.00026 (0.155)		-0.00105 (0.622)		-0.00104 (0.620)
DISABLED EXPERIENCE	-0.22356 (3.371)		-0.22586 (3.481)		-0.22582 (3.479)
DISABLED EXPERIENCE^2	0.00299 (1.338)		0.00405 (1.857)		0.00401 (1.837)
LIMIT 1 WALKING		-1.17160 (3.642)	-0.87051 (2.496)		-0.84788 (2.424)
LIMIT 2 USING STAIRS		-0.80860 (2.506)	-0.31413 (0.885)		-0.28059 (0.786)
LIMIT 3 STANDING		-0.08381 (0.263)	0.14479 (0.416)		0.12029 (0.345)
LIMIT 4 SITTING		-0.87576 (2.446)	-0.33627 (0.860)		-0.33755 (0.863)
LIMIT 5 KNEELING		-0.30454 (0.952)	0.07475 (0.219)		0.06737 (0.197)
LIMIT 6 LIFTING		-0.13479 (0.386)	-0.12290 (0.359)		-0.13304 (0.386)
LIMIT 7 CARRYING		1.29048 (1.370)	0.22284 (0.634)		0.22814 (0.649)
LIMIT 8 REACHING		-1.26955 (3.360)	-0.81907 (1.874)		-0.80882 (1.849)
LIMIT 9 HANDLING		-0.83905 (1.967)	-0.19282 (0.418)		-0.17558 (0.381)
LIMIT 10 SIGHT		-0.77208 (2.229)	-0.34346 (0.962)		-0.34477 (0.965)
LIMIT 11 HEARING		-0.86972 (2.101)	-0.67507 (1.623)		-0.65806 (1.580)
LIMIT 12 DEAL W PEOPLE		-1.63337 (2.727)	-1.31656 (2.224)		-1.24199 (2.077)
LIMIT 13 OTHER		0.12998 (0.373)	1.02434 (0.964)		1.11291 (1.043)
MARITAL STATUS		0.67498 (1.914)		0.32153 (0.917)	0.32153 (0.917)
CONSTANT	6.12086		5.74351		5.69963
R^2	.130		.206		.206
F STATISTIC	8.849		4.787		4.576
DEGREES OF FREEDOM	257		244		243
STANDARD ERROR	2.56829		2.45325		2.45405

REGRESSION NUMBER 9
WAGE ESTIMATING EQUATION - DISABLED BLACKS
LIMITATION HINDERS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.14212 (2.418)		0.08013 (1.442)		0.07419 (1.328)
EXPERIENCE	-0.06679 (0.495)		-0.00529 (0.045)		-0.01081 (0.084)
EXPERIENCE^2	0.00030 (0.557)		-0.00032 (0.202)		-0.00031 (0.190)
DISABLED EXPERIENCE	-0.21669 (3.387)		-0.21040 (3.499)		-0.20769 (3.452)
DISABLED EXPERIENCE^2	0.00289 (1.317)		0.00356 (1.728)		0.00347 (1.683)
LIMIT 1 WALKING		-1.28697 (4.122)	-0.62841 (1.802)		-0.61714 (1.769)
LIMIT 2 USING STAIRS		-1.15095 (3.645)	-0.50473 (1.375)		-0.46789 (1.269)
LIMIT 3 STANDING		-1.15574 (3.638)	-0.27110 (0.733)		-0.27199 (0.736)
LIMIT 4 SITTING		-0.68746 (2.098)	0.33425 (0.889)		0.31351 (0.833)
LIMIT 5 KNEELING		-1.00984 (3.210)	-0.20714 (0.559)		-0.23111 (0.622)
LIMIT 6 LIFTING		-1.36366 (4.489)	-0.84980 (2.452)		-0.86550 (2.495)
LIMIT 7 CARRYING		-1.30949 (3.401)	-0.44462 (1.071)		-0.42974 (1.034)
LIMIT 8 REACHING		-1.41097 (4.211)	-0.56279 (1.278)		-0.54319 (1.233)
LIMIT 9 HANDLING		-1.03435 (2.792)	-0.12442 (0.286)		-0.13170 (0.303)
LIMIT 10 SIGHT		-0.80256 (2.453)	-0.53767 (1.592)		-0.52398 (1.551)
LIMIT 11 HEARING		-0.66253 (1.729)	-0.27243 (0.648)		-0.26737 (0.672)
LIMIT 12 DEAL W PEOPLE		-1.04267 (2.209)	-0.45247 (0.865)		-0.42704 (0.815)
LIMIT 13 OTHER		0.61254 (0.993)	2.16292 (3.257)		2.10647 (3.162)
MARITAL STATUS		0.54063 (1.565)		0.34393 (1.059)	0.34393 (1.059)
CONSTANT	5.96792		6.77844		6.72064
R^2	.133		.257		.258
F STATISTIC	9.498		6.333		6.062
DEGREES OF FREEDOM	272		259		258
STANDARD ERROR	2.56011		2.36939		2.36883

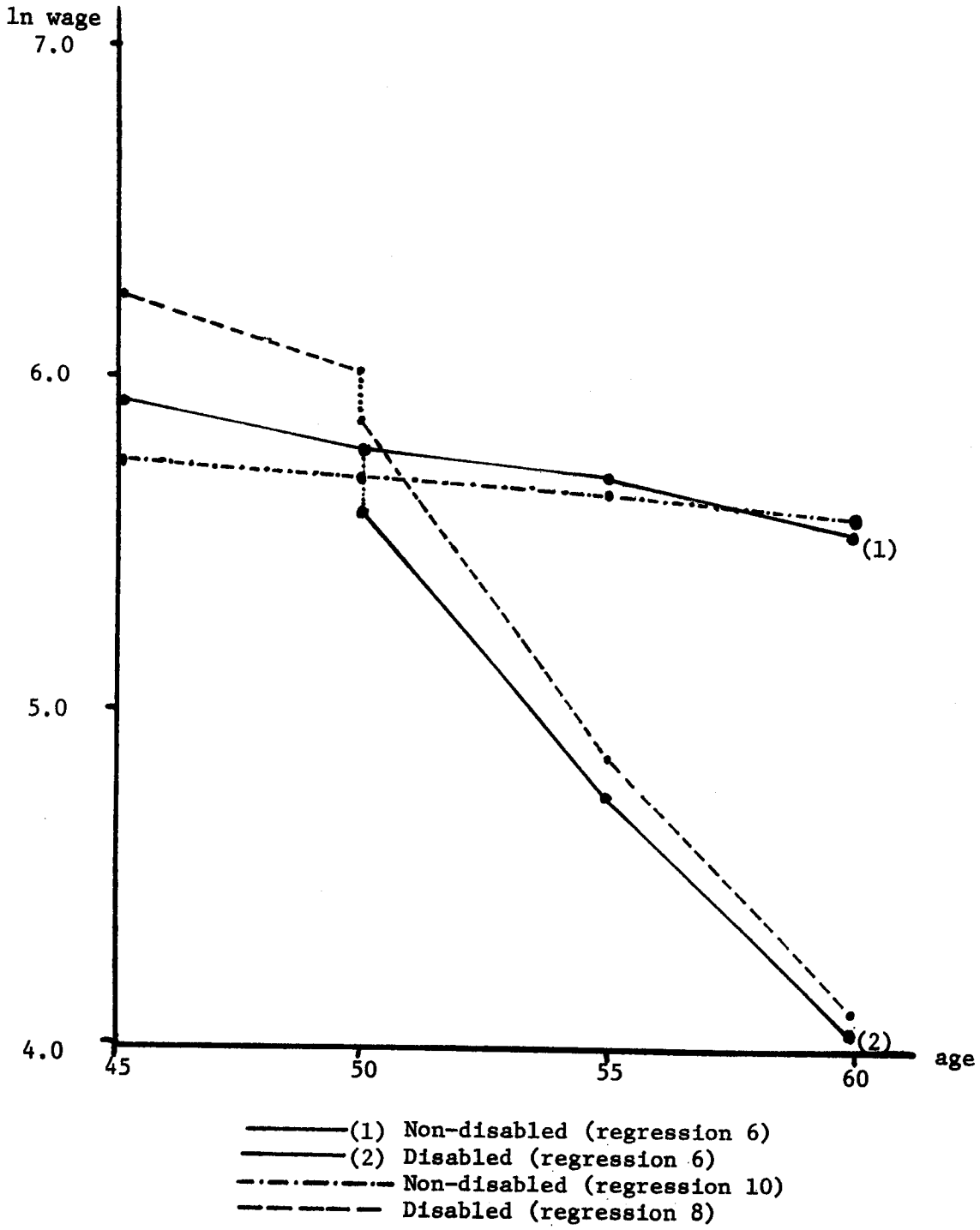
REGRESSION NUMBER 10
WAGE ESTIMATING EQUATION - NON-DISABLED BLACKS

VARIABLE	VARIABLES IN	VARIABLES OUT	FULL EQUATION
SCHOOL	0.02841 (3.477)		0.02848 (3.486)
EXPERIENCE	0.01732 (0.399)		0.02054 (0.471)
EXPERIENCE^2	-0.00038 (0.759)		-0.00041 (0.830)
MARITAL STATUS		0.05404 (1.098)	0.05404 (1.098)
CONSTANT	5.40847		5.29612
R^2	.118		.118
F STATISTIC	27.732		21.108
DEGREES OF FREEDOM	599		598
STANDARD ERROR	0.50403		0.50395

GRAPH 2

LINEAR APPROXIMATION OF WAGE PROFILE (IN LOGS)

(Black married male with 7 years of schooling becoming unable to lift (limit 6) at age 50)



significant coefficients with the exception of "other" limitation (limit 13), which is positive but not significant. The individual effect of each disability is to decrease the wage rate. When all the limitations which prevent an activity are entered in the regression simultaneously, standing (limit 13), kneeling (limit 5) and carrying (limit 7) all become positive, although they are not significant. Limit 13 becomes significantly positive (.10 level) when all limits are included, possibly picking up the effect of psychosomatic disabilities and marginal impairments which do not hinder one's employment. The positive signs on limits 3, 5, and 7 may be due to multicollinearity.[8]

In regression 9 (disabled blacks, limitation hinders the activity), only "other" limitation (limit 13) is positive when entered individually, and it is not statistically significant. When all limitations are entered simultaneously, sitting (limit 4) and carrying (limit 7) become positive, but are not significant, and "other" limitation (limit 13) becomes significantly positive. Again limit 13 indicates "other" activity limiters and may be picking up the effects of "psychosomatic disabilities" and marginal impairments which do not, by themselves, interfere with one's employment.

As with the sample of whites, there is no clear tendency for the magnitude of wage loss caused by a limitation which prevents an activity to exceed the wage loss when the limitation hinders the activity. For example, persons prevented from walking (limit 1) suffer a larger loss in wage than those who are simply hindered. On the other hand, those who are prevented from lifting (limit 6) suffer only a small loss relative to those who are hindered in their ability to lift.

The largest wage loss for blacks was attributable to not being able

to deal with people (limit 12). This handicap reduces the average wage rate from $3.22 to about $ .85. This handicap may manifest itself in an inability to keep one's job and therefore lowers the wage rate. A handicap which prevents one from walking (limit 1) lowered the average wage for blacks by $1.88 to $1.24. Being hindered in walking reduced the magnitude of the loss to $1.45, which lowered the average wage to $1.77. Reaching limitations (limit 8) also caused large wage losses. One who was prevented from reaching lost over half his wages, or $1.76 per hour. Those who were hindered in their reach lost $1.56. Sight (limit 10) and hearing (limit 11) problems also caused large losses amongst the blacks. It is interesting to note that while hearing problems were negative and significant in terms of wage loss for the blacks, the same limitation was of positive and significant sign for whites. This result may be a function of occupation or perhaps access to health care and corrective devices.

The inclusion of marital status in the full equation produces different results for non-disabled and disabled persons. For the non-disabled, controlling for marital status increases the rate of return to schooling and the coefficient on experience. In the case of the disabled population, controlling for marital status decreases the rate of return to schooling and decreases the coefficient on experience. This may indicate that black, married, disabled persons partially withdraw from the labor market, relying on their wives to enter the labor force or to expand their employment. The less time an individual spends on the job, the less on-the-job training, hence a lower rate of return to experience. In order to reduce one's participation, it may be necessary to take a job for which one is overqualified, thus reducing the rate of

return to schooling.

The effect of marital status on the level of disability is, as with whites, not clear. For about one half of the limitations, controlling for marital status increased the magnitude of the effect of the disability on the wage rate for blacks. In the other half, controlling for marital status decreased the magnitude of the effect of disability on the wage rate. There does not appear to be any clear pattern indicating that married individuals suffer less of a loss because they must support a wife, or suffer a larger loss since they have a wife who can replace them in the labor market.

Black - White Comparisons

All regressions have found a rate of return to schooling that is smaller for blacks than for whites. The differential between these rates of return may be attributable to quality of schooling or the intensity of schooling and, in part, to discrimination in the labor market, among other factors. The cohort of men used in this analysis went to school during the 1920's and 1930's, many years prior to the Brown vs. Board of Education decision, and equal quality of education is very unlikely. The standard error of the coefficient of schooling also indicates a larger variance in the rate of return to schooling for blacks than for whites, quite possibly reflecting larger disparities in the quality of schooling for blacks than for whites. If discrimination in the labor market exists, and blacks are paid lower wages for equal work, or are segregated into lower paying jobs, one would expect the rate of return to be lower for blacks.

The losses in terms of time disabled appear to be more dramatic for blacks than for whites, with wages falling off more quickly for the

blacks.[9] There are differences in the magnitudes of the limitations by race, although there is no clear pattern to the differentials. Certain limitations hinder blacks more than whites, and vice versa.

It is important to note that there are also distinct differences between absolute and relative losses. Since the dependent variable is the log of wages, the coefficient on the limitation will indicate a relative loss. Thus whites may suffer larger absolute losses given the same magnitude of a limitation due to the wage differential between the races.

The coefficients for the variable representing a limitation in walking (limit 1) are of approximately the same magnitude for both blacks and whites. However, based on the average wage rates for blacks and whites, this limitation causes a wage loss of $2.98 or about 60 percent of the wage for whites while the same limitation results in a wage loss of $2.00 or 62 percent for blacks. The inability to use stairs (limit 2) causes a wage loss of $2.12 or 42 percent for whites and a loss of only $ .88 or 27 percent for blacks. Being prevented from reaching (limit 8) reduces the average wage for whites by $2.09 or 42 percent while blacks suffer a smaller absolute loss of $1.78 but a larger proportional loss of 55 percent. Comparing sight one finds that when prevented from seeing (limit 10), whites lose $1.80 or 36 percent of their wage while blacks lose $1.06 and suffer about the same proportionate loss, of 32 percent.

Hearing (limit 11) is of peculiar sign for whites, raising the wage by $2.12 or 42 percent. Blacks on the other hand, lose $1.68 or slightly over half their average wage. The same pattern of wage change due to hearing loss is present in the limitation hinders activity regression.

This result may be due to the sample properties, although there is a relatively large representation of individuals with hearing problems in both races. Six and one half percent of all whites and 5.4 percent of all blacks claim to be unable to hear at all.

The racial differences in the magnitude of the wage loss do not seem to be strictly occupational (e.g. blue collar vs. skilled and white collar) differences. Whites, for instance, suffer larger relative losses when prevented from using stairs (limit 2), standing (limit 3) and lifting (limit 6) while blacks have larger relative wage losses from hearing (limit 11) and sitting (limit 4) limitations.

Being married increases the wage rate for both races, although whites receive a larger increase from marriage than do blacks. The typical explanation for the increase in wage rate due to marriage is that marriage (i.e. a spouse) increases one's efficiency in producing human capital.

The wage determining equation was also fit with the Sample II data (men becoming disabled after 1966), used for the wage growth equation, to determine the compatibility of the samples. The final regression results are shown in Appendix B. The results appear to be quite similar to those from Sample I with two exceptions. The coefficients on experience, although not significant, are of the proper sign to indicate an inverted U shaped earnings function with a maximum at about 33 years of experience for whites, and about 40 years of experience for blacks, or about 49 and 53 years of age respectively.[10] The second difference appears in the coefficients on the limitations. In the wage regressions for Sample II, more of the limitations have positive and significant coefficients indicating an increase in wages from certain disabling

conditions. Perhaps in the short run, management shifts these persons to positions of a different nature, not requiring these activities, which offer higher salaries. Support for this theory may be evidenced in recent affirmative action or 'hire the handicapped' programs. Programs also exist to find suitable employment for disabled individuals; this may reduce search costs or provide additional information not previously attainable. In addition, expenditures on programs to rehabilitate disabled persons nearly quadrupled between 1965 and 1970.[11] The number of persons considered rehabilitated doubled during the period. It is likely that the individuals in Sample II are those who were helped by these expenditures. Finally, the five year period may not be long enough for certain disabling conditions, especially environmental health problems, to worsen to the point of significant wage loss.

In conclusion, the wage determining model has shown that disabling conditions do, in most cases, decrease one's earnings, both through the investment process and through one's inability to fully employ his human capital stock.

Wage Growth Equation

The wage growth model, as developed in Chapter II, but controlling for the amount of time disabled, is:

$$\Delta \ln Y = \beta_0 + \beta_1 '\underline{X} + \beta_2 K_1 + \beta_3 K_1 \chi + \beta_4 K_2 + \beta_5 S + \beta_6 exp + \beta_7 MS$$

where:

$\Delta \ln Y$ = Change in ln wage rate from 1966 - 1971

$\underline{X}$ = Vector of activity limitations

K_1 = Weeks worked from 1966 - 1971

$K_1\chi$ = Weeks worked interacted with a disability term, χ, where χ is a dummy variable (1 if disabled)

K_2 = Disabled experience in weeks

S = Schooling

exp = Life cycle experience

MS = Marital status

The sample used for this analysis includes only persons who were not disabled prior to the first survey (1966). With this sample it is possible to analyze the wage changes associated with disability and to determine the differential wage growth between disabled and non-disabled persons.

The dependent variable is the difference in the logarithm of the 1971 and 1966 wage rates. The independent variables include: the 13 activity limitations; labor market experience from 1966 - 1971, in weeks; time disabled; an interactive term between experience and a dummy variable indicating whether the individual is disabled or not, to assess the differential rate of return to on-the-job training for disabled and non-disabled individuals; and school and years of potential labor market experience to pick up any differences in investment levels between the individuals.[12]

The regressions were fit by Ordinary Least Squares,[13] and the limitations were entered in a stepwise manner to assess the impact of each limitation independently. The sample was stratified by race. It was, however, unnecessary to separate those who were disabled from those who were not, since the growth equation takes account of differing rates of return to schooling, and differing rates of return to experience will be picked up by the interactive term of disability and experience. The

regression results are reported in Regression Tables 11 - 14.

Whites

The regression results for whites appear in Regression Tables 11 and 12. The major differences between the regression for 'limitation prevents activity' (regression 11) and the regression for 'limitation hinders activity' (regression 12) occurs in the magnitudes of the coefficients on the limitations. There are no substantive differences in the other coefficients.

There is a highly significant increase in the wage rate associated with each week of employment. The growth from each week of experience is higher, in both regressions, for the disabled individuals. The larger return, although small in magnitude, is highly significant and can not be dismissed. In regression 11, 'limitation prevents activity', a week's worth of experience provides log wage growth of .01133 for non-disabled individuals. The same week of experience is worth 25 percent more, or .01411 for those who become disabled. If the week is spent in the disabled condition the growth is .01129, or a slightly smaller gain for the person who is disabled than for the person who is non-disabled. In regression 12, 'limitation hinders activity', a week of experience results in wage growth of .01104 for non-disabled individuals. Those who will become disabled gain about 27 percent more or .01403 per week of experience. A week spent disabled returns .01187 in logarithmic wage growth, or 7.5 percent higher growth than that of the non-disabled individual. Point estimates are presented later in this chapter.

It appears that, at least for whites, the differential in wage growth between disabled and non-disabled individuals is not due to a significant difference in the rate of return to investment. Instead,

REGRESSION NUMBER 11
WAGE GROWTH EQUATION - ALL WHITES
LIMITATION PREVENTS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
WEEKS WORKED (1966-1971)	0.01293 (20.180)		0.01131 (17.179)		0.01133 (16.903)
WEEKS WORKED X DISABLED	0.00092 (2.342)		0.00278 (5.586)		0.00278 (5.567)
TIME DISABLED IN MONTHS	-0.01356 (4.945)		-0.01112 (4.071)		-0.01129 (4.114)
SCHOOL	0.00224 (0.321)		0.00443 (0.654)		0.00485 (0.715)
LIFECYCLE EXPERIENCE	0.00238 (0.567)		0.00308 (0.759)		0.00308 (0.756)
LIMIT 1 WALKING		-0.33043 (3.080)	-0.12015 (0.995)		-0.12232 (1.015)
LIMIT 2 USING STAIRS		-0.54440 (5.183)	-0.24395 (2.094)		-0.24443 (2.088)
LIMIT 3 STANDING		-0.55917 (5.303)	-0.19528 (1.539)		-0.19574 (1.542)
LIMIT 4 SITTING		-0.43125 (3.226)	-0.13490 (0.902)		-0.13170 (0.880)
LIMIT 5 KNEELING		-0.69347 (6.658)	-0.45080 (3.824)		-0.44935 (3.804)
LIMIT 6 LIFTING		-0.39446 (2.851)	0.12753 (0.816)		0.12637 (0.805)
LIMIT 7 CARRYING		-0.05185 (0.471)	-0.05011 (0.447)		-0.05032 (0.443)
LIMIT 8 REACHING		-0.98809 (6.838)	-0.88426 (5.655)		-0.87568 (5.544)
LIMIT 9 HANDLING		-0.21783 (1.175)	0.27050 (1.175)		0.27848 (1.390)
LIMIT 10 SIGHT		-0.11164 (0.700)	0.05356 (0.319)		0.05979 (0.352)
LIMIT 11 HEARING		0.24905 (1.842)	0.09674 (0.687)		0.10197 (0.721)
LIMIT 12 DEAL W PEOPLE		-0.07910 (0.423)		-0.01117 (0.045)	-0.01115 (0.055)
LIMIT 13 OTHER		0.77904 (1.735)	0.85144 (1.906)		0.83316 (1.862)
MARITAL STATUS		-0.08783 (1.401)		-0.05324 (0.871)	-0.05330 (0.871)
CONSTANT	-3.02349		-2.62608		-2.62375
R^2	.317		.360		.360
F STATISTIC	124.480		42.732		40.453
DEGREES OF FREEDOM	1328		1316		1314
STANDARD ERROR	0.63020		0.60938		0.60987

REGRESSION NUMBER 12
WAGE GROWTH EQUATION - ALL WHITES
LIMITATION HINDERS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
WEEKS WORKED (1966-1971)	0.01315 (20.126)		0.01101 (15.826)		0.01104 (15.850)
WEEKS WORKED X DISABLED	0.00057 (1.480)		0.00300 (5.824)		0.00300 (5.832)
TIME DISABLED IN MONTHS	-0.01157 (4.211)		-0.00843 (3.010)		-0.00863 (3.071)
SCHOOL	0.00262 (0.367)		0.00197 (0.283)		0.00245 (0.352)
LIFECYCLE EXPERIENCE	0.00197 (0.462)		0.00108 (0.259)		0.00110 (0.263)
LIMIT 1 WALKING		-0.28065 (2.645)	0.04111 (0.313)		0.03727 (0.894)
LIMIT 2 USING STAIRS		-0.59249 (5.801)	-0.32273 (2.581)		-0.32210 (2.575)
LIMIT 3 STANDING		-0.56306 (5.545)	-0.18146 (1.360)		-0.18149 (1.353)
LIMIT 4 SITTING		-0.54176 (4.544)	-0.18146 (1.178)		-0.17958 (1.165)
LIMIT 5 KNEELING		-0.45102 (4.410)	0.02987 (0.230)		0.03034 (0.235)
LIMIT 6 LIFTING		-0.54795 (4.590)	0.05852 (3.464)		0.05784 (0.342)
LIMIT 7 CARRYING		-0.81508 (7.620)	-0.60005 (4.921)		-0.59652 (4.889)
LIMIT 8 REACHING		-0.67532 (5.603)	-0.29503 (1.769)		-0.29084 (1.743)
LIMIT 9 HANDLING		-0.37883 (2.555)	0.07131 (0.375)		0.07585 (0.400)
LIMIT 10 SIGHT		-0.28643 (2.022)	-0.09524 (0.534)		-0.09051 (0.508)
LIMIT 11 HEARING		0.07131 (0.552)	0.13700 (0.930)		0.14014 (0.951)
LIMIT 12 DEAL W PEOPLE		-0.33259 (2.147)	0.20126 (0.994)		0.19692 (0.972)
LIMIT 13 OTHER		-0.22518 (1.298)	-0.06427 (0.332)		-0.07289 (0.375)
MARITAL STATUS		-0.09178 (1.430)		-0.05585 (0.888)	-0.05585 (0.888)
CONSTANT	-3.06978		-2.49235		-2.45547
R^2	.308		.344		.344
F STATISTIC	120.779		40.265		38.182
DEGREES OF FREEDOM	1340		1327		1326
STANDARD ERROR	0.64621		0.62900		0.62905

the differential appears to come from the disabled individual spending fewer weeks in the labor force and, of course, from the direct effect of disability on wage growth.

The lack of the expected differential rate of return to a week in the labor force between the disabled and non-disabled whites may be evidence of diminishing marginal gain to investment, since, as was noted previously, disabled individuals work fewer weeks. It may also be the case that disabled individuals actually invest more in a week's time than non-disabled individuals. Holding the number of weeks worked constant, a larger rate of investment would be expected to yield a larger return over the same period of time. This behavior would be economically irrational unless the disabled individual extended his future work life beyond a previously planned retirement date, or unless an increase in working time was expected.

The length of time disabled has a highly significant negative impact on wage changes. This indicates that holding weeks worked constant, disabled persons' human capital stocks are depreciating more rapidly than the human capital of the non-disabled individuals.

The school and life cycle experience variables, included to assess differences in the level of investment of each individual, are small and nonsignificant. This indicates that there is little difference in the investment behavior of the men in this sample. This result lends support to the hypothesis put forth earlier that, due to the homogeneity of the older aged sample, there is no difference in rates of investment among the sample and consequently, heteroskedasticity is not a problem.

Entered into the equation individually, most of the limitations which prevent the various activities are negative; those which hinder

the activites are, for the most part, negative and significant. The only exceptions for the white sample are hearing (limit 11) and "other" limitation (limit 13); neither of which is significantly positive. Entering all the limitations together changes a number of the coefficients to positive, and most of the limitations lose their significance. This result is most likely attributable to multicollinearity.[14] None of the limitations which are of positive sign are statistically significant, and one can not accept the hypothesis that becoming disabled increases one's wage growth. At the same time it is evident that, at least individually, specific limitations tend to retard wage growth. In regression 11 (limitation prevents activity) the disabling conditions reducing wage growth the most for white men are reaching (limit 8), kneeling (limit 5) and using stairs (limit 2). The limitations which have the strongest impact on wage growth by hindering activity are carrying (limit 7), reaching (limit 8) and using stairs (limit 2).

Including a dummy variable for marital status indicates that, contrary to previous studies, being married with spouse present, reduces one's wage growth, although this result is not statistically significant. The inclusion of the marital status variable increases the negative impact of length of time disabled on wage growth. Marital status also uniformly reduces the impact of the disabling conditions on wage growth for individuals whose activity is hindered by their limitation. There is no discernable pattern to changes in the magnitude of limitations which prevent one from performing the activity.

It is possible to employ this equation to estimate wage rates and the wage growth associated with a marginal week of experience. The wage growth equation:

$$\Delta \ln Y = \beta_0 + \underline{\beta}_1' \underline{X} + \beta_2 K_1 + \beta_3 K_1 \chi + \beta_4 K_2 + \beta_5 S + \beta_6 exp + \beta_7 MS$$

can be written:

$$\ln W_{71} - \ln W_{66} = \beta_0 + \underline{\beta}_1' \underline{X} + \beta_2 K_1 + \beta_3 K_1 \chi + \beta_4 K_2 + \beta_5 S + \beta_6 exp + \beta_7 MS$$

or:

$$\ln W_{71} = \ln W_{66} + \beta_0 + \underline{\beta}_1' \underline{X} + \beta_2 K_1 + \beta_3 K_1 \chi + \beta_4 K_2 + \beta_5 S + \beta_6 exp + \beta_7 MS$$

which is equivalent to:

$$W_{71} = W_{66} e^{\{\beta_0 + \underline{\beta}_1' \underline{X} + \beta_2 K_1 + \beta_3 K_1 \chi + \beta_4 K_2 + \beta_5 S + \beta_6 exp + \beta_7 MS\}}$$

The change in the wage rate associated with a marginal week in the labor force is the partial derivative of the above with respect to experience, or:

For disabled individuals [15] ($K = K_1 = K_2$)

$$\frac{dW_{71}}{dK} = W_{66}(e^{\{\beta_0 + \underline{\beta}_1' \underline{X} + \beta_2 K_1 + \ldots + \beta_7 MS\}})(\beta_2 + \beta_3 + \beta_4)$$

For non-disabled individuals ($K = K_1$, $K_2 = 0$, $\chi = 0$)

$$\frac{dW_{71}}{dK} = W_{66}(e^{\{\beta_0 + \beta_2 K_1 + \ldots + \beta_7 MS\}}) \beta_2$$

Basing estimates on the mean values of the non-disabled white sample, the wage of the average white non-disabled man grew from $3.61 per hours (actual) in 1966, to an estimated $5.05 in 1971 (the actual average was $5.09). The change in the wage for a non-disabled man associated with one additional week of experience was 5.72 cents.

Based on the mean values for disabled men, a person becoming disabled and who is, for example, prevented from using stairs (limit 2)

for two years would witness wage growth from $3.07 (actual) to only $3.19. The rate of wage change is substantially lower at only 3.60 cents per marginal week of experience. Had the same individual not become disabled and worked the same number of weeks as his non-disabled counterpart, the wage would have grown at a rate of 4.92 cents per week with an overall increase from $3.07 per hour to $4.34 per hour.[16]

One can see that the growth in the wage rate is slowed substantially by the occurrence of a disability. It is also apparent that those who become disabled differed somewhat in the characteristics that determine the rate of wage growth, and would have expected, on the average, a lower rate of growth even if they had not become disabled. This further supports the contention that disability is endogenous to the model.

Blacks

The wage growth regression results for the black sample are given in Regression Tables 13 and 14. Qualitatively, the results are similar to the white sample, although the magnitudes differ considerably between the two races.

The coefficient on the weeks worked term is positive and statistically significant in both regressions 13 (limitation prevents activity) and 14 (limitation hinders activity). The size of the coefficient indicates that black individuals in the sample are approaching the end of wage growth and are perhaps near the peak of their earnings profile. In regression 13, 'limitation prevents activity', the rate of return in wage growth for non-disabled blacks is about half that of those who will become disabled (.00409 vs. .00866). However when that week is spent disabled, the time disabled effect actually outweighs the positive return and growth is actually negative (-.00099). For those whose

REGRESSION NUMBER 13
WAGE GROWTH EQUATION - ALL BLACKS
LIMITATION PREVENTS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
WEEKS WORKED (1966-1971)	0.00666 (6.741)		0.00408 (4.115)		0.00409 (4.113)
WEEKS WORKED X DISABLED	0.00353 (5.460)		0.00457 (5.259)		0.00457 (5.255)
TIME DISABLED IN MONTHS	-0.04146 (8.787)		-0.03858 (7.390)		-0.03858 (7.382)
SCHOOL	0.00591 (0.532)		0.00195 (0.187)		0.00191 (0.184)
LIFECYCLE EXPERIENCE	0.00651 (0.896)		0.00247 (0.361)		0.00244 (0.356)
LIMIT 1 WALKING		-0.91705 (5.357)	-1.01554 (5.276)		-1.01529 (5.269)
LIMIT 2 USING STAIRS		-0.42742 (2.469)	0.23099 (1.120)		0.23040 (1.116)
LIMIT 3 STANDING		-0.54473 (3.097)	-0.02318 (0.105)		-0.02294 (0.105)
LIMIT 4 SITTING		-1.02999 (5.008)	-1.07136 (4.025)		-1.07109 (4.020)
LIMIT 5 KNEELING		-0.21574 (1.226)	0.38372 (1.893)		0.38352 (1.890)
LIMIT 6 LIFTING		0.27952 (1.329)	0.60281 (2.790)		0.60416 (2.790)
LIMIT 7 CARRYING		-0.27929 (1.539)	-0.70912 (3.411)		-0.70948 (3.410)
LIMIT 8 REACHING		-0.79132 (3.105)	-0.54698 (1.986)		-0.54940 (1.992)
LIMIT 9 HANDLING		-0.35444 (1.176)	-0.36005 (1.202)		-0.35932 (1.199)
LIMIT 10 SIGHT		0.74538 (3.434)	0.98331 (3.845)		0.98523 (3.840)
LIMIT 11 HEARING		0.17271 (0.635)	-0.18092 (0.611)		-0.18160 (0.612)
LIMIT 12 DEAL W PEOPLE		1.03874 (2.126)	1.95891 (3.812)		1.95431 (3.787)
LIMIT 13 OTHER		(none in the sample)			
MARITAL STATUS		0.01808 (0.255)		-0.00748 (0.114)	-0.00748 (0.114)
CONSTANT	-1.57800		-0.75346		-0.74749
R^2	.300		.400		.399
F STATISTIC	47.721		22.705		21.405
DEGREES OF FREEDOM	549		537		536
STANDARD ERROR	0.67221		0.62096		0.62153

REGRESSION NUMBER 14
WAGE GROWTH EQUATION - ALL BLACKS
LIMITATION HINDERS ACTIVITY

VARIABLE	VARIABLES IN	VARIABLES OUT	VARIABLES IN	VARIABLES OUT	FULL EQUATION
WEEKS WORKED (1966-1971)	0.00746 (7.467)		0.00204 (2.051)		0.00206 (2.065)
WEEKS WORKED X DISABLED	0.00355 (5.575)		0.00631 (7.095)		0.00633 (7.064)
TIME DISABLED IN MONTHS	-0.04116 (8.961)		-0.03379 (6.784)		-0.03991 (6.793)
SCHOOL	0.00357 (0.315)		-0.00684 (0.682)		-0.00633 (0.691)
LIFECYCLE EXPERIENCE	0.00618 (0.835)		-0.00252 (0.381)		-0.00265 (0.400)
LIMIT 1 WALKING		-0.70951 (4.075)	-0.87004 (4.480)		-0.86680 (4.386)
LIMIT 2 USING STAIRS		-0.40750 (2.384)	0.13114 (0.647)		0.12971 (0.612)
LIMIT 3 STANDING		-0.60691 (3.497)		-0.00989 (0.007)	-0.00564 (0.003)
LIMIT 4 SITTING		-0.53859 (2.817)	-0.74489 (2.538)		-0.73679 (2.340)
LIMIT 5 KNEELING		-0.27558 (1.599)	0.55948 (2.581)		0.56164 (2.587)
LIMIT 6 LIFTING		-0.65687 (3.644)	-0.16445 (0.775)		-0.15338 (0.719)
LIMIT 7 CARRYING		-1.29110 (6.270)	-0.94327 (4.115)		-0.94635 (3.997)
LIMIT 8 REACHING		-0.87165 (4.015)	-0.62844 (2.037)		-0.64522 (2.057)
LIMIT 9 HANDLING		-0.64132 (2.624)	-1.34742 (4.017)		-1.34130 (3.990)
LIMIT 10 SIGHT		0.91296 (4.395)	0.53692 (1.999)		0.54770 (2.032)
LIMIT 11 HEARING		-0.56587 (2.439)	-0.67180 (2.207)		-0.67825 (2.187)
LIMIT 12 DEAL W PEOPLE		0.85959 (3.084)	0.72378 (1.767)		0.71405 (1.728)
LIMIT 13 OTHER		1.55882 (4.646)	3.60563 (6.199)		3.61903 (6.208)
MARITAL STATUS		0.01142 (0.158)		-0.04319 (0.045)	-0.04313 (0.672
CONSTANT	-1.74579		0.00678		0.04237
R^2	.321		.481		.479
F STATISTIC	53.704		31.396		28.035
DEGREES OF FREEDOM	553		541		539
STANDARD ERROR	0.68872		0.60214		0.60301

condition hinders activity (regression 14) the return is about four times greater for those who will become disabled than for those who are non-disabled. Once disabled, the rate of return to experience is positive but very small (.00009). Thus, although those blacks who become disabled originally had a larger rate of return in wage growth to a week worked, once disabled these individuals lose nearly all the gains from experience.

The length of time disabled is negative and statistically significant, and in both regressions, is several times larger than the return to investment. As mentioned previously, this reduces the rate of growth in wages attributable to a week worked. In regression 13 (limitation prevents activity) the reduction actually results in a net depreciation for disabled individuals. The coefficients on schooling and lifecycle experience are small and not statistically significant. The difference in the signs of these two terms between regressions is of little concern given the small coefficients and large standard errors.

The limitations, included individually, are no longer predominantly negative. In the 'limitation prevents activity' regression (regression 13) the limitations of sight (limit 10), dealing with people (limit 12), lifting (limit 6) and hearing (limit 11) are all positively signed, and the first two limitations (limits 10 and 12) are significantly positive. In the 'limitation hinders activity' regression (regression 14), sight (limit 10), hearing (limit 11), dealing with people (limit 12) and "other" limitation (limit 13) are all positive and highly significant. It is difficult to understand how developing a handicap such as being prevented from seeing, could increase one's wage rate unless there is some type of occupational sorting or retraining occurring to increase

one's wage growth.

When all limitations are entered simultaneously in the 'limitation prevents activity' regression (regression 13), only walking (limit 1), sitting (limit 4) and carrying (limit 7) significantly reduce the wage growth, while sight (limit 10), dealing with people (limit 12) and lifting (limit 6) significantly increase the wage. Entered simultaneously in the 'limitation hinders activity' regression (regression 14), walking (limit 1), carrying (limit 7), handling (limit 9) and reaching (limit 8) significantly reduce wage growth, while sight (limit 10), dealing with people (limit 12) and "other" limitation (limit 13) are significantly positive. It is interesting to note that when entered alone, hearing (limit 11) is significant and positive, yet when included with the other limitations, it is negative and significant to the .1 level. It is likely that these perverse results are due to the small sample size (58) of disabled blacks.

The coefficient on marital status is small and negative and is not statistically significant in either regression 13 (limitation prevents activity) or 14 (limitation hinders activity). Inclusion of the marital status dummy variable alters slightly the magnitudes of the limitations in both regressions; there is, however, no apparent pattern to these changes for the black sample of individuals.

Estimating the wage growth for blacks from this equation, based on the mean characteristics of the sample, the non-disabled blacks would have predicted wage growth from $2.72 per hour (actual) in 1966, to $3.23 (estimated) in 1971. The actual mean value of the wage rate for non-disabled blacks was $3.26 per hour, and again, the estimate is very close. The wage increase to a marginal week of employment for

non-disabled blacks is 1.3 cents.

Based on the mean values for disabled men, the average black becoming disabled, who is, for example, prevented from reaching (limit 8), experiences a wage decline. The wage rate for this individual fell from $2.09 (actual) to an estimated $1.45. The wage change due to a marginal week's employment appears to be -0.143 cents, or for this case, depreciation exceeds investment. Had this individual not become disabled, he would have faired very well with his wage rate growing from $2.11 to an estimated $3.12. The change in wage associated with a marginal week of employment is nearly as large as that for the non-disabled individual, at 1.28 cents per week, even though the mean age is somewhat higher and mean education level is over a year lower.

Black - White Comparisons

Whites receive larger rates of wage growth from an additional week of experience than do blacks. Once disabled, whites lose very little wage growth in the investment process itself while blacks may actually suffer a net depreciation over time. The difference may be due to a larger investment in health care by whites, occupational segregation by race with blacks being employed in situations which cause a continued deterioration of health, or perhaps due to other reasons.

Another large difference occurs in the magnitude of the effect of individual limitations on wage growth. For whites, the coefficients on the limitations generally indicate a fall in the rate of wage growth, while for blacks, becoming handicapped, depending on the limitation, may actually increase one's wage growth. This perverse result may be due to the small sample of disabled blacks. The result may also be attributable to a fundamental difference in the kinds of disabling conditions

which occur. Perhaps blacks are susceptible, especially in this age group, to a slow but continual loss of health. Whites, on the other hand, may tend to maintain their overall health but are struck by sudden and severe disabilities (e.g. accident, heart attack, etc.) which result in a sudden, large reduction in income. Investment in health care may, however, prevent the condition from deteriorating over time.

Conclusion

It has become evident from the empirical analysis that disability does in fact reduce earnings. It has been demonstrated that there are two separate effects of disability on earnings. First, for the most part, the coefficients on the limitations were negative and significant in the wage estimating equation. This provides for an immediate reduction in the wage rate associated with the occurrence of a disabling condition. Second, although the inverted U shaped earnings profile was not present (probably due to the age of the sample), as time passes in the disabled state the wage profiles of non-disabled and disabled individuals separate, with the wages of the disabled individual declining substantially relative to those of the non-disabled individual.

In the wage analysis, whites were found to gain a substantially higher rate of return to schooling than were blacks. The magnitude of the limitations also differed by race. There was, however, no apparent pattern to these differences in magnitude.

The wage growth equation demonstrates the reduction in the growth of wages occurring with a disability. The decline in growth is apparently attributable to several factors including a reduction in labor market experience (i.e. weeks worked), a decline in investment rates during one's labor market experience, or an increase in the rate of

depreciation of one's human capital stock. Whites and blacks both lose wage growth due to disability, although disabled whites do not appear to have their wage growth decelerate as much as disabled blacks as time passes in the disabled state. The disabled white's loss in wage growth appears to be attributable more to fewer weeks worked than to a smaller gain per week.

Blacks, both disabled and non-disabled, were found to have larger relative (percentage) wage growth than whites, although whites received a larger rate of growth from a marginal week of experience. Finally, disabled individuals were found to differ from non-disabled individuals in the characteristics which determine wage growth. Based on their mean characteristics, these individuals would have witnessed a smaller wage increase from a marginal week of experience even if they had worked the same number of weeks as their non-disabled counterparts.

FOOTNOTES TO CHAPTER III

1) Mincer applied a linear decay function to the ln $(1 - S_t)$ term. The term then becomes ln $(1 - K_0 - [K_0 t/T])$ which can be distributed to the constant term and coefficients on experience through the use of a Taylor series expansion. This technique is unacceptable in the present context since the rate of investment is dependent not only on experience, but also on the level of disability. Should the level of disability change at any time period, the rate of investment will depart from the linear decay function. Mincer. Schooling, Experience and Earnings, National Bureau of Economic Research, New York, 1974, pp. 90 - 91.

2) Economic theory dictates that one's prospective wage need not be zero to cause an individual not to participate. Instead, the prospective wage need only be less than the individual's reservation wage. The basis for imputing a wage rate of zero is not that the individual is not working, and therefore faces a zero wage rate. The choice of a zero wage rate is, rather, based on the response to a separate question about participation in the labor force; that response is "unable to work". It is assumed that these individuals are totally disabled and have zero employable human capital and, for that reason, a zero wage rate. As compared to other surveys of the disabled it does not seem unreasonable that somewhat fewer than 100 individuals, or about 12 percent, would be totally disabled.

3) See Appendix B for a list of the 13 activity limitations and a copy of the relevant portions of the questionnaire.

4) The Kendal Tau-B coefficients (for ranked correlation) are presented for the limitations in Appendix C. These simple correlations are relatively large (often .60 or .70), and the multiple correlation is undoubtedly much larger. This may give rise to multicollinearity, resulting in insignificant t statistics and possibly sign changes on the coefficients. Solutions to the multicollinearity problem may be worse than the problem itself. Dropping variables biases the coefficients; principal components and other dodges result in a loss of information and often make coefficients difficult to interpret.

5) Mincer, J. Schooling, Experience and Earnings, (New York, 1974), p. 84.

6) Mincer, J. Schooling, Experience and Earnings, (New York, 1974), pp. 53, 92.

7) Mincer, J. Schooling, Experience and Earnings, (New York, 1974), p. 66.

8) See Appendix C for a table of Kendal Tau-B coefficients for ranked correlation.

9) A quick way to see this differential is to compare the decline in ln wage over time (age) in Graphs 1 and 2. The slope is much steeper for blacks than for whites.

10) The men in this sample are at or beyond the peak of the earnings profile, probably explaining the insignificance of the experience terms.

11) The source of these data is: Table #474, 1971 Statistical Abstract of the United States Bureau of the Census, U.S. G.P.O., p. 297.

12) Lazear, Mincer and others claim that experience (or where one is located on the age - earnings profile) and one's schooling are prime determinants of the level of investment, and that the rate of investment will affect one's wage rate. Including these terms will help to assess the propriety of the assumption that the rate of investment is zero. A small nonsignificant coefficient will support the assumption.

13) Due to the characteristics of the disturbance term (i.e. Δ ln [1 - S_t] may make the disturbance heteroskedastic) it may be preferable to employ Generalized Least Squares (GLS). However since these individuals are near the peak of their profiles it is likely that investment is small and the change in investment very small. In addition, as previously noted, schooling and life time experience are included to pick up much of the non-random effect. In any case, OLS is unbiased and consistent, being only inefficient. This is likely to produce t statistics which are conservative.

14) A table of Kental Tau-B coefficients for ranked correlation is supplied in Appendix C.

15) β_4 is actually .25 times the calculated β_4 since time disabled was measured in months rather than weeks.

16) A table (Table 7) of return to a marginal week of work for all disabling conditions is presented in Chapter V.