

This PDF is a selection from a published volume from the National Bureau of Economic Research

Volume Title: Economics—A Half Century of Research 1920–1970

Volume Author/Editor: NBER

Volume Publisher: NBER

Volume ISBN:

Volume URL: <http://www.nber.org/books/annu70-1>

Conference Date:

Publication Date: 1970

Chapter Title: Staff Report: Studies in Industrial Organization

Chapter Author(s): Various

Chapter URL: <http://www.nber.org/chapters/c13557>

Chapter pages in book: (p. 92 - 97)

descriptive analysis compares just two types of banks: the very small banks and the large banks with numerous branches. Similarly, the regression analysis is restricted to the relatively small group of banks with deposits in excess of \$500 million. The results of the exploratory analysis have proven most useful, and the analysis is now being extended to encompass the entire body of data.

David T. Kresge

Other Studies

Benoit Mandelbrot is investigating the influence of rational anticipation on the variability of prices in competitive markets. This study follows the lines of his earlier work, which indicated that, as anticipation of the variables that

influence price is improved, and therefore price is made increasingly "rational," the variability of prices is increased.

Richard Selden is revising his study "Financial Intermediaries and the Effectiveness of Monetary Policy: The Case of Finance Companies" preparatory to staff review, and Robert Shay is planning the final summary report on the Consumer Credit Study.

The program of studies on the quality of credit in booms and depressions is also nearing its final stages. The report on *Home Mortgage Delinquency and Foreclosures*, by James Earley and John Herzog, has been published. George Hempel's manuscript on "The Postwar Quality of State and Local Debt" and Edgar Fiedler's "Statistical Compendium on Credit Quality" have been submitted to the Board of Directors.

7. STUDIES IN INDUSTRIAL ORGANIZATION

Economics of Health

Since the last *Annual Report*, the following papers have appeared:

Richard Auster, Irving Leveson, Deborah Sarachek, "The Production of Health, An Exploratory Study," *The Journal of Human Resources*, Fall 1969.

Victor R. Fuchs, "Can The Traditional Practice of Medicine Survive?", *Archives of Internal Medicine*, January 1970.

Victor R. Fuchs, Elizabeth Rand, Bonnie Garrett, "Health Manpower Gap Reexamined," *New England Journal of Medicine*, February 5, 1970.

K. K. Ro, "Patient Characteristics, Hospital Characteristics and Hospital Use," *Medical Care*, July-August 1969.

A paper by Victor R. Fuchs, Elizabeth Rand, and Bonnie Garrett, "The Distribution of Earnings in Health and Other Industries," has been accepted for publication by *The Journal of Human Resources*.

A volume entitled "Essays in the Economics of Health and Medical Care" is now in preparation. It will incorporate most of the work completed during the past few years.

The advisory committee for the program is

chaired by Dr. George James, Dean of the Mount Sinai School of Medicine, and includes the following members: Gary S. Becker, Columbia University and NBER; James Brindle, Health Insurance Plan of Greater New York; Norton Brown, M.D.; Eveline Burns, New York University Graduate School of Social Work; Philip E. Enterline, University of Pittsburgh; Marion B. Folsom; Eli Ginzberg, Columbia University; William Gorham, Urban Institute; David Lyall, M.D.; Melvin Reder, Stanford University; Peter Rogatz, M.D., State University of New York.

The program is supported by grants from the Commonwealth Fund and the National Center for Health Services Research and Development. Reports concerning individual studies follow.

An Econometric Analysis of Spatial Variations in Mortality Rates by Race and Sex

The primary objective of the study is to measure the effects of income, schooling, and other

economic variables upon health, and to isolate their role in explaining the well-known discrepancy in the health status of whites and Negroes in the United States.

The study makes use of spatial data (census divisions, states, and standard metropolitan statistical areas—SMSA's) for the United States in the 1959-61 period. The statistical techniques employed are ordinary least squares (OLS) and two-stage least squares (2SLS). Health is measured by 1959-61 age-adjusted mortality rates for whites and Negroes (or non-whites) by sex. A tentative and partial summary of findings follows.

1. In multiple regressions that do not take account of schooling the coefficients of family income are usually negative and often approach or achieve statistical significance at conventional levels. Income elasticities of the mortality rate from OLS regressions for SMSA's vary from $-.06$ for white males to $-.31$ for Negro males.

2. The results when family income is decomposed into a labor and a nonlabor component suggest that, in the case of white males, the observed coefficient of family income represents a compromise between the favorable health effects of increases in nonlabor income and the unfavorable (or less favorable) health effects of increases in earnings. Estimated non-labor income elasticities of the mortality rate for white males vary from $-.13$ to $-.37$.

3. The OLS regression coefficients for a measure of schooling are negative and usually achieve statistical significance. The existence of an inverse relationship is also supported by the results for 2SLS. Schooling elasticities of the mortality rate (OLS) vary between $-.24$ for white males to $-.67$ for Negro males. The high correlation between income and schooling makes it difficult to determine whether income improves health through schooling or schooling has an independent effect on health.

4. Both the OLS and 2SLS results suggest the existence of a strong inverse relationship between the mortality rate and the per cent married with spouse present. This effect seems especially strong for Negro males.

5. Per capita state and local public welfare expenditures are found to be inversely correlated with the mortality rate. The elasticities are $-.05$ for white females and $-.10$ for Negro females.

6. The mortality rate is positively correlated with a measure of psychological tensions (the death rate from ulcers of the stomach).

7. The results for a regional dummy variable suggest that residing in the South reduces the mortality rate for white females while it increases the rate for Negro females.

The estimated regression equations are being used to "explain" the observed race and sex differentials in mortality rates.

Morris Silver

The Demand for Health: A Theoretical and Empirical Investigation

The aim of this study is to construct and estimate a model of the demand for the commodity "good health." This is, of course, what consumers demand when they purchase medical services. As economists, we are interested in health—measured here by rates of mortality and morbidity—because of its influences on the amount and productivity of labor.

My model takes as its point of departure the view that health is a durable item. This view is adopted because "health capital" is one component of human capital, and the latter has been treated as a stock in the literature on investment in human beings. Consequently, it is assumed that individuals inherit an initial stock of health that depreciates over time—at an increasing rate, at least after some stage in the life cycle—and can be increased by investment. Gross investments in the stock of health are said to be produced by household production functions, whose direct inputs include the time of the consumer and such market goods as medical care, diet, exercise, recreation, and housing. The production function also depends on certain "environmental variables" that influence the efficiency of the production process.

The most important of these variables is the level of education of the producer.

It should be realized that in this model the level of health of an individual is *not* exogenous but depends, at least in part, on the resources allocated to its production. Health is demanded by consumers for two reasons. As a consumption commodity it directly enters their preference functions, or, put differently, sick days are a source of disutility. As an investment commodity it determines the total amount of time available for market and nonmarket activities; that is, an increase in the stock of health reduces the time lost from these activities, and the monetary value of this reduction is an index of the return to an investment in health.

Figure II-1 illustrates the determination of the optimal stock of health capital at any age, i .

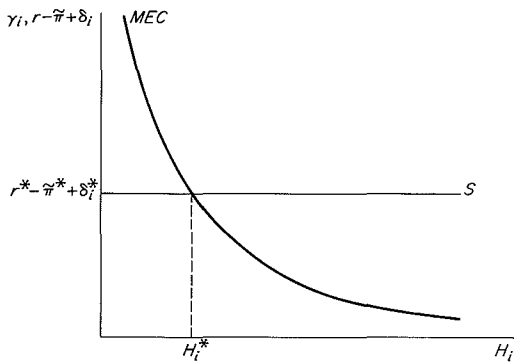


Figure II-1

The demand curve, *MEC*, shows the relationship between the stock of health (H_i) and the rate of return on an investment in health or the marginal efficiency of health capital (γ_i). The marginal efficiency of capital is defined as WG/π , where W is the wage rate, G is the marginal product of health capital—the increase in healthy time caused by a one-unit increase in the stock of health—and π is the marginal cost of gross investment. Since the output produced by health capital has a finite upper limit of 365 healthy days, diminishing marginal productiv-

ity is assumed. Therefore, the *MEC* schedule slopes downward. The supply curve, *S*, shows the relationship between the stock of health and the cost of capital. The latter variable equals the sum of the real-own rate of interest ($r - \pi$) and the rate of depreciation (δ_i). Since the cost of capital is independent of the stock of health, the supply curve is infinitely elastic. The equilibrium stock is given by H_i^* , where the demand and supply curves intersect.¹

Two novel features of the model are the roles it assigns to age and education. The interpretation of the effects of these two variables on the demand for health and medical care follows.

1. An increase in the rate of depreciation with age would increase the cost of capital and reduce the demand for health over the life cycle. At the same time, if the elasticity of the demand curve in Figure II-1 were less than unity, medical expenditures would tend to rise with age. Put differently, with a relatively inelastic demand curve for health, older persons would have an incentive to offset *part* of the reduction in health caused by an increase in the rate of depreciation by increasing their medical outlays.

2. It is well-documented that more-educated persons are more efficient producers of money earnings than their less-educated colleagues. Since education improves market productivity, it may be expected to improve nonmarket productivity as well. This implies a positive correlation between education and the efficiency of the gross investment production process. In other words, an increase in education would increase the amount of health capital obtained from given amounts of medical care and other inputs, lower the marginal cost of gross investment, and shift the *MEC* schedule to the right. With the wage rate and the cost of capital held constant, the more-educated would demand a larger optimal stock of health. If the demand curve were relatively inelastic, however, the correlation between expenditures on medical

¹ The above presentation assumes that the marginal disutility of sick time equals zero. This analysis is modified in the study to take account of the consumption aspects of the demand for health.

care and education would be negative.

The empirical sections of the study estimate demand curves for health and medical care and gross investment production functions. The demand curves are fitted by ordinary least squares, and the production functions by two-stage least squares. The principal data source is the 1963 health interview survey conducted by the National Opinion Research Center and the Center for Health Administration Studies of the University of Chicago. Healthy time, the output produced by health capital, is measured either by the complement of the number of restricted-activity days due to illness and injury or by the complement of the number of work-loss days.

The most important regression results follow.

1. Education has a positive and statistically significant coefficient in the health demand curve. The marginal cost of producing gross additions to health capital is roughly 7.1 per cent lower for consumers with, say, eleven years of formal schooling than for those with ten years.

2. An increase in age simultaneously reduces health and increases medical expenditures. Computations based on the age coefficients reveal that the continuously compounded rate of growth of the depreciation rate is 2.1 per cent per year over the life cycle.

3. The best estimate of the elasticity of the demand curve in Figure II-1 is 0.5.

4. Estimates of the elasticity of health with respect to medical care range from 0.1 to 0.3.

The empirical analysis also explores the effects of changes in wage rates and property income on the demand for health and medical care. In addition, the impact of disability insurance—insurance that finances earnings lost due to illness—on work-loss is assessed. Moreover, to check the results obtained when ill-health is measured by sick time, variations in death rates across states of the United States are studied. This analysis reveals a remarkable qualitative and quantitative agreement between the mortality and sick time regression coefficients.

Michael Grossman

An Economic Analysis of Accidents

Accidents impose significant losses on property and persons—for example, accidents are exceeded only by heart disease and cancer as a cause of death in the United States. So far, there has been little systematic economic analysis of accidents, yet, they can be viewed as an economic problem in the sense that inputs of scarce resources can reduce both the probabilities of and the losses from accidents. In this study a model is first developed which identifies those factors that determine the level of one's resource inputs to reduce expected accident losses. These factors include (1) the initial probability and loss from an accident, (2) the individual's wealth, (3) the productivity and cost of safety devices, (4) the availability of insurance, (5) attitudes toward risk, and (6) legal liability rules.

The second part of the study will be an empirical analysis of accidents. Data are available by states on deaths in 1960 from all accidents by color and by sex. Cross-section regressions will be estimated with independent variables, such as income, years of schooling, medical service inputs, population density, and industrial and occupational characteristics. A cross-section analysis of deaths from specific types of accidents—for example, automobile accidents—will also be undertaken.

A striking feature of the accident data being

TABLE II-3

Deaths from Accidents per
100,000 Persons, U.S., 1959-61

Age Group	Whites		Nonwhites	
	Males	Females	Males	Females
All Ages (age-adjusted)	70.2	25.1	98.6	34.9
15-24	92.4	19.3	95.8	19.9
25-34	67.4	14.0	103.8	24.3
35-44	60.3	15.5	110.3	29.1
45-54	71.4	21.5	122.7	32.9
55-64	83.8	29.2	130.8	45.8

Source: Iskrant and Joliet, *Accidents and Homicides*.

studied is the higher rates for nonwhites than for whites in the United States. In Table II-3, nonwhite accident deaths are more than 30 per cent greater than for whites, and similar differences exist in every region of the country. It is interesting to note further the pattern of accident deaths by age for whites and nonwhites. For white males accidents peak at ages 15-24 and decline continuously down to the 45-54 age group, while for nonwhites accident rates rise continuously as age increases. An attempt will be made to explain not only the difference in over-all rates between whites and nonwhites but also the widening differential with age.

William M. Landes

Expenditures for Physicians' Services

This study, which is being undertaken at the request of the National Center for Health Services Research and Development (Department of H.E.W.), is concerned with expenditures for physicians' services in the United States in the post-World War II period. These expenditures rose from \$2.6 billion in 1948 to \$11.6 billion in 1968. The rate of increase was substantially more rapid than that recorded for the gross national product, personal consumption expenditures, or expenditures on other services. Moreover, the gap has been widening in recent years.

The purpose of our study is twofold: first, we will identify the "sources" of growth in expenditures for the entire period and significant subperiods. These sources include changes in population (size and composition), price (several variants will be considered), number of visits, quantity of service per visit (tests, X-rays, etc.), and quality of service (specialization, length of training).

The second part of the study will be an analysis of the behavior of physicians and patients. Supply and demand elasticities will be estimated from time series and cross-section data. We hope to shed some light on the growth of

specialization, the simultaneous existence of excess demand (in general practice) and excess supply (in surgery), and the growth of insurance and prepayment.

Victor R. Fuchs
Marcia J. Kramer

Socioeconomic Determinants of Hospital Use

In rewriting a portion of my manuscript, I became aware of the need to formulate explicit models. New models have been constructed and, to test them, it has become necessary to run a few more regressions. I plan to rewrite my paper as soon as I get the results. In the meantime, I am working on a short paper with Richard Auster entitled "Income and the Consumption of Hospital Services."

K. K. Ro

The Ownership Income of Management

I have revised my study and it has been sent to the Board for review under the title, "The Ownership Income of Management." The Table of Contents is as follows:

1. Introduction
 2. Methodology and the Data
 3. Executive Compensation Patterns
 4. Study: Stock Ownership and Income: Large Manufacturers
 5. Study: Stock Ownership and Income: Retail Trade
 6. Study: Stock Ownership and Income: Small Manufacturers
 7. Summary and Evaluation
- Appendixes*
- A. Numerical Example of Compensation Calculation

- B. Corporations in the Three Samples
- C. Sample Sizes by Year and Executive Rank
- D. Ownership Income and Compensation Within the Large Manufacturing Sample: Adjusted for Extreme Values
- E. Ownership Income and Compensation Within the Retail Trade Sample: Adjusted for Extreme Values
- F. Ownership Income and Compensation Within the Small Manufacturing Sample: Adjusted for Extreme Values

Wilbur G. Lewellen

Diversification in American Industry

Our work has been focused until recently on developing the necessary basic data for analysis. Future work will proceed in two directions.

First, we have completed the compilation of data on the diffusion of thirteen product innovations as measured by the number of firms producing the products at successive points in time in the 1920-68 period. These products are spread over a broad spectrum of industries. We are now examining the identity of early and later entrants into production in terms of their asset size. The next step will be an attempt to "explain" the rate of diffusion or entry by the rate of change in sales, price movements, and major technical modifications in these products subsequent to their introduction. Thus far, it appears there is at least one fairly consistent pattern: the number of producers does not remain at a plateau after reaching its maximum but rather the rise is followed by a marked decline. The interval from innovation to peak in number of producers varies considerably. One of our objectives is to explain this variation.

The second direction taken by our work involves the analysis of product diversification patterns for a large number of individual firms. We now have a reliable record for 1968 of the activities of roughly 350 manufacturing and

140 nonmanufacturing firms. This record, based on Dun and Bradstreet data, shows for each firm the breakdown of employment by 4-digit industry classified on the basis of the primary activity of each plant. For each firm, the entire "compustat" record of financial data, covering a considerable span of years, is also available. The sample was selected after tests were carried out to ensure that both the "compustat" and the Dun and Bradstreet data referred to the same configurations of parent and subsidiary companies. We now intend to examine two interrelated questions with the help of these data:

1. What is the nature of the linkages between the primary and the secondary activities of companies? For example, do these linkages appear to be in the production or in the marketing characteristics of the activities? To what extent can the spectrum of activities be explained by vertical integration?

2. What is the relative importance of individual company versus industry characteristics in explaining diversification? Among individual company characteristics, one would include past profitability, growth rates, and expenditures on research and development and on advertising. Among the industry characteristics, one would include capital intensiveness, marketing costs, the composition of labor and other attributes of the production processes of the primary industries by which the companies are classified, as well as the growth and profitability of these industries.

In addition to the problems discussed above, our manuscript will also contain some description and analysis of trends in diversification since 1954, based on aggregative census data.

I expect to complete a manuscript for this study by early fall of 1970. Robert McGuckin, a graduate student at the State University of New York at Buffalo, is collaborating with me in the project. The study is financed by the National Bureau of Economic Research with some supplemental financing by the General Electric Foundation.

Michael Gort