THE EFFECT OF DISABILITY ON WAGES: A HUMAN CAPITAL APPROACH

by

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ABSTRACT

L. SCOTT MULLER. The Effect of Disability on Wages: A Human Capital Approach (Under the direction of SOLOMON W. POLACHEK.)

The basic human capital model is altered to explain wage loss due to disability. This approach allows for the dual effects of disability on wages; the initial loss due to the disability and the continued loss due to decreased investment during the period disabled. A theoretical model is developed and tested empirically using data from the 1966 to 1971 National Longitudinal Survey of Men 45 to 59. In addition to wage rate determination, wage growth is examined and a simultaneous model of wage and hours is estimated.

The results show a reduction in wages and earnings caused by the disabling conditions. First, the disability causes an immediate reduction of the wage rate and second, disabled individuals invest less in human capital and consequently wage growth is reduced. This causes the earnings profiles of disabled and non-disabled individuals to separate and the earnings of the disabled to decline relative to those of the non-disabled as time passes.

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CHAPTER I

Introduction

In 1969 William G. Bowen and T. Aldrich Finegan [1] wrote:

> That the labor force status of an individual will be affected by his health is an unassailable proposition. It is unassailable, however, because a priori reasons tell us it must be so, not because there is a mass of supporting evidence.

Since then there have been several attempts to show empirically that health affects one's earnings either through changes in labor force participation, changes in the wage rate, or both. This thesis will extend the literature on the subject by employing the human capital theory to explain the effect of disability on the wage rate and wage growth of individuals.

The human capital approach offers a theoretical explanation of differences in the labor market earnings of disabled persons. Major differences in earnings have been linked to individual differences in education and experience (age), both of which are critical factors in the determination of an individual's human capital stock. In this thesis, disability will be approached as a decline in or limitation to the employment of human capital.[2] That limitation or loss of human capital will influence the wage rate one commands in the labor market, as well as one's future investment in human capital.

It is important, first, to understand the nature of disability. Disability is not an absolute; it must be measured in relative terms. A 'disabled' worker need not be totally unemployable; rather disability

reflects an inability for the worker to perform some task as he had once been able. Disability can attack for a relatively short period of time or it may be permanent. A disabled worker may find his disability declining over time, either due to "healing" of or adaptation to the handicap, or he may find his condition deteriorating. Thus disability is not a matter of full or zero labor force participation [3], but rather the degree of disability will determine the degree of participation in the labor force. Disability will be defined as the "inability to participate fully in the labor force or in closely allied activities by reason of some medically identifiable dysfunction." [4]

Ill health and disability do affect the labor force participation of workers. Estimates of the portion of persons reporting an activity limitation vary, although 15 to 20 percent of potential labor force participants appears to be the most frequently reported result.[5] A disabled worker can have his labor force participation affected in any of the following ways: he may be rendered totally and permanently unable to work; he may be limited in the amount and/or kind of work he is able to do; or there may be no appreciable effect due to the disability.

Although the effect of disability varies dramatically according to the individual, some comparisons are possible. For prime age males (ages 45 to 54) the labor force participation rate is over 25 percentage points lower for persons claiming an activity limitation.[6] In fact it is estimated that one half of the adult males not in the labor force are disabled. On the average, disabled individuals who are in the labor force supply fewer hours of work annually than the non-disabled population,[7] although the difference is rather small. Wages appear to be lower, ceteris paribus, for disabled persons,[8] and combining the two effects gives

disabled persons substantially lower earnings than non-disabled persons.

On the average, income declines with disability, and the decline is related to the severity of the disability. A study of Social Security applicants [9] revealed that in about 82 percent of cases in which a worker became disabled, a reduction of income occurred, while in less than two percent of the cases was an increase reported.

Johnson and Murphy [10] have estimated that in 1966, after adjusting pre-disability earnings for inflation and productivity change, the average wage loss for low income workers due to severe disability was $2,439 or 60 percent of expected wage, and the average wage loss due to a non-severe disability was $1,066 or 24 percent of the expected wage. Although this result was based on a sample of low income families, the results are indeed noteworthy.

The above result is not, however, applicable across all workers, occupations, or incomes. Disability occurs less frequently among the more highly educated (and consequently higher income) workers.[11] In addition, labor force participation rates for disabled individuals are highest amongst those who have attained the highest level of schooling. Several explanations have been offered for the above phenomenon. Good health has been linked both to education and income, presumably due to better knowledge about, and a greater ability to pay for medical care. Second, once disabled, better educated persons may be more able to adapt to their handicap and are more likely to have occupations which, being sedentary in nature, are more easily adaptable to the handicap.

Another researcher [12] estimates that the average white male, upon becoming disabled, loses approximately 36 percent of his earnings. This is the smallest loss of the sex-race cohorts, while black females suffer

the largest loss at about 38 percent of their earnings.

Thus the magnitude of the disability problem is not small, In fact, estimates of the national loss in income due to disability range as high as 23 billion dollars in 1966.[13] This figure represents about six percent of all earned income for that year.

Conceptual Problems

There are several conceptual problems associated with measuring the labor market impact of disability.[14] First, it is often difficult to isolate disability from the normal aging process. As one grows old, human capital depreciates and health deteriorates. In order to separate old age from health it is often desirable to adopt an arbitrary age limit for the analysis (e.g. 65 years of age), beyond which losses are attributed to aging rather than to poor health.

Measuring disability is also problematic. Certain types of limitations may be occupationally specific, resulting in limitations for some occupations but not others. For instance, a bricklayer may easily tolerate a loss of hearing while the loss of a limb would be disabling. A telephone operator, on the other hand, might be able to work without a limb but certainly would not be employable in that occupation after suffering a hearing loss. An attractive measure of disability might use a scale of zero to one, with zero being no limitation and one being total disablement (activity limitation).

In addition, it is important to remember that disability is often a marginal impairment. Lack of education, sex or race discrimination, or other problems may already present hardships to an individual. The marginal addition of the disability may or may not be significant; thus it is important to isolate these effects.

Finally, two biases exist in analyzing disability. Most data sets ask the respondent to judge his own disability. There may be a bias for able-bodied unemployed persons, and especially non-participants in the labor force, to give disability as a socially acceptable reason for non-participation. In addition, a simultaneity problem exists between health and income in the human capital model. Not only does health determine income, but income also contributes to health through the ability to afford, or the propensity to invest in, a treatment for a disability or ill health. This paper will treat disability as exogenous to earnings, that is, determined by conditions beyond the control of the individual; although in reality, disability is probably partially exogenous and partially endogenous. Household and automobile accidents are certainly exogenous to the human capital model. Industrial accidents are probably also exogenous in incidence, although they may be occupationally linked. Many "diseases", especially those which are occupational in nature, (e.g. heart attack) are endogenous to the health-earnings relationship. In all cases however, investment in health care, made possible by higher earnings, could reduce the impact of a disability. This relationship is endogenous to the model. The assumption of exogeneity could be relaxed in future research.

Review of the Literature

The largest portion of literature in the disability area has dealt with the effect of disability on labor force participation and the supply of labor. Bowen and Finegan,[15] found that, for men ages 45 to 64, the participation rate for those with no limitation was almost 98 percent while those reporting a limitation had a participation rate somewhat less than 72 percent. The authors found a positive correlation between

education and participation for both the disabled and the non-disabled populations. The proportion of persons claiming a disability increased with age. Blacks and married persons had a higher incidence of disability. Occupational segregation and the availability of a substitute worker (e.g. a wife) explain these findings.

Berkowitz and Johnson [16] added health measures to the typical labor force participation model (including age, race, marital status, education, asset income, expected wage, transfers, wages of other household members, unemployment rate, etc.). Health was quantified as a vector of limitations.[17] Those limitations with statistically significant coefficients were of negative sign, indicating that health does in fact reduce participation rates. Stratifying the sample according to race, the authors found that blacks are more likely to reduce their labor force participation than are whites, given some limitation. Unfortunately, the data, the 1966 Social Security Survey of Disabled Adults, contains only persons reporting some limitation. The results cannot be generalized to the entire population.

Scheffler and Iden [18] added a disability variable to a participation model and fit that model with a more representative sample than did Johnson and Berkowitz. The authors used a two stage model to estimate labor force participation. The first stage represented the decision to enter the labor force, while the second stage estimated the number of weeks and hours of labor supplied, given the decision to enter the labor force. Unfortunately, the only disability information available in the 1967 Survey of Economic Opportunity (the data employed in the paper) were three questions asking if one's health prevented one from working, limited the amount of work one could perform, or limited the kind of work one could

do. From these three questions the authors constructed a binary variable for the presence of a primary and/or secondary disability. This measure not only represents the presence of ill health but, in addition, measures labor force participation indirectly.[19] Due to this error the results are likely to be biased.

Despite these shortcomings, the results of the Scheffler-Iden analysis are interesting. As expected, the coefficients on the primary and secondary disabilities were negative, and they were significant in all but the hours worked equation. The binary variable for length of disability (i.e. over one year) was negative and significant in the participation equation while it was positive and significant in the number of weeks in the labor force and number of weeks worked equations. This may indicate lower participation rates for disabled persons although those who do work supply a larger number of weeks. Conflicting evidence is shown in the participation equation for the week prior to survey week, where the length of disability significantly increases the likelihood of having worked.

The inclusion of disability variables reduced the education coefficients in the labor force participation equation by 50 percent and made the education variable smaller or insignificant in the second stage equations. This indicates the magnitude of the health-education interaction.

The disability coefficients for white middle-aged males were twice those of blacks, possibly due to higher non-wage income for whites, which may allow middle age individuals to withdraw from the labor force. Individuals without this source of support must remain in the labor force and the disability will appear less severe. The old age sample produced the opposite effect with the disability coefficients for blacks being larger

than those for the whites.

In conclusion, disability was significant in all but the hours of work equation. This may be explained by the inability of an individual to determine the number of hours he wishes to work; rather the number of hours is determined by his decision to enter the labor force. This article raises additional questions about the labor market behavior of disabled persons.

Luft [20] compared not only participation and labor supply of disabled and well populations, but also extended disability analysis into earnings and wages. The method employed was to first estimate participation, labor supply, wages and earnings for the well population and then to compute the gross difference between the disabled and the well populations. Finally the differences were adjusted by means of wage and participating equations, taking into account differences in the components of earnings (e.g. age, education, etc.). Although the participation rates are lower for the disabled population and the disabled work fewer weeks per year and fewer hours per week, given their demographic and socioeconomic characteristics, the disabled population would have, in the absence of disability, worked more weeks per year than the well population.

The author notes that women and blacks generally suffer larger and more frequent losses from disability than do males or whites. The explanation offered for the racial differential is that whites are more likely to receive medical care than blacks, and blacks are more likely to be employed in occupations susceptible to disability. The larger loss for women is generally attributed to their supposed secondary position in the labor force. According to this analysis, the average loss of earnings to an individual is about 35 percent of annual earned income.

Grossman and Benham [21] used a multiple stage model to analyze the effects of disability on weeks worked and the wage rate. The paper is unique in that the authors attempt to construct an index of health which not only indicates the presence of ill health but also measures the magnitude of the problem. The index is the first principal component of five self-assessed binary variables indicating the quality of one's health (good, fair, poor, etc.) and a variable representing the number of limitations an individual suffers out of a list of 17 possible limitations. The index is then normalized to values between zero and one.

The labor supply function is the typical function containing expected wage, experience, number of children, other income, etc., with the health index added. The coefficient on the health index is negative and significant, indicating a reduction in weeks worked due to the presence of ill health.

The wage function is the basic human capital model with the health index (and several other control variables) added. This is the first attempt to alter the human capital model to explain the earnings effect of disability; however, the functional form is not correct. The authors fail to incorporate health into the actual investment process, an oversight which will be corrected here. These results indicate that poor health directly reduces the wage; however, the coefficient on the health index variable is not significant to conventional levels.

Bartel and Taubman [22] have investigated the impact of health, disability, and prior illness, upon earnings. Controlling for schooling and age (as a proxy for experience), the authors find that most of the limiting conditions and prior sickness have a negative impact on earnings. The magnitudes of these effects are, for the most part, not

significant. The results indicate that health and disability play a part in wage determination.

Most recently, Donald Parsons [23] explored the relationship between health, labor supply and the allocation of time within the family. Three binary variables indicating good, fair, and poor health were added to the labor supply equation in a simultaneous system including hours worked per year and 'other income' [24]. All of the health variables were found to reduce the hours of work relative to the reference population, those who claimed to be in excellent health. Other income was found to reduce the number of hours worked, although the effect was not significant. The instrument for hours worked had a significantly negative impact on other income. This appears to indicate that a decreased male labor supply causes an increase in both the earnings of other family members and the transfer income to the family. However, the author notes that when the estimation was repeated for family earned income only, the effect was reduced substantially. This indicates an insensitivity of family earned income to the health of the male. The biggest shortcoming of the analysis is the failure to make health endogenous to the system. Certainly health not only affects the availability of transfer income, but the availability of transfer income will determine one's claimed health status.

Conclusion

This thesis will concentrate mainly on the change in the wage rate due to disability, although the earnings effects caused by changes in labor force participation will be considered in an extension of the model in Chapter IV. The analysis will be undertaken within the human capital framework as Grossman and Benham, and Bartel and Taubman have done;

however, major changes will be made. Where the past studies have simply added a variable(s) representing disability or ill health in an almost ad hoc method, this thesis will consider the topic within a theoretical model of human capital investment and earnings. The major features of this model include its ability to measure the immediate effect of disability on wages and the secondary effect on investment in post-school training, and its ability to account for changes in the magnitude of disability over time. Past work in this area has entirely avoided the effect of health on investment in human capital, yet this effect contributes to the loss of earnings of disabled workers relative to the non-disabled.

Finally, in addition to the human capital model which determines wages, an earnings growth approach will be employed.[25] This analysis is particularly applicable in the case of disability since it enables one to assess the true loss over time due to the occurrence of a limitation. This approach has never before been applied to disability.

FOOTNOTES TO CHAPTER I

1) William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation, (Princeton, N.J., 1969), p. 62.

2) The choice to approach disability as a limitation to the employment of one's stock of human capital rather than as an actual change in the stock of human capital, is simply a matter of preference. The results are functionally the same, however this approach seems more compatible with the instance where an individual condition improves over time, even though there has been no direct investment in health capital.

3) Full labor force participation is not absolute; labor force participation differs by sex, age, education and race, among other things. For prime age males full labor force participation tends to be 40 hours per week, 50 - 52 weeks per year. Full participation is generally considered the "usual" situation for workers in the same age, sex, race, etc., cohort.

4) Monroe Berkowitz and William G. Johnson, "Towards an Economics of Disability: The Magnitude and Structure of Transfers and Medical Costs," Journal of Human Resources, Summer 1970, p. 273.

5) For example: Berkowitz and Johnson (Journal of Human Resources, Summer 1970, p. 271) find that one sixth of working aged adults are limited in their ability to work either due to chronic health conditions or impairment.

   Nagi et al. (American Journal of Economics and Sociology, January, 1972, p. 22) note that the National Health Survey finds 12.3 million persons aged 17 - 64 (approximately 16 percent of the labor force) suffer chronic conditions limiting their work while the Social Security Survey indicates that 17.8 million persons aged 18 - 64 suffer a limiting condition (approximately 23 percent of the labor force).

   Davis (Monthly Labor Review, October, 1972, p. 47) cites the 1966 National Longitudinal Survey figure of 19.3 percent of the population of men aged 45 - 64 as the number with a health problem limiting the amount or kind of work they are capable of performing.

6) William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation, (Princeton, N.J., 1969), p. 63.

7) J.M. Davis, "Impact of Health on Earnings and Labor Market Activity," Monthly Labor Review, October, 1972, p. 48.

8) M. Grossman and L. Benham, "Health, Hours, and Wages," in The Economics of Health and Medical Care, Mark Perlman, Editor, (New York, 1974), pp. 223 - 255.

9) Saad Nagi and Linda Hadley, "Disability Behavior: Income Change and the Motivation to Work," Industrial and Labor Relations Review, January, 1972, p. 225.

10) W.G. Johnson and E.H. Murphy, "The Response of Low-Income Households to Losses from Disability," Industrial and Labor Relations Review, Vol. 29, No. 1, 1975, p. 95.

11) W.G. Bowen and T.A. Finegan, The Economics of Labor Force Participation, (Princeton, N.J., 1969), p. 63.

12) Harold S. Luft, "The Impact of Poor Health on Earnings," Review of Economics and Statistics, Vol. 57, No. 1, February, 1975, p. 51.

13) Harold S. Luft, "The Impact of Poor Health on Earnings," Review of Economics and Statistics, Vol. 57, No. 1, February, 1975, p. 51.

14) Many of these arguments are raised in Berkowitz - Johnson (Journal of Human Resources, Summer, 1970). For a more complete discussion see this article.

15) W.G. Bowen and T.A. Finegan, The Economics of Labor Force Participation, (Princeton, N.J., 1969), pp. 62 - 66.

16) Monroe Berkowitz and William G. Johnson, "Health and Labor Force Participation," Journal of Human Resources, Vol. 9, No. 1, Winter, 1974, pp. 117 - 128.

17) The limitations included in the regressions are: walking and stooping, handling, reaching, lifting and carrying, sight and hearing, and mental or nervous conditions.

18) Richard M. Scheffler and George Iden, "The Effect of Disability on Labor Supply," Industrial and Labor Relations Review, Vol. 28, No. 1, October, 1974, pp. 122 - 132.

19) For further discussion of this matter see William G. Johnson's forthcoming "Comment on Scheffler-Iden," in Industrial and Labor Relations Review.

20) Harold S. Luft, "The Impact of Poor Health on Earnings," Review of Economics and Statistics, Vol. 57, No. 1, February, 1975, pp. 43 - 57.

21) M. Grossman and L. Benham, "Health, Hours and Wages," in The Economics of Health and Medical Care, Mark Perlman, Editor, (New York, 1974), pp. 205 - 233.

22) Ann Bartel and Paul Taubman, "Health and Labor Market Success: The Role of Various Diseases," Unpublished manuscript, June, 1977.

23) Donald Parsons, "Health, Family Structure, and Labor Supply," American Economic Review, September, 1977, pp. 703 - 712.

24) Other family income included: the sum of wealth income, non-work related transfer programs, the sum of work related transfer income, and the earned income of other family members.

25) For additional information on this type of analysis see Lazear, "Age, Experience, and Wage Growth," American Economic Review, Vol. 66, No. 4, September, 1976, pp. 548 - 558.