SOCIOECONOMIC CAREERS AND DIFFERENTIAL MORTALITY AMONG OLDER MEN IN THE UNITED STATES*

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INTRODUCTION

A main focus of mortality analysis for developed nations is differentials in levels and patterns of mortality across socioeconomic groups and the social processes that give rise to those differences. Stemming from the strong regularity that mortality rates vary inversely with positions in socioeconomic hierarchies, these investigations document an important effect of social inequality within societies and assess the effects of socioeconomic change of mortality trends. To the extent that death rates vary across social groups, such analyses suggest how to improve health and prolong life for large segments of the population and aid in understanding long-run mortality trends.

The goals of this paper are: (1) to describe socioeconomic mortality differences among adult males in the United States; (2) to examine the effects of socioeconomic differentiation early in life on the timing of mortality in later adulthood; (3) to obtain estimates of socioeconomic effects that are relatively free from biases due to health-related selection into socioeconomic positions; (4) to illustrate a strategy for estimating the effects of several dimensions of socioeconomic statuses at multiple periods of life; (5) to show the value to mortality analysis of longitudinal data that are gathered for other purposes; and (6) to illustrate modern methods of survival analysis in the study of social differences in the

timing of death.

The first section of this paper briefly reviews studies of socioeconomic mortality differences and places the present investigation within the context of prior research. It discusses the effects of health-related selection into socioeconomic statuses on estimates of social differences in mortality. It also describes a rudimentary model of the effects of socioeconomic changes over a man's lifetime on his mortality risks. The second section discusses the data and the third section discusses the analytic methods used in this paper. The fourth section presents empirical results. The last section includes a summary of main findings, conclusions, and future research.

The Study of Socioeconomic Effects

The investigation of socioeconomic mortality differences in developed nations generally, and the United States (US) in particular has been limited by the availability of good data on the socioeconomic characteristics of decedents and comparable surviving populations. (See Rosenberg and McMillen, 1983 for a recent review of US data.) In the United States, the analysis of adult socioeconomic differences on national populations has been largely confined to the analysis of aggregate, "ecological," associations between social characteristics of areas (states, counties, census tracts) and mortality rates; and to a single cross-sectional study of individuals, the 1960 Matched Records Study, a linkage of 1960 Census records to certificates of deaths in the four-month period following the 1960 enumeration (Kitagawa and Hauser, 1973). The Matched Records Study documented large cross-sectional differentials in mortality rates among levels of educational attainment, and provided some evidence of

differentials by occupation and income as well. Although Kitagawa and Hauser results are valuable, the individual-level data from which they derive have not been preserved, thus precluding further analysis. Moreover, given their cross-sectional nature, the data provide no information on longer-run effects of age-dependent socioeconomic conditions. More recently, researchers have attempted to exploit data obtained for other purposes to provide fuller analyses of socioeconomic effects (Rosenberg and McMillen 1983). Such studies advance previous work by including multivariate analyses of socioeconomic effects. They remain, however, largely cross-sectional, and thus often control poorly for health-related selection into social positions (see below).[1]

In contrast to the largely cross-sectional US research, major prospective and longitudinal studies have been carried out in several European nations [see Fox (1984) for a review]. Some of these studies consist of cross-sectional censuses (or samples) combined with mortality records in later years. Others obtain longitudinal information on social characteristics as well as on the timing of death. These data largely focus on differences in mortality among broad socioeconomic categories defined at an initial observation point, rather on multivariate analysis of the effects of socioeconomic standing at several stages of life (e.g., Fox, Goldblatt, and Jones, 1985). The European studies, however, generally rest on data superior to those used in US studies. Because the European studies are longitudinal, moreover, they can separate socioeconomic effects from the

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[1] For the most part, moreover, the recent studies have not used modern methods for the multivariate analysis of survival data.

contaminating effects of health-related selection.

Since high quality longitudinal data on mortality is not generally available for the US, mortality studies must exploit data obtained for other purposes. This paper uses the National Longitudinal Survey of Labor Market Experience of Mature Men (NLS), a panel survey of 5020 men in the United States aged approximately 45-59 in 1966 (Center for Human Resource Research, 1985). Designed as a source of information about work careers and retirement, these data are a unique resource for studying mortality among older men in the US.[2] The data are unique in that they include detailed information on respondents' work, educational, and family histories, including wealth, income, and socioeconomic characteristics of respondents' parents. Information about experience up to 1966 is obtained retrospectively, whereas information after that year is obtained through a sequence of interviews through 1983. Although the data come from a sample that is modest in size relative to major mortality studies in developed countries, by application of suitable methods, one can use the data to investigate socioeconomic effects on mortality. The analysis reported here shows that retrospective socioeconomic histories of workers are a valuable and relatively inexpensive way to study socioeconomic effects. The data are described in further detail below.

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[2] One previous analysis of the data examined socioeconomic effects on mortality (Mott and Haurin, 1985). The present paper considers additional aspects of socioeconomic status not included by Mott and Haurin and applies more appropriate statistical methods to the data.

Selection into Socioeconomic Positions and Mortality Differentials

As is well-known, estimated mortality differences across social characteristics such as marital status, occupation, and income can be distorted by the tendency for persons in poor health to enter disproportionately statuses and positions that are observed to have higher mortality rates. Conversely persons in good health tend to attain or remain in higher status positions. Observed differentials in death rates among social categories, therefore, result from *both* the effect of those categories on mortality and also health-related selection of persons into the categories (e.g., Kitagawa and Hauser, 1973; Fox, 1979; 1984; Fox, Goldblatt, and Adelstein, 1982; Fox, Goldblatt, and Jones, 1985). Several strategies are available to neutralize these selection biases.

One strategy is to measure socioeconomic conditions several years prior to the period during which deaths are observed. This strategy minimizes the likelihood that the health conditions that lead to death or survival during the observation period also determine socioeconomic position. A second strategy is to measure health conditions directly. If valid measures of morbidity are available, then they can serve as statistical controls in the assessment of socioeconomic effects. A third strategy is to assess the effects of socioeconomic standing just prior to the period during which deaths are observed, but to control for prior socioeconomic standing. This last strategy *indirectly* controls selection biases insofar as prior socioeconomic standing affects subsequent health. As is discussed further below, the first and third of these strategies are used in the analyses reported here.

Differential Mortality and the Socioeconomic Career

The effects of social conditions on the timing of death cumulate through life. Mortality in later adulthood is conditional on experiences in childhood, adolesence, and young adulthood. Social and economic conditions and experiences are a sequence of opportunities for and constraints upon styles of life (diet, recreation, places of residence, consumption of preventive medical care, etc.) that may affect long-run morbidity and mortality risks. The risks at any moment are a weighted function of all past activities. The weights, however, are difficult to specify because so many hypotheses are possible. For example, past experiences may cumulate so that individuals can be described by an age-dependent index that is their average socioeconomic level over all previous socioeconomic levels that they have experienced. Alternatively, experiences in the remote past may decline in importance as time passes and thus have lesser weight. Another possibility is that very recent conditions and experiences have not had enough time to affect mortality and must be discounted relative to the more remote past. Yet another possibility is that conditions at specific stages of life (e.g., late childhood or early adulthood) have a disproportionate impact because individuals are particularly vulnerable to environmental deprivation at those stages. Finally, the rate and direction of *change* in socioeconomic conditions, rather than their average level, may affect mortality. Of course, data that reveal these processes are scarce. More important, we lack specific theories upon which to base the function relating current and past activities and statuses to present mortality risks.

A Simple Approach to the Effects of Socioeconomic Careers.

The complex relationship between cumulative life experience and mortality on the one hand, and the contaminating influence of health-related selection into socioeconomic positions on the other, implies that our understanding of mortality can benefit from an unstructured investigation of the combined effects of social conditions at various stages of life. That is, we can view mortality risks in mid to late adulthood as a function of current and past socioeconomic conditions, where the weights are determined empirically. Such an approach is preliminary to more structured investigations in which the weights are constrained to follow specific hypotheses about the cumulative impact of experiences. This approach, moreover, enables us to assess socioeconomic mortality differences and also take account of the effects of health-related selectivity on gross associations between socioeconomic standing and mortality.

This paper examines the effects of socioeconomic statuses that are measurable with the available data and have been investigated in the study of phenomena other than mortality. Numerous studies have examined the effects of the social standing of the family of orientation, schooling, and early labour force achievements on income and occupational mobility and attainment at maturity (e.g., Duncan, Featherman, and Duncan, 1972; Sewell and Hauser, 1975). These same variables index potentially important dimensions of socioeconomic variation in mortality as well as provide an outline of individuals' socioeconomic careers.

More specifically, we view mortality risks as a function of socioeconomic conditions in childhood, schooling, early occupational experience, occupation at maturity, and financial assets. Each of these

factors affects mortality both directly and also indirectly through later socioeconomic statuses. We index family socioeconomic background by a classification of respondents' fathers' occupations during the respondents' teenage years. Socioeconomic background affects adult mortality both directly and through its effect on socioeconomic statuses established later in life, especially educational attainment. Educational attainment, measured by formal schooling completed, also affects mortality directly and through its impact on occupational achievement and on the accumulation of wealth. Men's occupations on entry into the labour force, are a function of their educational and social backgrounds and may affect mortality rates later in adulthood. Occupational positions and financial assets at maturity are affected by family background, schooling, and occupation at labour force entry and themselves may affect rates of mortality in late adulthood.

Although many mechanisms govern the associations between early and later socioeconomic standing, a key relationship from the standpoint of the present study is that early socioeconomic conditions may affect health and morbidity, which, in turn, affect occupational and financial standing in later adulthood. As discussed above, occupational and financial standing may be associated with subsequent mortality rates both because of socioeconomic effects and also heath related selection into occupational and financial levels. However, the *net* associations between occupational and financial status on the one hand and mortality on the other, once earlier socioeconomic statuses are controlled, provide estimates that are relatively free of the contaminating effects of selection.

To summarize, then, we examine the effects of socioeconomic experiences, positions, and experiences over a broad span of life--

childhood, youth, young adulthood, and maturity--on mortality rates from midlife onwards. This enables us to achive two goals: (1) to describe the effects of additional dimensions of social standing to those that have been examined in previous research, including essential aspects of individuals' socioeconomic careers, and (2) to obtain estimates of the effects of later socioeconomic standing on mortality that are purged of some of the contaminating effects of health on socioeconomic standing.

DATA

Sample Design and Overview

The 5020 NLS respondents were sampled from the US civilian noninstitutional population and were first interviewed in 1966 and on 11 subsequent occasions between 1967 and 1983 via face-to-face or telephone interviews. The analysis, therefore, is of survival patterns over the 17-year period from 1966 to 1983; that is, the age spans 45-62 for the youngest birth cohort up to 59-76 for the oldest cohort. The NLS provides retrospective data on date of birth, race and ethnicity, educational attainment and training, military service, labour force experiences up to 1966, and parental socioeconomic characteristics when respondents were teenagers. It also includes prospective data on health, occupational, and other labour market experiences, income and wealth, and family circumstances from 1966 onwards. Although the survey provides no direct information on mortality, deaths are recorded as reasons for permanent attrition from the panel. Respondents; exact ages and causes of death are unknown.

Survival and Attrition

Table 1 summarizes the mortality information provided by the NLS. The first panel of the table classifies NLS respondents by their age in 1966 and

whether they died or survived the observation period. The analyses reported here exclude 14 of the 5020 respondents because the survey provides unreliable information on their ages. (Although the target population for the survey was persons 45-59 in 1966, some respondents fall outside this interval, as indicated by the 44-61 age range in the table.) The survey provides information on 1495 decedents and 3511 survivors. The latter include not only persons who survive until 1983, but also persons who drop out of the panel prior to 1983 for reasons other than death (refusal, unreported change of address, etc.). The second panel of Table 1 classifies the observations into survivors, deaths, and withdrawals for reasons other than death for each of the 11 intervals between panel waves. Year-to-year variation in the relative importance of deaths and other withdrawals is most likely the result of variation over time in survey methods, especially between telephone and face-to-face interviewing. The increasing relative importance of deaths arises from both accelerating mortality with age and the increasingly selective group of "loyal" respondents who remain in the survey. Such variations are unlikely to affect the analysis of socioeconomic effects on mortality.

The analyses reported in this paper assume that the NLS provides unbiased estimates of the mortality experience of the US male population.[3] More specifically, they assume that interviewers correctly report deaths and that probabilities of attrition from the NLS due to causes other than death

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[3] The NLS is confined to the 1966 civilian noninstitutional population. Less than two per cent of 45-59 year old men were inmates of institutions in the 1960's (Land and Hough, 1986, 64).

are independent of probabilities of death. Deaths may be misclassified as attrition from other causes if interviewers cannot verify their occurrence. Withdrawal from the panel may result from serious illnesses that closely precede death, implying a lower death rate among respondents than among dropouts. Multivariate analyses of the effects of socioeconomic factors on mortality may also be affected by biases in mortality rates, although these distortions are reduced to the extent that factors predicting attrition from other causes are also controlled in the models. As shown below, however, life table functions estimated from NLS data agree rather closely with those based on official vital statistics.

Estimating Age at Death

The multivariate methods used in this paper (see below) assume that one can rank all decedents by their age at death with few ties. If the ages at death are grouped or many ties are observed, then the computational burden of the multivariate analysis greatly increases. Ages at death of NLS respondents, however, must be inferred from the inter-survey interval in which they die because exact age or date of death is not reported. As indicated in Table 1, this interval is either one or two years wide. The NLS does report date of birth and, for completed interviews, date of interview to the exact day. The interview dates, date of birth, and interval of death enable us to estimate an exact age of death. For the *ith* individual let t_{0i} denote exact date of birth, t_{ki} denote exact date of the *kth* interview ($k = 1, \ldots, K$), and $\bar{t}_{k+1}$ denote the *average* date of interview for persons who respond to the (k+1)*st* interview. Then, for an individual who dies between the *kth* and (k+1)*st* interview, estimated age at death is

$$a_{ki} = t_{ki} - t_{0i} + [(\bar{t}_{k+1} + t_{ki})/2].$$

That is, we assume that a decedent lives for exactly one half the interval between his last interview and the average interview date for men who survive and respond to the next interview. By incorporating information on exact days of birth and last interview, we virtually eliminate ties in estimated ages of death.

Measurement of Independent Variables

All independent variables are measured categorically and, in the multivariate analyses, are represented by sets of dichotomous variables. The variables and their categories are as follows: (1) *Race* (black vs. nonblack); (2) Years of Formal *Schooling* (< 8 years, 8-11 years, 12 years, ≥ 13 years); (3) *Father's Occupation* when Respondent was Age 15 [Professional or Managerial, Clerical or Sales, Craftsman, Operative, Service or Private Household, Farm Labourer, Nonfarm Labourer, Farm Owner or Manager (including tenant), Member of the Armed Forces]; (4) Respondent's *First Occupation* after leaving school (same categories as for Father's Occupation); (5) Respondent's *Occupation in 1966* (same categories as for Father's Occupation, but excluding Armed Forces); and (6) Total Family *Assets* in 1966 (in quartiles).

The occupational categories are a grouping of 1960 US Census Major Occupation categories. Respondent's occupation in 1966 excludes the armed forces because the survey is restricted to persons who were civilians in 1966. For persons who were not employed in 1966, 1966 occupation corresponds to their most recent job. Family assets include the sum of the values of house and other real estate, family business, automobiles, stocks and bonds, and savings accounts, minus debts. All of the independent variables except for race have missing data for at least some respondents.

Life table functions specific to levels of the socioeconomic variables (see below) are estimated over all persons for whom the data are present on the variable. In the multivariate analyses, each classification is augmented with an additional dichotomous variable that equals one if data are missing on that variable for a respondent and zero otherwise.

MODELS AND METHODS

The analysis of mortality differentials reported in this paper applies two general methods, (1) life table analyses of average years lived over the observation period for selected socioeconomic groups and (2) regression models for the partial effects of socioeconomic factors on (instantaneous) mortality rates. The former analyses focus explicitly on differences in *durations* of life. Whereas regression models for duration of life are available, provided one assumes a particular parametric distribution of survival times (e.g., Kalbfleish and Prentice, 1980, Ch. 3), this analysis uses regression methods that do not assume a particular distribution of lifetimes and that estimate differences in instantaneous *rates* of death. The life table functions, therefore, reveal the quantitative importance in years of life of the differences in rates detected by the regression models.

Life Table Estimation

We report estimates of average years lived during the observation period within cohorts of men with approximately equal ages in 1966. These estimates derive from typical life table formulae except that they are based on the experience of *actual* rather than synthetic cohorts and they take account of censoring during the observation period. Let l_x denote the number of survivors of a cohort to exact age m, T_x denote the years of life remaining beyond age x for that cohort, n_x denote the number of men who

enter the age interval x to x+1, c_x denote the number of men who are censored between ages x and x+1, and d_x denote the number of men who die between ages x and x+1. Then, for example, for men aged 50 at the 1966 survey, we estimate average years lived during the 17-year observation period as

$$(1) \qquad (T_{50} - T_{67})/l_{50} = \{\sum_{x=46}^{63} (l_x + l_{x+1})/2\}/l_{50}$$

where $l_{50} = n_{50}$ is estimated directly from sample observations in 1966; for x>50,

$$l_x = l_{x-1}\{1 - [d_{x-1}/(n_{x-1} - c_{x-1}/2)]\};$$

and

$$n_x = n_{x-1} - c_{x-1} - d_{x-1}.$$

These calculations assume that, within single year intervals, mortality follows a uniform distribution and censored observations are observed for an average of half a year.

Proportional Hazards Model

To examine the net effects of the independent variables on survival we use a modified version of the proportional hazards regression model (e.g., Cox, 1972; Kalbfleisch and Prentice, 1980). Under the proportional hazards model, changes in the covariates (independent variables) adjust the instantaneous rate of mortality proportionately. A key feature of this model is that the baseline hazard function is unspecified; that is, the age path of mortality is arbitrary and only the proportionality of the effects of the covariates is assumed. Let t denote age; X_{ki} denote the value on the k*th* covariate for the i*th* individual (i = 1,...,I; k = 1,...,K); $\lambda_i(t)$ denote the mortality hazard for the i*th* individual; $\lambda_0(t)$ denote the (unspecified) baseline mortality hazard; and β_k denote a parameter to be

estimated for the effect of the k*th* covariate on the hazard. Then the proportional hazards model is:

$$(2) \qquad \lambda_i[t \mid X_{1i},\ldots,X_{ki}] = \lambda_0(t)[\exp(\Sigma_k \beta_k X_{ki})].$$

The parameters β_k denote the effects of unit change in the covariates X_k on the log of the hazard rate within categories of (i.e., "holding constant") the other independent variables in the model. For categorical independent variables, which are used in the present analysis, β_k denotes the deviation in the log hazard rate for the group for which $X_k=1$ from the baseline group (for whom *all* $X_k=0$). The quantity $\exp(\beta_k)$ for categorical X_k expresses the hazard of the group for which $X_k=1$ as a proportion of the baseline hazard. For example, if $\exp(\beta_k)=1.25$, then mortality in the group for which $X_k=1$ is 25 per cent higher than for the baseline group.

The covariates X_{ki} are specified in eq. (2) to be time-invariant, a suitable specification for variables which may be regarded as fixed as of the beginning of the observation period, such as family background, formal educational attainment, and prior labour force experiences. Some covariates, however, such as occupational position or family assets after 1966, may vary with time. To include the latter covariates in the model it would be necessary to generalize eq. (2) by replacing X_{ki} with $X_{ki}(t)$. In practice, models with time-varying covariates require substantially more computation to estimate than models with only fixed covariates. Analyses reported in this paper are confined to examining the effects of fixed covariates. In assessing the effects of occupations and family assets at midlife, therefore, the present analysis treats these variables as fixed at their 1966 levels.

Stratification for Cohort Differences

Because the NLS data represent men aged 44-60 in 1966, they include a number of birth cohorts. The broad range of cohorts may make eq. (2) unsuitable for analysis of socioeconomic effects because of intercohort changes in mortality, cohort differences in selection of healthy individuals, and a "built-in" nonproportionality of cohort mortality differences after age 44. Intercohort trends in mortality may alter the level or shape of λ_0, invalidating the assumption of a fixed baseline hazard. In addition, the sample design may create heterogeneity among birth cohorts in proportions surviving to selected ages. For example, 100 per cent of sample men aged 55 in 1966 survive to age 55, but less than 100 per cent of men aged 45 in 1966 survive to age 55. As of 1966, therefore, older cohorts are more selective than younger cohorts of men with good survival chances. The selectivity may bias estimates of age and cohort patterns of mortality, as well as the estimated effects of covariates (Manton and Stallard, 1984; Vaupel, Manton, and Stallard, 1979; Vaupel and Yashin, 1985). Finally, even in the absence of differential selectivity or intercohort change, the design of the NLS dictates that cohort-specific hazards are nonproportional. By design, the mortality hazard is zero for sample observations until 1966. After 1966, the hazard follows the appropriate age pattern of mortality. In the absence of cohort trends or selectivity effects, different cohorts will have different, and severely nonparallel hazard functions from age 45 onward.

One strategy for taking account of cohort effects is simply to include indicators of cohort membership as covariates in eq. (2). This controls for proportional upward or downward shifts in mortality rates over cohorts and

for correlations between cohort membership and other covariates in the model. This strategy fails, however, to control for nonproportional cohort differences. Thus, we *stratify* the data by birth cohort, and estimate eq. (2) *within* cohorts, albeit with common effects β_k of the covariates across cohorts (Breslow *et al.* 1983; Kalbfleisch and Prentice, 1980, 87-88). For the *jth* birth cohort (j = 1,...,J), the model is

$$(3) \qquad \lambda_{ij}[t \mid X_{1ij},\ldots,X_{kij}] = \lambda_{0j}(t)[\exp(\Sigma_k \beta_k X_{kij})],$$

where all other notation is as defined above. Unlike eq. (2), which assumes a single unobserved baseline hazard $\lambda_0(t)$, this model allows for J baseline hazards $\lambda_{0j}(t)$, one for each cohort. The β_k denote deviations from *cohort-specific* baseline hazards resulting from variation in the X_k.

In practice, we stratify the observations into six cohorts that are exact ages 44-47, 47-50, 50-53, 53-56, 56-59, and 59-61 in 1966. We estimate eq. (3) for selected combinations of independent variables using the partial likelihood method (e.g., Kalbfleisch and Prentice, 1980), which is implemented with the BMDP computer program package (Dixon, 1983).

EMPIRICAL RESULTS

This section first summarizes the socioeconomic characteristics of the NLS sample and their implications for differential mortality. Second, it describes differentials in average years of life over the 1966-83 period for the NLS respondents. Third, it discusses the estimates of proportional hazards models that show the gross effects of the socioeconomic variables. Finally, it presents multivariate results on the net effects of socioeconomic factors on mortality.

Socioeconomic Distributions

Table 2 presents the distributions of the NLS sample by categories of

the independent variables. The distributions for some of the variables do not sum to 1.0 because a proportion of the observations have missing data on the variables. Because the survey overrepresents blacks, distributions by socioeconomic status are more heavily weighted toward lower socioeconomic positions relative to the population. The 1966 family assets measure, however, is based on *sample* quartiles. Twenty per cent of sample respondents are missing data on assets in 1966.

The occupation distributions illustrate well-known patterns of inter- and intragenerational changes in occupation distributions in the US (e.g., Featherman and Hauser, 1978). In particular, men aged 45-59 in 1966 were much more likely than their fathers to be employed in "white collar" (professional, managerial, clerical, and sales) occupations, and much less likely to be the owners, managers, or tenants of farms. Within the NLS cohort, 37 per cent of men begin their work lives as farm or nonfarm labourers but only 13 per cent occupy these positions by age 45-59. In addition, from first to 1966 jobs, the occupation distributions show relative increases in numbers of men in upper white collar and upper blue collar positions. These intragenerational differences result from both typical age patterns of employment and also historical trends in the occupation composition of the labour force.

Differences in Average Years Lived.

Life table analyses illustrate patterns of socioeconomic differentials by *duration* of life. Such analyses are ill-suited to multivariate investigations, but they describe basic socioeconomic differences. Table 3 reports expected years of life between selected ages of late adulthood for the NLS men. The age spans correspond to three-year birth cohorts. The

first panel of the table compares estimates of average years lived in a 17-year interval for NLS men to corresponding life table functions based on US published vital statistics (US Department of Health, Education, an Welfare, 1979) for all socioeconomic groups combined. The vital statistics are based on 1975 deaths to US males, events that occur approximately midway through the NLS observation period. As these results indicate, NLS and vital statistics estimates of average years lived agree closely. At most the two estimates differ by .3 of a year. Like the vital statistics estimates, the NLS averages trace the age pattern of mortality, which implies that average years lived vary inversely with initial age of the intervals.

The second panel of Table 3 shows substantial differences in average years lived among men with varying amounts of formal schooling. For five of the six cohorts, years lived varies directly with educational status, producing a difference of approximately two years between men with only elementary school (< 8 grades) and those with at least some post-secondary schooling (13+ grades). These results are highly consistent with those obtained from the 1960 Matched Records Study. Kitagawa and Hauser (1973,17) report a difference between elementary and college-educated men in expected years of life remaining at age 45 of 1.7 to 2.2 years, which they attribute mainly to mortality from age 45 to 65 (rather than after 65). The estimates in Table 3 indicate similarly large differences in years lived by educational status. This pattern is unlikely to result from adverse selection of persons in poor health into lower status groups. Rather, differentials in schooling are established early in life and index differences in style of life and socioeconomic status that persist into middle-age.

Table 3 also reports differences in average years lived by 1966 Occupation and Family Assets. These estimates are more likely to result from both genuine socioeconomic effects on mortality and adverse selection of persons in poor health into the lower status groups. The differentials are nonetheless broadly consistent with those across schooling groups. In most cohorts men in the most advantaged occupational groups--professionals, managers, farm owners, and farm managers--average 1.5 to 2.0 years of life more than those in the least advantaged groups--labourers, service, and private household workers. The farm occupations, including both owners and labourers, are a dwindling proportion of the labour force, suggesting that both highly unfavorable and highly favorable occupations have been reduced in number as the working population has become more urbanized. Table 3 also shows that average years of life vary directly with family assets, resulting in a difference of approximately two years between the poorest and wealthiest quartiles.

Gross Effects of Socioeconomic Characteristics

Whereas the life table analyses reveal socioeconomic variation in *durations* of life from 1966 to 1983, proportional hazards models show the effects of socioeconomic characteristics on instantaneous mortality *rates* during the observation period. Each model controls for within-sample cohort differences by allowing, through stratification, for cohort-specific baseline hazard functions. Table 4 reports the socioeconomic effects for some elementary models. The first three columns of the table present models for the effects of each socioeconomic characteristic considered alone. The first column reports the β's for the difference in the log hazard rate $\{\log[\lambda_i(t)]\}$ between each social category and the baseline category (in

parentheses). The second reports the asymptotic normal statistic $Z(\beta)$ for each parameter. Under simple random sampling, values of these statistics in excess of ± 1.96 indicate significance beyond the .05 level for a two-tailed test.[4] The third reports the quantities $\exp(\beta)$, which denote proportionate differences in mortality rates between each category and the baseline category.

Race and Schooling. The gross effects of socioeconomic factors on the mortality hazard are largely what one would expect from prior research and from the life table estimates discussed above. The mortality hazard for blacks exceeds that of whites (nonblacks) by approximately 45 per cent, a difference similar to that between men with high school degrees and those with only elementary school educations ($1.0/0.68 \doteq 1.47$). Mortality varies inversely with schooling level. Even at the post-secondary schooling level, marginal increases in schooling continue to dampen the mortality hazard.

Father's Occupation. Occupational variation in the mortality hazard has a similar pattern to that for schooling but varies in strength across measures of occupation (father's, first, and 1966). Father's occupation affects the survival chances of sons in middle age. The mortality hazards of sons of operatives, farm labourers, and nonfarm labourers exceed those

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[4] The NLS is a multi-stage probability sample, rather than a random sample. The exact effect of this on statistical tests is unknown. A conservative estimate of statistical significance at the .05 level, however, may require that $Z(\beta)$ be as large as 3.00 for such a complex sample. Strictly speaking, therefore, the reported Z statistics are of descriptive value only.

for sons of professionals and managers by 44%, 73%, and 33% respectively. More generally, men from blue collar backgrounds experience higher death rates during middle age than men from white collar backgrounds, although many of the specific contrasts among occupations are not statistically significant. Whether the differentials by father's occupation indicate specific life-long effects of social orgins or of socioeconomic circumstances that are correlated from one generation to the next will be discussed further below.

First Occupation. The effects of first occupation on the mortality hazard are generally stronger than for father's occupation. Mortality hazards for men who enter the labour force in lower blue collar occupations are nearly twice those of men who enter as professionals or managers. As Table 2 shows, however, less than 10 per cent of NLS men had first jobs as professionals or managers. Although differences in mortality hazards among blue collar occupations and between blue collar and lower white collar occupations for first job follow an approximate socioeconomic gradient, these differences ares are small relative to the contrast with the upper white collar occupations. Finally, while the mortality hazard for men who start their careers in the armed forces is the highest for any occupation, possibly indicating the poor health prospects of World War II veterans, this estimate is based on only one per cent of the NLS sample (see Table 2).

1966 Occupation. The gross differences in mortality hazards among occupations at the onset of the study (1966) resemble those among first occupations. Professionals and managers have superior survival chances to all other groups, although the difference between them and the small farm owner and manager category is trivial. Relative to the first job

differentials, however, 1966 occupation differentials show a clearer socioeconomic gradient. For example, nonfarm labourers 1966 have approximately a 40 per cent higher hazard than operatives (1.86/1.32) and a 60 per cent higher hazard than craftsmen. The hazard for clerical and sales workers is only about 15-20 per cent higher than for the highest white collar group, but well below that of all blue collar occupations except craftsmen.

Family Assets. The mortality hazard has a strong inverse relationship with family assets. The largest contrast occurs between the lowest fourth of the asset distribution and the remainder of the asset distribution. Men in the second quartile of the asset distribution experience mortality at approximately two thirds the rate of men in the first quartile, whereas men in the highest quartile have one half the mortality hazard of men in the poorest families.

Net Effects of Socioeconomic Characteristics

The gross effects of socioeconomic characteristics reported above establish the size of mortality differentials and imply that socioeconomic processes deserve further investigation and interpretation. They do not, of course, indicate causal relationships between socioeconomic factors and survival. The effects of "early" socioeconomic status, indexed by father's occupation, schooling, and first occupation, are unlikely to result from adverse selection into lower status positions of persons in poor health because these statuses apply to circumstances 25 or more years prior to the observation period. Whether their effects persist when later events and statuses are controlled, however, remains to be investigated. Conversely, the gross effects of "late" socioeconomic status, while statistically

strong, may result from patterns of health-related selection.

The models discussed in this section introduce the effects of socioeconomic positions in their approximate temporal order. The last three columns of Table 4 report the net effects of race, schooling, and father's occupation to show whether the gross father's occupation effects persist when schooling and race are controlled. As the results indicate, the gross effects of father's occupation virtually disappear when race and schooling are included in the model.[5] The net effect of schooling on the mortality hazard, in contrast, is only slightly smaller than its gross effect. Evidently, the gross effects of father's occupation are almost entirely due to the ability of sons from higher socioeconomic origins to acquire more schooling, rather than from persistent effects of socioeconomic origins through life. This result agrees with those for the effects of social origins on other outcomes than mortality. Most of the association between father's occupation and son's occupation at maturity, for example, is attibutable to education differentials by social origins (for example, Featherman and Hauser, 1978). In view of these results, the remaining models include race and schooling, but not father's occupation.

Table 5 reports estimates of models that include the effects of NLS respondents' own occupations, controlling for race and schooling. The first three columns report a model that includes race, schooling, and first occupation. They show that approximately one third of the gross mortality differences by race and by educational level are transmitted to middle-aged

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[5] Estimates not shown here reveal that the decline mainly results from the control for schooling rather than for race.

men through their initial occupations. [Compare, for example, net β's for schooling of -.117, -.294, and -.411 to gross β's of -.192, -.386, and -.608 (see Table 4).] Within first occupation categories men with some post-secondary schooling have a mortality hazard that is about two thirds of the hazard for men with only elementary schooling, in contrast to a gross differential of almost 50 per cent. Conversely, much of the gross mortality differential among first occupations results from the association between educational attainment and status of first job. Once race and schooling are controlled, the only important contrast in hazards that remains is between professionals or managers and all other white and blue collar occupations for which the hazard is 30 to 40 per cent higher. This contrast is roughly half the size of the gross contrast reported in Table 4. (Differences between farm owners and armed forces and their first occupations are large, but, as noted above, farm ownership and the military are uncommon first occupations.)

The middle three columns of Table 5 report estimates for a model that includes race, school, and both first and 1966 occupations. Compared to the gross effects of 1966 occupation, the net effects are substantially smaller. Mortality hazards for lower white collar and upper blue collar workers are essentially the same as for professionals and managers once the other variables are controlled. Relative to the hazards for these groups, however, those for lower blue collar occupations are 35 per cent higher. Among the small fraction of men who are farm owners and managers in 1966, the mortality hazard is lowest of all occupations, approxmately 75 per cent of that for professionals and managers. This contrast, however, is barely statistically significant.

Taking account of 1966 occupation reduces the size of contrasts among schooling groups by approximately three fourths, compared to the model that includes only first occupation. A clear educational gradient nonetheless remains, indicating that the effects of schooling persist, even when occupations are taken into account. Additionally, the net effects of first occupation are virtually unchanged once 1966 occupation is taken into account. That is, the mortality hazards of lower white collar and blue collar first occupations are all approximately 30 per cent higher than for professional and managerial first occupations. In contrast to occupation at maturity, where lower blue collar workers experience higher mortality hazards than other groups, for first occupation, *all* blue collar and lower white collar groups are disadvantaged compared to upper white collar occupations (and farm owners).

The last model, reported in the final three columns of Table 5 includes the effects of family assets in 1966. Although the gross effect of assets is reduced by approximately one fifth when race, education, and first and 1966 occupations are controlled, the net effects are substantial. Controlling all other variables, the mortality hazard for men in the top quartile of the asset distribution is only 60 per cent of that for men in the bottom quartile. Differences in wealth also account for substantial portions of the effects of 1966 occupations, which still indicate higher net mortality for blue collar than white collar positions but with a much smaller differential than is observed when assets are not taken into account. Similarly, the effects of educational attainment are further reduced once wealth is controlled. Their final net effects continue to show a clear inverse relationship between school attainment and the mortality

hazard, but the net differentials are approximately 40 per cent of the gross differentials. In contrast, the effects of first occupation are unchanged once family assets are taken into account. A lifelong benefit to entering the labour force in professional or managerial occupations remains even taking account of the later occupational and monetary benefits that may accrue to workers.

The Effects of "Occupational Careers"

First and 1966 occupations are not a full summary of occupational experience, but they provide a considerably fuller picture of men's careers than a single occupational measure.[6] Another way of illustrating the combined effects of early and later occupations on mortality is to examine the relative mortality risks of men in given *combinations* of first and 1966 occupations.

Table 6 reexpresses the estimates of the second model in Table 5 by reporting the proportionate difference in mortality for men in each combination of occupations compared to men who were in professional or managerial positions for both their first and 1966 occupations. These calculations assume that the effects of the two occupational statuses are multiplicative on the hazard (additive on the log hazard), and that no more complex interactions are present. They show that, controlling for educational and racial differences among occupations, men who are in labouring occupations at both the beginning and toward the ends of their work lives have mortality risks approximately 80 percent higher than men who

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[6] Only 25 per cent of NLS men occupied the same first and 1966 major occupational category.

are professionals or managers both early and late in their careers. (See diagonal elements in Table 6 of 1.74 for farm labourers and 1.82 for nonfarm labourers.) A man who enters the labour force as a labourer but enjoys mobility into upper blue collar or white collar occupations can reduce approximately half of the disadvantage associated with a lifelong career as a labourer.

SUMMARY AND CONCLUSION

Summary of Findings

This paper has documented the large socioeconomic differences in mortality in the US that have been reported by other researchers and, in addition, has provided more refined estimates of the way that socioeconomic conditions affect the timing of death in later adulthood. Although men's mortality hazards in late adulthood vary inversely with the socioeconomic status of their parents--as indicated by fathers' occupations, this effect is transmitted through later experiences, especially educational attainment. Men with at least some post-secondary schooling enjoy two more years of life and a mortality hazard 50 per cent lower than men with only elementary schooling. About half of this differential, however, results from the occupational and financial advantages enjoyed by men with more schooling. Men who enter the labour force as professionals or managers enjoy a 30 per cent lower mortality hazard during the late adult years, a differential that persists when the later socioeconomic advantages enjoyed by such men are taken into account. Mortality hazards vary inversely with occupation at maturity (1966) along a more continuous socioeconomic gradient on which the hazards for upper blue collar and lower white collar workers fall between those of labourers and professionals or managers. Most of the later

occupation effect, however, results from differences in the wealth associated with occupation, which negatively affect the mortality hazard.

Conclusions

The analyses reported here provide several estimates of socioeconomic effects that are relatively free from the biases from health-related selection into socioeconomic positions. First, differentials in schooling and first occupation are associated with variation in mortality rates measured at least 25 years after these statuses are acquired. Except among a small number of men who endure ill-health from their childhood on, schooling and initial occupational status are not determined by health conditions that also determine the timing of death. Rather, these statuses themselves may determine the style and quality of life which in turn govern the timing of life-threatening illnesses. These results also suggest that recent and future gains in life expectancy may be realized as a result of increases in levels of educational attainment. Almost 30 per cent of NLS respondents fell into the lowest education level, a much higher proportion than in cohorts born since 1950, for whom proportions with only elementary school education fall well below 10 per cent (e.g., Mare, 1981).

Second, insofar as early statuses do affect long-run health, the *net* effects of later occupational attainment and family wealth reported here are purged of selection biases to a degree. From such analyses as these, of course, one cannot rule out contaminating influences of those aspects of ill-health that are unrelated to the early socioeconomic conditions controlled in the models.

The analyses reported here illustrate the value of relatively small-scale surveys for the understanding of differential mortality. No doubt,

sampling errors for estimated effects are larger than desirable. But, powerful statistical methods, appropriately applied, enable one to obtain valid estimates of socioeconomic effects that are sufficiently precise to be compared to those derived from large-scale data sources that are dedicated to mortality analysis.

Work in Progress

The NLS not only provides the basis for estimating basic socioeconomic differences in mortality among older men in the US, but also will support several more refined investigations that are now under way (Mare and Palloni, 1984). These include (1) the incorporation into basic models of differential mortality short-term variation in socioeconomic characteristics, such as assets, employment status, and occupational standing; (2) analysis of the effects of self-reports of health on mortality for the purposes of further controlling for health-related selection into occupations as a possible source of bias in estimates of socioeconomic mortality differences; and (3) joint analysis of the survival of NLS men and their wives. The last of these topics includes investigation of the effects of changes in marital status on mortality and exploration of possible "bereavement effects" on the mortality hazard of the surviving spouse. It also enables us to examine the relative importance of common family experiences (lifestyle, place of residence, wealth, etc.) and specific aspects of work and socioeconomic background that differ between spouses in determining mortality chances.

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TABLE 1

Survival Status from 1966-1983 of Men in National Longitudinal Survey of Mature Men By Age in 1966 and By Observation Period

Age at 3/1/66	Total	Dead	Censored
44-47	807	152	655
47-50	1088	240	848
50-53	1053	323	730
53-56	971	337	634
56-59	833	332	501
59-61	254	111	143
TOTAL	5006	1495	3511

Interval Between Observations	Survive	Die	Censored
1966-67	4813	60	133
1967-68	4669	72	72
1968-69	4449	102	118
1969-71	4207	165	77
1971-73	3983	168	56
1973-75	3754	174	55
1975-76	3509	100	145
1976-78	3258	161	90
1978-80	3031	202	25
1980-81	2892	101	38
1981-83	2623	190	79
1983-	0	0	2623

TABLE 2

Proportions of Men Aged in Selected Socioeconomic Categories: 45-59 Year Olds in 1966 (N=5006)

Race:		Schooling:	
Nonblack	0.72	< 8 Grades	0.29
Black	0.28	8-11 Grades	0.36
		12 Grades	0.21
		13+ Grades	0.15

1966 Family Assets:		
1st quartile	0.20#	($-32,304 < A < $720)
2nd quartile	0.20	($720 < A < $8,243)
3rd quartile	0.20	($8243 < A < $21,778)
4th quartile	0.20	($21,778 < A < $1,028,805)

Occupations:

	Father's	First	1966
Prof. & Man.	0.13#	0.08#	0.21#
Cler. & Sales	0.04	0.12	0.09
Craftsmen	0.11	0.06	0.22
Operatives	0.12	0.23	0.20
Service & Priv. HH.	0.06	0.06	0.08
Farm Lab.	0.02	0.23	0.03
Nonfarm Lab.	0.07	0.14	0.10
Farm Owners, Man. & Ten.	0.36	0.04	0.06
Armed Forces	0.00	0.01	--

Proportions may not add to 1.00 because all classifications include a category for missing data.

TABLE 3

Estimated Average Years Lived Between 1966 and 1983
By Cohort and Selected Socioeconomic Categories

	Approximate Age Span Observed from 1966 to 1983					
	46-63	49-66	52-69	55-72	58-75	60-77
Socioeconomic Group						
All (NLS)	15.4	15.0	14.4	13.9	13.5	12.9
(No. of Obs.)	(807)	(1088)	(1053)	(971)	(833)	(254)
All (1975 US Male Life Table)	15.6	15.2	14.7	14.2	13.5	13.1
Schooling:						
< 8 Grades	14.4	14.8	13.9	14.1	12.6	12.0
8-11 Grades	15.4	14.9	14.1	13.8	13.7	12.7
12 Grades	15.8	15.2	14.7	13.8	14.6	13.0
13+ Grades	16.2	15.5	15.3	14.3	14.9	14.5
1966 Occupation						
Prof. & Man.	16.1	15.6	14.5	14.1	14.4	13.6
Cler. & Sales	15.1	15.1	14.8	13.8	13.8	12.9
Craftsmen	15.6	15.3	14.6	14.3	13.9	12.5
Operatives	15.0	14.7	14.4	13.8	13.8	14.5
Serv. & Priv. H.H.	14.5	14.2	13.5	13.6	12.0	11.2
Farm Labor.	13.8	13.8	13.5	14.2	11.9	12.6
Nonfarm Labor.	14.9	14.8	13.9	12.8	11.8	9.6
Farm Own. & Man.	16.4	15.5	14.8	15.3	14.7	13.5
1966 Family Assets						
1st Quartile	14.3	13.5	13.0	13.3	12.0	11.4
2nd Quartile	15.4	15.0	14.7	13.8	12.9	12.8
3rd Quartile	15.7	15.6	14.3	14.3	13.7	12.5
4th Quartile	16.3	15.6	15.4	14.4	15.0	13.5

TABLE 4

Socioeconomic Effects on Mortality from 1966 to 1983,
Men Aged 45-59 in 1966: Selected Proportional Hazard Models*

Variable**	Gross Effects			Father's Occupation, Race, Schooling		
	β	$[\beta/SE(\beta)]$	$EXP(\beta)$	β	$[\beta/SE(\beta)]$	$EXP(\beta)$
Race:						
(Nonblack)						
Black	0.373	(6.9)	1.45	0.288	(4.7)	1.33
	(-2log L = 19122)					
Schooling:						
(< 8 Grades)						
8-11 Grades	-0.192	(-3.2)	0.83	-0.145	(-2.2)	0.87
12 Grades	-0.386	(-5.0)	0.68	-0.329	(-3.8)	0.72
13+ Grades	-0.608	(-6.6)	0.54	-0.542	(-5.2)	0.58
	(-2log L = 19108)					
Father's Occupation:						
(Prof. & Man.)						
Cler. & Sales	0.119	(0.7)	1.13	0.100	(0.6)	1.11
Craftsmen	0.188	(1.7)	1.21	0.075	(0.6)	1.08
Operatives	0.365	(3.4)	1.44	0.171	(1.5)	1.19
Service & Priv. HH.	0.170	(1.3)	1.19	-0.123	(-0.9)	0.88
Farm Lab.	0.550	(3.2)	1.73	0.107	(0.6)	1.11
Nonfarm Lab.	0.285	(2.3)	1.33	-0.012	(-0.1)	0.99
Farm Owners, Man., & Ten.	0.161	(1.8)	1.17	-0.158	(-1.6)	0.85
Armed Forces	0.089	(0.1)	1.09	0.118	(0.1)	1.13
	(-2log L = 19143)					
				(-2log L = 19065)		
First Occupation:						
(Prof. & Man.)						
Cler. & Sales	0.400	(2.8)	1.49			
Craftsmen	0.550	(3.5)	1.73			
Operatives	0.571	(4.4)	1.77			
Service & Priv. HH.	0.668	(4.2)	1.95			
Farm Lab.	0.638	(4.9)	1.89			
Nonfarm Lab.	0.658	(4.9)	1.93			
Farm Owners, Man., & Ten.	0.295	(1.7)	1.34			
Armed Forces	0.790	(2.3)	2.20			
	(-2log L = 19126)					

TABLE 4 (Continued)

Variable	Gross Effects		
	β	$[\beta/SE(\beta)]$	$EXP(\beta)$
1966			
Occupation:			
(Prof. & Man.)			
Cler. & Sales	0.169	(1.5)	1.18
Craftsmen	0.132	(1.5)	1.14
Operatives	0.278	(3.3)	1.32
Service & Priv. HH.	0.592	(5.9)	1.81
Farm Lab.	0.630	(4.8)	1.88
Nonfarm Lab.	0.621	(6.6)	1.86
Farm Owners, Man., & Ten.	-0.121	(-0.9)	0.87
	(-2log L = 19081)		
1966 Family			
Assets:			
(1st quartile)			
2nd quartile	-0.404	(-5.4)	0.67
3rd quartile	-0.546	(-6.9)	0.58
4th quartile	-0.782	(-9.6)	0.46
	(-2log L = 19059)		

* All models are estimated within strata defined by 3-year year-of birth categories (see text). N=5006.

** All classifications include a category for missing data.

TABLE 5

Socioeconomic Effects on Mortality from 1966 to 1983,
Men Aged 45-59 in 1966: Selected Proportional Hazard Models†

Variable‡	Race, Schooling, and First Occupation			Race, Schooling, and First and 1966 Occupations			Race, Schooling, Occupations, and Assets		
	β	[Z(β)]*	EXP(β)	β	[Z(β)]*	EXP(β)	β	[Z(β)]*	EXP(β)
Race:									
(Nonblack)									
Black	0.253	(4.1)	1.29	0.167	(2.6)	1.18	0.082	(1.3)	1.09
Schooling:									
(< 8 Grades)									
8-11 Grades	-0.117	(-1.8)	0.89	-0.077	(-1.1)	0.93	-0.019	(-0.3)	0.98
12 Grades	-0.294	(-3.4)	0.75	-0.251	(-2.8)	0.78	-0.167	(-1.8)	0.85
13+ Grades	-0.411	(-3.5)	0.66	-0.365	(-3.0)	0.69	-0.278	(-2.2)	0.76
First Occupation:									
(Prof. & Man.)									
Cler. & Sales	0.294	(1.9)	1.34	0.273	(1.8)	1.31	0.287	(1.9)	1.33
Craftsmen	0.363	(2.1)	1.44	0.387	(2.3)	1.47	0.402	(2.4)	1.49
Operatives	0.312	(2.1)	1.37	0.300	(2.0)	1.35	0.299	(2.0)	1.35
Service, Priv. HH.	0.330	(1.9)	1.39	0.294	(1.7)	1.34	0.290	(1.6)	1.34
Farm Lab.	0.253	(1.7)	1.29	0.246	(1.6)	1.28	0.247	(1.6)	1.28
Nonfarm Lab.	0.335	(2.2)	1.40	0.318	(2.0)	1.37	0.304	(1.9)	1.35
Farm Owners, Man.	-0.033	(-0.2)	0.97	0.042	(0.2)	1.04	0.036	(0.2)	1.04
Armed Forces	0.724	(2.1)	2.06	0.703	(2.1)	2.02	0.736	(2.2)	2.09
966 Occupation:									
(Prof. & Man.)									
Cler. & Sales				0.075	(0.6)	1.08	0.036	(0.3)	1.04
Craftsmen				-0.081	(-0.9)	0.92	-0.123	(-1.3)	0.88
Operatives				0.002	(0.0)	1.00	-0.068	(-0.7)	0.93
Service, Priv. HH.				0.320	(2.9)	1.38	0.219	(1.9)	1.24
Farm Lab.				0.305	(2.1)	1.36	0.108	(0.7)	1.11
Nonfarm Lab.				0.285	(2.6)	1.33	0.171	(1.5)	1.19
Farm Owners, Managers				-0.274	(-1.9)	0.76	-0.240	(1.7)	0.79
966 Family Assets:									
(1st quartile)									
2nd quartile							-0.307	(-3.9)	0.74
3rd quartile							-0.398	(-4.6)	0.67
4th quartile							-0.527	(-5.5)	0.59
-2log L	19075			19038			19002		

† All models are estimated within strata defined by 3-year year-of-birth categories (N=5006).

‡ All classifications include a category for missing data.

* Z(β) denotes the asymptotic normal statistic associated with each estimated β, that is, $\beta/SE(\beta)$.

TABLE 6

Relative Hazards for Combinations of First and 1966 Occupations*

First Occupation	1966 Occupation PM	CS	C	O	SP	FL	NL	FO
Professionals & Managers (PM)	1.00	1.08	0.92	1.00	1.38	1.36	1.33	0.76
Clerical & Sales (CS)	1.31	1.41	1.20	1.31	1.81	1.78	1.74	1.00
Craftsmen (C)	1.47	1.59	1.35	1.47	2.03	2.00	1.96	1.12
Operatives (O)	1.35	1.46	1.24	1.35	1.86	1.84	1.80	1.03
Service & Private HH (SP)	1.34	1.45	1.24	1.34	1.85	1.82	1.78	1.02
Farm Labourers (FL)	1.28	1.38	1.18	1.28	1.77	1.74	1.70	0.97
NonFarm Labourers (NL)	1.37	1.48	1.26	1.37	1.89	1.86	1.82	1.04
Farm Owners and Managers (FO)	1.04	1.12	0.96	1.04	1.44	1.41	1.38	0.79

* Relative Hazards are computed from Model 2 in Table 5 and assume a constant race-education composition across occupations.