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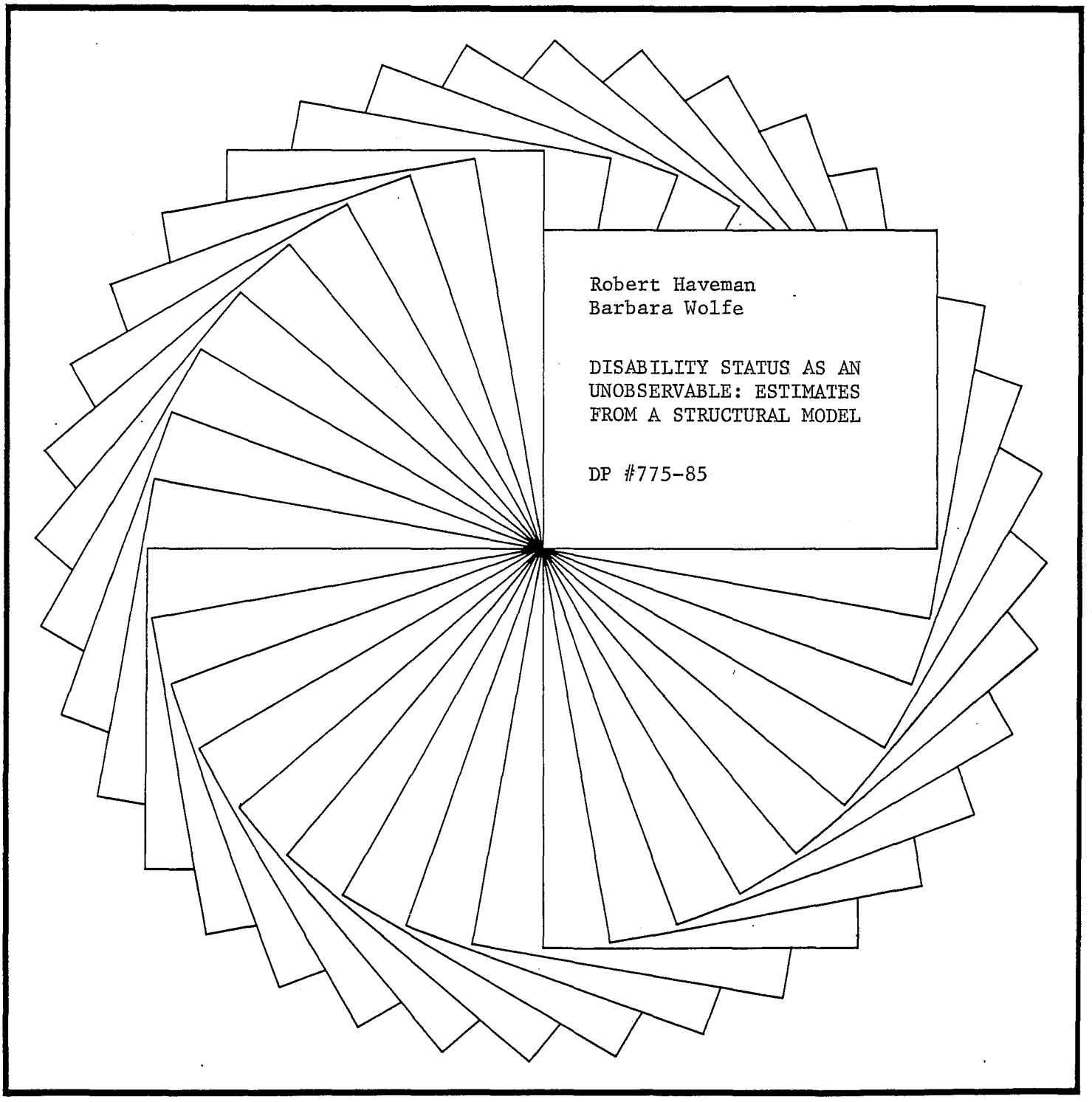

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Disability Status as an Unobservable: Estimates from a Structural Model

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Abstract

This paper proposes a new index of "true disability" by treating disability status as an unobservable phenomenon which is both causally related to a number of exogenous characteristics of an individual and correlated with a number of observed indicators of health, impairment and qualifications for employment.

First we define true disability and distinguish it from related concepts. We then discuss the importance of an objective and reliable measure of disability for economic research on labor market and other behavior. We then present the specification of our structural model for estimating true disability as a latent variable. Finally, we present the results of our estimation and compare the constructed index with characteristics believed to be associated with true disability and with a self-reported index of the severity of disability.

Disability Status as an Unobservable: Estimates from a Structural Model

The true disability status of an individual has important implications for a wide variety of decisions which he or she is required to make. The most prominent of these decisions are whether or not to work, how much to work and the kind of work to do, whether or not to apply for disability-related income transfer benefits, whether or not to seek retraining and rehabilitation services, and the extent of utilization of health care services. Efforts to model and empirically estimate the determinants of these decisions have been plagued by the absence of any reliable and objective indicator of the severity of the disability with which any individual is affected. Those indicators which are readily available are based on three measures:

1. Individual self-reports. These are subjective and potentially endogenous, with choices made regarding work that perhaps reflect taste rather than true activity-limiting conditions.

2. Medical reports. These are partial in their evaluation, unrelated to individual labor market potential, and of limited availability.

3. Post-observation mortality. This measure reflects only those physical and mental characteristics associated with individual longevity.

All have substantial disadvantages for both behavioral research and statistical descriptions of the disability status of the population.

In this paper, we propose a new index, which describes the "true disability" status of an individual. This index treats true disability status as an unobservable phenomenon, but one which is both causally

related to a variety of exogenous characteristics of an individual and correlated with a variety of observed indicators of statuses and behaviors believed to be associated with true limitations on functioning in the labor force. In Section I, we will define what we mean by true disability, and distinguish it from the related concepts of impairment, handicap, and health status. Section II discusses the importance of an objective and reliable indicator of disability status for behavioral research, using the studies of the work-effort response of individuals to available income transfers to illustrate the problem. Section III presents the specification, of our structural model for estimating true disability as a latent variable, and the resulting estimates of the relevant parameters. Finally, we compare our estimated index with a variety of characteristics believed to be associated with true disability, and with a self-reported index of the severity of disability.

I. DISABILITY, IMPAIRMENTS, AND HEALTH STATUS

A definition of disablement or impairment is necessary to identify the disabled population. Unfortunately, there is no definition that is unambiguously the correct one, as the concept of disability ultimately rests on a social judgment. Only when a person falls significantly below some threshold of deviation from the average does society designate that person as sufficiently atypical to warrant special attention. When the characteristic at stake is the physical or mental capacity of a person to engage in productive activities within a social environment, that person is considered handicapped and/or disabled. However, society does not

unambiguously reveal who is so designated. Defining the disabled population therefore requires reliance on a surrogate or proxy measure.

Contrary to much common usage, we define disability as a shortfall in the physical, mental, or emotional capability of an individual to adequately perform activities required for jobs which, on other grounds, he or she would be qualified to hold. Consistent with this functional-capability definition of disability, we define handicap to be a limitation of a physical, mental, or emotional sort which reduces, to varying degrees, one's ability to perform the functions required for jobs as well as other activities. And we define impairment as a loss in physiological, anatomical or mental capacity which may lead to a handicap. These definitions reflect three considerations which affect an individual's success in the labor market: whether or not an individual is limited in specific work-related functions; the severity of these limitations; and the requirements in terms of functional performance that are imposed by occupations which an individual could normally hold, given his or her age, education, training, and skills.

Given these definitions, an individual's true disability status is distinguishable from his or her health status, even though the two concepts overlap. Health status concerns deviations from what is commonly referred to as "good health," and typically involves impairments in one or more of the body's systems. Such impairments are often short-term (e.g., influenza), although they may well be long term or terminal as well. When they are long term, they may or may not impair a person's ability to perform the functions required by his or her occupation. Thus, a severely disabled person (e.g., a quadriplegic) may well be in good health. Conversely, a person sick with influenza may have no job-

prejudicing impairments. On the other hand, a person bedridden with terminal cancer has both low health status and severe impairments.[1]

II. DISABILITY STATUS AND ECONOMIC BEHAVIOR

Disability (and health) status is relevant to a wide variety of individual economic behaviors--e.g., labor supply, occupation, marital status, and geographic location. Studies of the determinants of individual choice in all of these domains--but, especially, in the labor supply area--have focused on the role of economic factors (e.g., wage rates and expected transfer incomes) in explaining observed behavior. Success in obtaining unbiased estimates of the role played by these economic variables depends on the availability of measures of disability status that are not endogenous to the behavior being investigated.

Most studies, especially those analyzing the decision to retire, have relied upon some form of self-reported disability (or health) status. Use of such self-report measures has been criticized on grounds that responses offered by individuals both reflect and serve to justify decisions that have already been made (see Parsons, 1982). If, for stigma or other reasons, respondents rationalize a decision not to work (e.g., retiring before age 65) by citing work-related handicaps (or poor health) as reasons, the relationship between self-reported disability status and the observed behavior will be stronger than that between true disability status and work effort. As a corollary, the measured effect of economic variables on the decison to work will understate their true effect.[2]

Parsons (1982) attempted to evaluate the potential endogeneity problem associated with use of a self-reported disability index in a

single equation retirement/replacement rate/disability model. Comparing results from using both a self-reported disability indicator and actual mortality experience five years after the work status choice decision at issue, he found that the mortality measure was less closely related to the prior work effort decision than was the contemporaneous self-reported measure, and that the replacement rate was more significant when the mortality measure was used. From this exercise, he concluded that self-reports of work impairments were endogenous, and use of them in labor supply models tends to mask the measured effect of economic variables on labor force behavior.

A similar conclusion, based on a related exercise, was reported by Chirikos and Nestel (1984). They found that a simple, self-reported disabled/not disabled indicator was more closely correlated with the extent of work than was a more extensive index of impairments that reflects both the presence of a variety of functional limitations and the severity of each. Moreover, a probit equation explaining the determinants of disabled/nondisabled status revealed that both the extensive limitation index and economic factors were significant independent determinants, implying that simple self-reported disability is conditional on actual labor market performance and, hence, endogenous.

Anderson and Burkhauser (1984) compare a self-reported measure of disability status with subsequent mortality in both a single equation work status model (in which disability status is taken to be exogenous) and in a joint-demand framework, in which disability status and labor force choices are correlated (owing, for example, to both being dependent on similar preferences, such as preferences for recreation and exercise).

They found that, within the joint-demand model, the choice of the disability indicator does not affect the final estimated work effort response to economic variables. However, when the self-reported indicator was used, much of the estimated response to economic variables was found to come from the indirect effect of these variables on disability status, reflecting endogeneity. In the single equation model the effect of the economic variables was substantially smaller when self-reported disability status, rather than actual, post-period mortality, was used, again suggesting the endogenous nature of the self-reported variable. They concluded that self-reported measures tend to mask the measured effects of economic variables on labor force behavior, because of the endogeneity of the self-reports.

Other studies of the retirement decision, for example, Parsons (1980a, 1980b), have relied on subsequent mortality as an indicator of disability status at the time a retirement decision is made. This indicator has been criticized by Haveman and Wolfe (1984) as being arbitrary, a notoriously weak proxy for work-impairing limitations (the factor which is likely to be dominant in affecting work choices), and as excluding a wide variety of handicaps that are unrelated to longevity. The results by Colvez and Blanchet (1981) indicating that limitations and impairments of a wide variety of types have been increasing substantially over time while mortality rates have been decreasing cast further doubt on the appropriateness of this indicator in studies of individual behavior. Moreover, recent studies have indicated that self-reports of health are stable over time, highly correlated with medical doctor reports, and show no evidence of exaggeration of problems related to being out of the work

force (see Maddox and Douglass, 1973; Waldron, Herold, and Dunn, 1982; Ferraro, 1980 and Mossey and Shapiro, 1982).

These studies, then, leave the question of the choice of disability indicator for studies of individual behavior unresolved. Both simple self-reports of the disabled/nondisabled status of the individual and indicators of current disability based on subsequent mortality appear to be inadequate measures of disability status appropriate for use in behavioral studies. More comprehensive self-reported indicators, however, especially those that reflect the severity of impairing conditions, appear to be more reliable for such studies, though still not ideal.[3]

III. A GENERAL-PURPOSE DISABILITY INDICATOR

Given the absence of empirical counterparts to an economic concept of disability, and the controversy regarding use of either self-reported disability or subsequent mortality in the analysis of behavioral responses to economic incentives, an attempt to develop an independent and exogenous measure of true disability is in order. In this section, we present our proposed measure. This indicator is designed to be a multi-purpose indicator of true disability, and emphasizes the functional and work-related character of impairing conditions. Hence, the indicator is applicable for a wide variety of purposes, including the identification of the size and characteristics of the disabled population, and as a control variable in analyses of the determinants of economic behavior.

Consistent with the economic definition of disability presented in Section I, an appropriate measure of true disability should reflect three phenomena: (1) functional limitations, (2) severity of handicap, and (3)

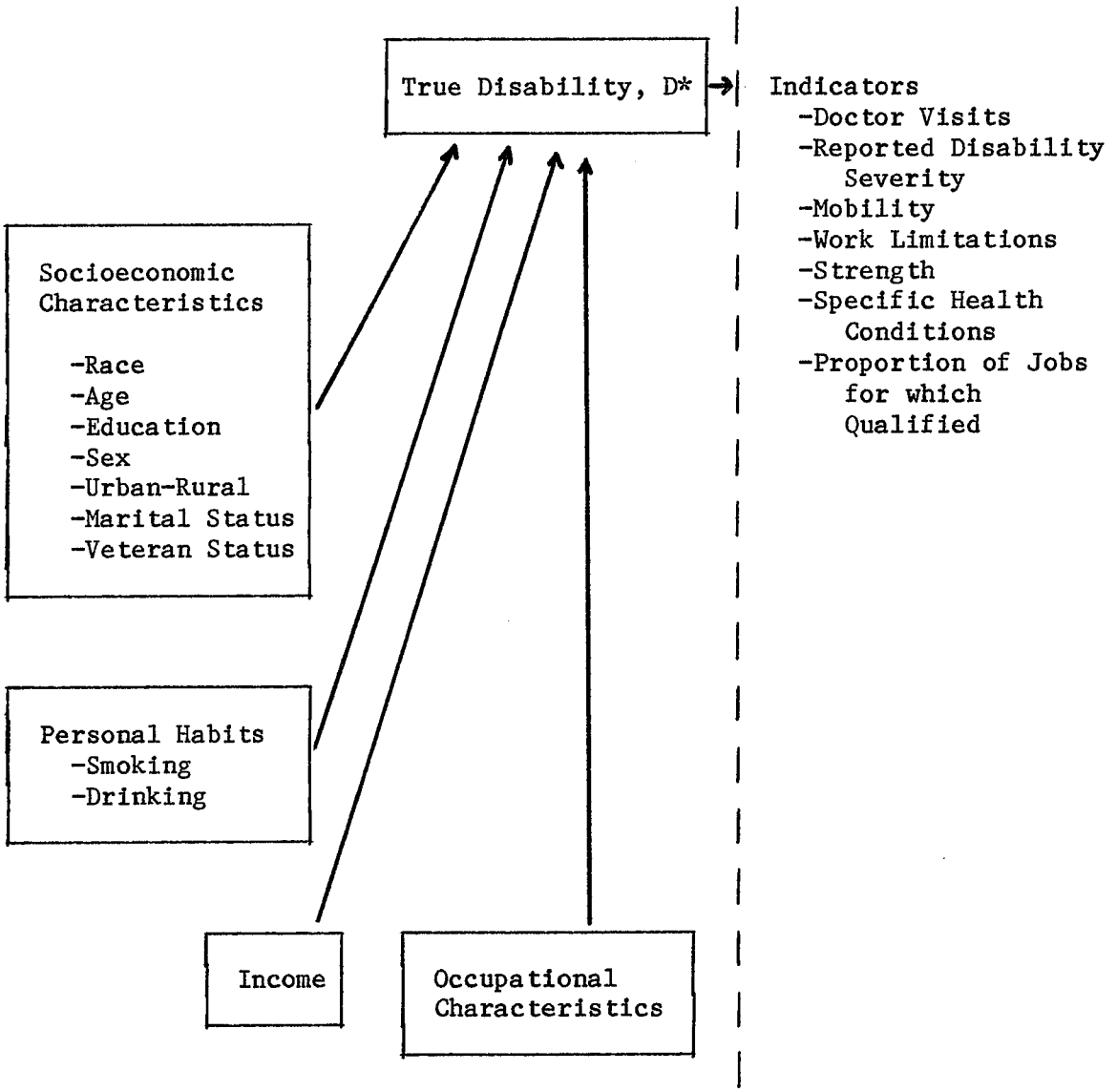
occupational tasks related to functional limitations. Our measure views true disability as an unobservable and estimates its value as a latent variable from a system of structural equations. Figure 1 presents a sketch of the model which underlies the estimation.

In this model, true disability is determined by a set of exogenous variables. These include the socioeconomic characteristics of the individual (education, sex, age, race, marital status), family income, personal habits, and the requirements and characteristics of an individual's normal occupation. They are shown in the boxes on the left-hand side and bottom of the figure. Education, family income, and being married are expected to be negatively related to true disability; non-white status and age are expected to be postively related. Smoking and excessive alchohol consumption are expected to contribute to true disability, while the sign on sex is ambiguous. Although women tend to live longer than men, they also tend to have more days per year during which they are incapacitated. Moreover, women who classify themselves as housewives may feel less reason to report themselves as disabled. The occupational characteristics will have mixed signs, depending on whether or not the work is hazardous or relatively conducive to the absence of impairments (e.g., involves physical exercise).

The model also includes a set of observable disability indicators--variables which are expected to reflect the presence or absence of impairing conditions or functional limitations. These are shown on the right-hand side of the figure, and include the extent of self-reported work limitations (with an expected positive relationship), severity of interviewer-assessed disability (+), self-reported, general health conditions (+), doctor visits per year (+), strength (-), specific health

Figure 1

Model of Disability as Latent Variable



problems (+), and the percentage of weighted occupations for which a person is qualified on the basis of a comparison of individual capabilities (e.g., education and physical capabilities such as the ability to lift, move, see etc.) with requirements of each occupation (-).

The structure of this model can be stated in notational form as equations (1) and (2):

$$(1) \qquad D^* = \underline{\beta}'\underline{X} + \varepsilon_1$$

$$(2) \qquad \underline{I_i} = \underline{\alpha_i} D^* + \underline{\varepsilon_i},$$

where D^* is an unobservable variable measuring true disability; $\underline{X}$ is a vector of observable exogenous variables; β is a vector of coefficients associated with $\underline{X}$; $\underline{I_i}$ is a vector of indicators for the unobservable variable D^*; $\underline{\alpha_i}$ is a vector of coefficients relating D^* to each indicator; and ε_i are the vectors of error terms assumed to be normally distributed where ε_1 and $\underline{\varepsilon_i}$ are uncorrelated but are permitted to be correlated with ε_j, $j \neq 1$.

The model was estimated employing the Lisrel full-information, maximum likelihood procedure. In the estimation, covariance among the error terms of the $\underline{I}$ variables was permitted, in particular among the variables indicating disability and among those indicating health status and among all of the $\underline{X}$ variables. However, the covariance between the health measures and the self-reported disability and work measures was constrained to equal zero. The data used were the 5344 men and 4369 women aged 18-64 in the 1978 Social Security Administration Survey of the Disabled.

In Table 1, the notation and definition of the variables is provided. Tables 2 and 3 present the estimation results from the Lisrel model, fit

Table 1

Description of the Variables

Variables		$\bar{X}$	σ
Exogenous Variables			
Race	race of respondent, 1=white	.85	.36
Education	number of years of education	10.9	3.8
Age	age of respondent in years	45.7	13.7
Sex	sex of respondent, 1=female	.45	.50
Urban	urban-rural residence of respondent, 1=rural	.24	.43
Married	marital status of respondent, 1=currently married	.67	.47
Income	total family income of respondent in 1977, in $000 per year	9.2	1.3
Vet. Mos.	number of months respondent was in military service	.27	.44
Vet. War	respondent a war veteran, 1=in military during wartime	.21	.40
Booze	respondent drinks excessively: yes=1; sometimes=.5; no=0	.16	.37
Cigs.[a]	cigarette consumption over smoking life	15.0	21.3
Occupational characteristics[b]			
Strength	requirement of strength on job before onset of work limitations	1.4	1.4
Climb	requirement of climbing on job before onset of work limitations	11.1	25.4
Stoop	requirement of stooping on job before onset of work limitations	20.4	34.1
Outdoors	exposure to outside elements on job before onset of work limitations	4.1	15.2
Cold	exposure to extreme cold on job before onset of work limitations	.96	6.1
Hot	exposure to extreme heat on job before onset of work limitations	2.5	10.3
Wet	exposure to wet/humid conditions on job before onset of work limitations	3.6	12.1
Noise	exposure to noise/vibration on job before onset of work limitations	14.5	27.1
Hazards	exposure to hazardous conditions on job before onset of work limitations	13.0	27.0
Atmosphere	exposure to adverse atmospheric conditions on job before onset of work limitations	7.1	18.3
Indicator Variables			
Doc. visits	number of visits to doctor per year	8.4	21.1
Severe	dummy variable, 1=interviewer reports severe disability	.51	.50
Secondary	dummy variable, 1=interviewer reports secondary disability	.05	.21

—table continues—

Table 1 continued

Variables		$\bar{X}$	σ
Indicator Variables, continued			
Poor	dummy variable, 1=respondent reports poor health	.30	.46
Fair	dummy variable, 1=respondent reports fair health	.25	.44
Good	dummy variable, 1=respondent reports good health	.25	.43
Mobile	mobility of respondent; 0=if bedridden; .1=if able to go to toilet; .25=if chair bound; .5=if outdoors on own; .75=if able to use public transportation; 1=other	.91	.22
Limited Work	dummy variable, 1=respondent is limited in work because of an impairment	.61	.49
Strength	current strength of respondent: 0=trouble lifting 10 lbs. and some trouble sitting for long; .25=trouble lifting 25 lbs.; .5=trouble lifting 50 lbs.; .75=can lift 50 lbs. but some trouble walking long distances or sitting long; 1=other	.39	.43
Strength Change	change in strength from before onset of work limitation to present	.27	.31
Unemployed-Health	dummy variable, 1=respondent is unemployed because of a health condition	.48	.50
Future Work	for respondents unemployed because of health condition, 1=definitely, .5=maybe, .25=not sure, 0=will not work in future; for workers set=1.	.64	.44
Sight	current level of sight: 0=blind; .25=trouble seeing with glasses; .75=no trouble seeing with glasses; 1=does not wear glasses	.73	.25
Factor 1[c]	first principal component of diagnosed health conditions representing overall orthopedic problems	$.21^{-6}$	1
Factor 2[c]	second principal component of diagnosed health conditions representing circulatory-heart problems	$.21^{-6}$	1
Factor 3[c]	third principal component of diagnosed health conditions representing respiratory problems	$-.16^{-6}$	1
Factor 4[c]	fourth principal component of diagnosed health conditions representing mental problems	$.98^{-6}$	1
Factor 5[c]	fifth principal component of diagnosed health conditions representing organ-based problems	$.28^{-8}$	1
Factor 6[c]	sixth principal component of diagnosed health conditions representing long-term illnesses	$.35^{-7}$	1
Factor 7[c]	seventh principal component of diagnosed health conditions representing paralysis	$.54^{-7}$	1
Factor 8[c]	eighth principal component of diagnosed health conditions representing sclerosis and related problems	$.47^{-7}$	1
Job Qual.[d]	percentage of jobs for which respondent qualifies	.46	.36

—table continues—

Table 1 continued

[a]For current smokers, packs of cigarettes smoked per day times (Age - 18); for former smokers, packs of cigarettes smoked per day times (Age when quit smoking - 18) times $(.8)^t$, when t equals years since respondent quit smoking.

[b]These variables were constructed by matching the respondent's 3-digit occupation before onset of a work limitation (or current occupation if no work limitation) to the physical demands of the occupations, obtained from the Dictionary of Occupational Titles (DOT). Values represent percentage of persons in occupation with specified requirement except for strength.

Strength: 1=sedentary; 2=light; 3=medium; 4=heavy; 5=very heavy
Climb: 1=if any requirement for climbing or balancing
Stoop: 1=if any requirement for stooping, kneeling, crouching, and or crawling
Outdoors: 1=if work is outside more than 75 percent of time; 0=if work is inside more than 75 percent of time; .5=if work is rather equally divided between inside and outside
Cold: 1=if work requires exposure to extreme cold
Hot: 1=if work requires exposure to extreme heat
Wet: 1=if work requires exposure to wet and humid conditions
Noise: 1=if work requires exposure to noise or vibration
Hazards: 1=if work requires exposure to conditions in which there is danger to life, health, or bodily injury
Atmosphere: 1=if work requires exposure to fumes, odors, toxic conditions, dust, or poor ventilation

[c]Scores on principal factors identified in principal components analysis of 48 specific health conditions and prognoses, including such conditions as asthma, high blood pressure, cancer, diabetes, missing limbs, paralysis, spasms, and stiffness.

[d]The percentage of the jobs in the economy for which a person is qualified, based on a comparison of the physical (climb, stoop, reach, strength, sight) and education requirements of 3 digit occupations (obtained from the Dictionary of Occupational Titles) with the physical and educational capabilities of the individual, with occupations weighted by their proportion of total employment, done separately for each sex.

separately over male and female observations.[4] Table 2 shows the estimates for equation (1); Table 3 for equation (2).

In general, the signs on the exogenous (causal) variables are as expected (Table 2). The more schooling possessed by the respondent, the lower true disability (D*); conversely, D* increases with age. Rural location, being married, and having more income all appear to significantly reduce true disability status (D*), while veteran status and cigarette consumption increase D*. Alchohol use appears to reduce disability status. Race is unrelated to D* for males; however, for females, being white is related to a lower disability index. Finally, jobs that require physical activity (strength, climbing) tend to reduce D*, while jobs that expose workers to adverse temperatures, environments, or working conditions (hazards) contribute to increasing true disability.

The coefficients in Table 3 indicate the relationships between the latent D* variable and the several indicators of disability status specified in equation 2. The signs of the coefficients and their significance are as expected and revealing. Our true disability measure is positively and significantly related to the number of doctor visits, self-reported poor health, the presence of work limitations, a reduction in strength, being unemployed owing to health conditions, and all but one of the factors depicting specific health conditions.[5] Being in good health, mobile, strong, expecting to work in the future, having good vision, and having the physical attributes and education to be qualified for a large number of jobs are all negatively and significantly associated with our latent true disability measure.

Table 2

Full Information, Maximum Likelihood Results for Equation 1[a]
$D^* = \underline{\beta}'\underline{X} + \varepsilon_1$ Coefficient (asymptotic t-statistic)

	Male	Female
Race	.01 (1.3)	-.04 (5.5)
Education	-.28 (34.9)	-.23 (28.3)
Age	.32 (35.9)	.38 (47.3)
Urban	-.07 (10.6)	-.06 (8.4)
Married	-.05 (6.4)	-.09 (12.0)
Income	-.07 (10.1)	-.06 (8.3)
Vet Mos.	.03 (3.8)	.02 (2.7)
Vet War	.03 (3.3)	.002 (0.2)
Booze	-.06 (8.1)	-.04 (5.8)
Cigs.	.05 (6.2)	.02 (2.9)
Occupational Characteristics		
Strength	-.29 (21.6)	-.13 (12.0)
Climb	-.28 (1.7)	.03 (0.3)
Stoop	.12 (7.5)	.04 (2.9)
Outdoors	.04 (4.9)	-.01 (0.9)
Cold	.02 (3.1)	.01 (1.5)
Hot	.02 (2.0)	.01 (0.8)
Wet	.02 (2.4)	-.01 (0.5)
Noise	.02 (2.1)	.03 (3.9)
Hazards	.03 (2.5)	.04 (3.0)
Atmosphere	-.01 (1.3)	-.01 (0.8)
Chi-square	9502	6800
Goodness of fit	.865	.859
N=	5344	4369

[a]Covariance is allowed between all of these exogenous variables.

Table 3

Full Information, Maximum Likelihood Results for Equations 2[a], $\underline{I}_i = \underline{\alpha}_i' D^* + \varepsilon_i$ Coefficient (asymtotic t-statistic)

	Male		Female	
Doc. Visits	.23	(21.1)	.31	(28.4)
Severe	1.00	---	1.00	---
Secondary	-.21	(18.4)	-.18	(16.0)
Poor	.66	(70.3)	.64	(66.4)
Fair	.17	(15.4)	.29	(26.9)
Good	-.41	(39.4)	-.42	(40.1)
Mobile	-.35	(31.1)	-.46	(42.4)
Limited Work	.97	(128.3)	.98	(133.0)
Strength	-.88	(102.2)	-.82	(90.9)
Strength Change	.80	(86.4)	.93	(117.0)
Unemployed-Health	1.01	(142.7)	.98	(131.8)
Future Work	-.92	(112.0)	-.91	(110.0)
Sight	-.37	(34.8)	-.46	(43.9)
Factor 1	.62	(63.4)	.72	(78.9)
Factor 2	.44	(42.8)	.49	(47.3)
Factor 3	.27	(25.1)	.11	(9.8)
Factor 4	.16	(14.7)	.18	(16.0)
Factor 5	.01	(1.1)	.22	(20.4)
Factor 6	.03	(2.7)	.11	(9.6)
Factor 7	.19	(17.3)	.10	(9.4)
Factor 8	.10	(8.7)	.25	(22.6)
Job Qual.	-.80	(86.9)	-.85	(96.5)

[a]Covariance between the health-related and disability-related variables is allowed; it is not allowed among the two sets of variables.

The model is similar for men and women and consistent with a priori expectations on signs and significance. Among both men and women, the variables that have the strongest relationship to true disability (as measured by the asymtotic t-statistic) are the following: limited in ability to work, strength, change in strength, unemployed owing to health conditions, self-reported likelihood of future work, self-reported poor health, and percentage of jobs for which qualified.

Our use of the latent variable, full-information technique has yielded a measure of "true" disability that both depends causally on the exogenous variables and incorporates information from the numerous health and disability measures which we judge to be indicative of the presence of authentic limitations to work. As such it is largely free of the potential endogeneity problems often associated with self-reported disability indicators. Moreover, because we have formed our model with particular attention to the ability of the respondent to work, it bears a far closer relationship to the functional concept of disability than does subsequent mortality. To be sure, reasonable alternative sets of exogenous and indicator variables could be employed in such a latent variable structural model, and an alternative indicator of true disability generated. We judge that both the comprehensiveness of our exogenous and indicator variables--including detailed working conditions, specific health conditions, and an explicit measure of the extent of the jobs for which an individual is qualified--and their close link to factors cited in the literature as implying work limitations yield an indicator which is richer in content than those generated from alternative specifications, yet highly correlated with them.

IV. D* AND ITS CORRELATES

The unobservable variable, D*, is taken to be fully characterized by its causal and indicator variables. Hence, for each observation, an imputed value of D*--an index of true disability--can be calculated from our estimated latent variable results. This index is contructed to be equal to the expected value of D*, conditional on the exogenous variables: $E(D^* \mid \underline{X}) = \underline{\hat{\beta}X}'$. The mean for this index is 15.7, the standard deviation is 6.9, the range .42 to 37.8.

Having calculated the index of true disability for each observation from the relevant coefficients, we can compare true disability with both a variety of individual socioeconomic characteristics and other indicators of disability status. The results of such comparisions are shown in Tables 4 and 5.

Table 4 presents the simple correlations between our index and other measures of disability, handicap, and health status. In column 1, the correlations follow the expected pattern relating to self-reported health status: positive and large with Poor Health, negative and large with Excellent Health, with appropriate intermediate relationship to Fair Health and Good Health. The second column shows the generally larger correlation with "work limitation" measures: positive with limited ability to work and unemployed owing to health problems; negative with able to work and expecting to work in the future. The last column presents a diverse group of disability type measures: typical measures such as percentage disabled (% Dis.), severe and secondary disability, a job-centered measure (Job Qual.), a measure of degree of handicap (Mobile), and a measure capturing a behavioral response of respondents (whether

Table 4

Correlation between "True Disability Index" and Other Indicators of Disability and Health Status

Health Indicators		Work Limitation Indicators		"Disability" Indicators	
Poor	.299	Limited Work	.390	Severe Dis.	.383
Fair	.123	Unemployed Health	.364	Secondary Dis.	-.042
Good	-.156	Able to Work	-.374	Mobile	-.113
Excellent	-.313	Future Work	-.395	% Dis.	.408
				Job Qual.	-.511
				Applied for SSDI	.266

Table 5

Correlation between "True Disability Index" and Selected Socioeconomic Variables

Background		Current Status		Economic Status	
Race (White = 1)	-.035	Married (Married = 1)	.127	Family Income	-.147
Education	-.463	No. of Children	.145	Working (Working in 1978 = 1)	-.242
Sex (Female = 1)	-.148	Age	.766		
		Never Married (Never Married = 1)	-.314		

applied for Social Security Disability Insurance [SSDI]). All of the relationships have the expected sign. The strongest relationship is with Job Qual., documenting the job-related character of D*. The high correlation between D* and % Dis. suggests both the overlap of and the difference between a more traditional disability index and our more comprehensive disability index. These correlations, then, serve to validate our true disability index; the relationships are all as expected, suggesting overlap with traditional measures. However, the predominance of correlations less than .5 shows that the index we have developed reflects a variety of factors not captured by any of the more traditional measures.

Table 5 presents the correlations between the true disability index, D*, and a selection of socioeconomic variables. The strongest relationship is with age, .766. This is likely to reflect the vocational nature of disability, deteriorating health, and functional ability. Education has the second highest correlation with the index, -.463, again indicating the tie of our index to vocational factors. These relationships suggest that persons with any particular impairment are less likely to find a job if they have little education and/or are older. The only unexpected relationship is the negative correlation between the index and Never Married. This can largely be explained by the negative relationship between Age and Never Married (-.39), which suggests that Never Married is a partial proxy for age. The correlation between the index and Family Income has the expected negative sign but is rather small. The relationship of D* with individual earnings rather than family income would be larger, but because a very high proportion of the sample are not working, this latter relationship is not reported.

SUMMARY

An indicator of true disability status has been obtained using a linear structural equation system. Health status, specific health conditions, impairments, functional limitations, and work limitations have all been incorporated into the index. Hence, D* would appear to capture the essential characteristics of disability: the inability of an individual to adequately perform activities required for jobs (or otherwise perform productively in a social environment, owing to a shortfall in physical, mental, or emotional capacities). In particular, D* would appear to reflect the three most important dimensions of disability: the extent of functional limitations, the severity of these limitations, and the requirements of functional performance in jobs for which the individual is qualified on other grounds.

The index of true disability is correlated with a variety of other measures of disability and health status, with the observed relationships as expected. Hence, the index is consistent with such traditional measures. However, the size of the correlations suggest that D* is a richer and more comprehensive indicator of true disability status than any one of these individual indicators.

Notes

[1]Extensive discussions of the concepts of disability, impairment, and health status are found in Riley and Nagi (1970); Nagi (1979); Berg (1973); Eisen, et al. (1979); Haveman, Halberstadt, and Burkhauser (1984). The importance of the concept used to measure health or disability status in assessing the extent of health or disability problems in the population, and changes in it, was revealed in Colvez and Blanchet (1981). Their analysis of trends in the annual Health Information Survey (HIS) reveals that health conditions limiting work and other activities increased substantially in the United States from 1965 to 1975 among all age and demographic groups, at the same time that longevity was increasing.

[2]Anderson and Burkhauser (1984) emphasize another endogeneity. It may be that true disability status is itself a choice variable which depends on the same exogenous variables as, say, retirement (or depends on variables that are correlated with those determining work effort). If this is the case, the effect of disability status, however measured, on work effort will be overstated, and the true effect of economic variables camouflaged.

[3]Haveman and Wolfe (1984), in a three-stage probit model designed to measure the work status response to both expected disability-related transfers and labor market income, found that both of the economic variables were strongly significant when used with a self-reported disability indicator that reflected the severity of impairments.

[4]The basic differences in labor market behavior between sexes were judged to yield different structural relationships between variables and a D* emphasizing work capabilities.

[5]Interviewer reported severe disability was used as the basis for standardizing the exogenous and remaining indicator variables; its coefficient is set equal to unity and is primarily useful for comparison.

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