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Life-Cycle Earnings of Respondents in the Retirement History Study

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IN THE RETIREMENT HISTORY STUDY

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FOREWORD

Low fertility levels in IIASA countries are creating aging
populations whose demands for health care and income maintenance
(social security) will increase to unprecedented levels, thereby
calling forth policies that will seek to promote increased family
care and worklife flexibility. The new Population Program will
examine current patterns of population aging and changing life-
styles in IIASA countries, project the needs for health and
income support that such patterns are likely to generate during
the next several decades, and consider alternative family and
employment policies that might reduce the social costs of meeting
these needs.

The economic effects of population aging derive from be-
havioral differences over the lifecycle and the aggregate res-
ponse to the changing proportion of the population in various
life stages. Thus, the IIASA Population Program includes studies
of changing work habits, marital statuses, and health of indivi-
duals as they age. This paper examines the lifecycle earnings
patterns of a cohort of US men and women from the Retirement
History Study. Their earnings are shown to rise until the mid-
50s and then fall due to reductions in the amount of labor sup-
plied. The age-earnings profiles differ by race and sex, with
increased education producing higher earnings and poor health
leading to lower earnings. These findings illustrate the earn-
ings patterns of older workers as they aged into their 60s in
the US under the pension and economic conditions that prevailed
in the 1970s. Understanding the effects of population aging
requires a knowledge of these and other lifecycle patterns along
with a theory of how individuals and societies alter their be-
havior in the presence of an altered population age structure.
An objective of the IIASA Population Program is to promote re-
search examining these responses to changing age structures of
populations.

Andrei Rogers
Leader
Population Program

LIFE-CYCLE EARNINGS OF RESPONDENTS
IN THE RETIREMENT HISTORY STUDY

I. INTRODUCTION

Human capital theory has shown the importance of examining
life-cycle earnings patterns instead of focusing on a single
year's earnings. Most of the studies seeking to illustrate age-
earnings profiles and the return to investment in training and
schooling have employed cross-sectional data to construct synthe-
tic cohorts. In these data, the effects of different cohorts can-
not be disentangled from the earnings response to labor market
experience. Recent studies by Ruggles and Ruggles (1977) and Rosen
and Taubman (1982) have used social security earnings records of
individuals to examine the lifecycle earnings of specific cohorts.
This paper examines the lifecycle earnings patterns of persons in
the Retirement History Study (RHS) by using their matched social
security earnings data in conjunction with the personal information
contained in the RHS. The findings relate to a specific cohort of
individuals born between 1906-1911 and are limited to their earnings
experience during the last half of their working life.

The RHS and the matching earnings records are described in
section II of this paper. This section also discusses some of
the advantages and disadvantages of using social security earnings
data. Section III presents earnings ratios as the cohort ages.

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Estimated age-earnings profiles are examined in section IV and the conclusions appear in section V.

II. RESPONDENTS IN THE RETIREMENT HISTORY STUDY

This paper examines the earnings of the respondents in the Retirement History Study, a ten-year longitudinal survey begun in 1969. Respondents include married men, men who were not married in 1969, and women who were not married in 1969. The unmarried respondents may have been married prior to the date of the first study. Respondents were interviewed every two years and answered a series of questions concerning their health, education, work history, and current income status.* The social security earnings histories of the respondents from 1951-1974 are available on the summary earnings record. These data represent annual earnings in employment covered by social security up to the maximum earnings subject to the social security tax. The social security data also include quarters of covered employment in each year and the quarter in which earnings exceeded the taxable maximum earnings.

Three main limitations arise with the social security earnings data. The first is incomplete data on actual earnings. This can occur because workers were in uncovered employment during some of their worklife. The extension of coverage during the 1950s and 1960s implies that some persons could have zero reported earnings early in the sample period and positive values in the more recent years. In addition, federal government workers and some state and local governmental employees remain outside the social security system. As a result, their age-earnings profile may have gaps as these workers move into and out of the governmental sector. In addition, their reported earnings in any year may represent supplements to their noncovered government earnings rather than total earnings. Rosen and Taubman (1982) proceed with their analysis after making the assumption the probability of zero earnings

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*See Irelan (1972) for a more detailed discussion of this survey.

in any quarter is uncorrelated with the independent variables. In general, this hypothesis is maintained throughout this paper; however, age-earnings profiles for persons who are nongovernment workers* in 1969 are also examined along with the earnings patterns of persons with positive earnings in every year between 1953-1974. These sample restrictions reduce or eliminate the zero earnings observations.

The second issue is the lack of a complete lifetime record of earnings. The earnings data used in this study are from 1953 when members of the RHS sample were aged 42-47 and end in 1974 when they were 63-68 years of age. Thus, this analysis pertains only to the last half of the working years and does not explain differences in initial levels of earnings or differences in the growth of earnings during the first 20 years of work experience. The data also do not contain an assessment of hourly wage differences or fluctuations in the annual hours of work.

The third data problem stems from the truncation of annual earnings of the maximum taxable earnings in each year. The use of the truncated data in least squares regressions would yield biased coefficients. Therefore, total annual earnings are imputed for persons whose earnings exceed the maximum based on the quarter in which their earnings were greater than the maximum taxable earnings.** Data from 1951 and 1952 are not included because a large number of persons have missing values for the

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*The RHS does not distinguish between federal civilian government workers who are not covered by social security and state and local government workers who may be covered by social security. Thus, it was decided to eliminate all government workers from the restricted sample in order to increase the likelihood that the earnings histories represent earnings on a primary job throughout an individual's worklife.

**This method estimates total earnings for persons with reported earnings exceeding the maximum taxable earnings, by assuming they passed the earnings ceiling in the middle of the quarter in which they are shown to have annual earnings over the limit. Next it assumes that the person has constant earnings throughout the year. Thus, annual earnings can be estimated by extrapolating from the point at which earnings exceeded the maximum taxable earnings. This procedure is similar to that employed by Ruggles and Ruggles (1977) and Fox (1979). Rosen and Taubman (1982) could not use this method because they did not have the required timing information concerning the quarter in which earnings exceeded the taxable maximum.

number of quarters with covered earnings and the quarter in which
the person exceeded the earnings maximum. Earnings are deflated
and reported throughout in 1967 US dollars as measured by the
consumer price index.

III. EARNINGS RATIOS AND DEMOGRAPHIC CHARACTERISTICS

Annual earnings are determined for each of the RHS respon-
dents. The respondents are then sorted on the basis of sex and
race and the mean annual earnings are calculated for each group.
The average annual earnings are then used to construct age-
earnings profiles for each demographic group. The relative
earnings of the various groups are then compared using earnings
ratios.

Age-Earnings Profiles: Sex Differences

The mean real earnings of male RHS respondents rose from
US $4155 in 1953 when their average age was 44 years to US $5262
in 1966 or an increase of 26.6 percent in annual earnings. After
peaking in 1966 when the average age of the cohort was 57 years,
mean annual earnings decline steadily through 1974 (see Table 1).
Average female earnings follow a similar pattern, rising from
between 1953 and 1967 and then declining. The percent increase
in female earnings is over twice the rise in male earnings so
that the ratio of female earnings increases from 29.2 percent of
average male earnings in 1953 to 38.6 percent in 1966. The sub-
sequent decline in female earnings is slower than the decline
in male earnings so that this earnings ratio continues to rise
and reaches 43.1 in 1974. This represents an increase in the
earnings ratio of almost 50 percent (from 29.2 to 43.1) between
the time the mean age of the cohort is 44 until it reaches 65.

Table 1. Mean real earnings by sex.[a]

| Year | Mean real earnings[b] | | Percent of 1953 earnings | | Female earnings as percent of male earnings |
	Male	Female	Male	Female	
1953	4,155	1,212	100.0	100.0	29.2
1954	4,035	1,204	97.1	99.3	29.8
1955	4,449	1,345	107.1	111.0	30.2
1956	4,680	1,474	112.6	121.6	31.5
1957	4,749	1,546	114.3	127.6	32.6
1958	4,546	1,567	109.4	129.3	34.5
1959	4,810	1,663	115.8	137.2	34.6
1960	4,859	1,695	116.9	139.9	34.9
1961	4,825	1,754	116.1	144.7	36.4
1962	4,976	1,814	119.4	150.0	36.5
1963	4,959	1,840	119.4	151.8	37.1
1964	5,093	1,931	122.6	159.3	37.9
1965	5,132	1,972	123.5	162.7	38.4
1966	5,262	2,030	126.6	167.5	38.6
1967	5,236	2,045	126.0	168.7	39.1
1968	5,093	2,035	122.6	167.9	40.0
1969	4,840	1,920	116.5	158.4	39.7
1970	4,174	1,694	100.5	139.8	40.6
1971	3,555	1,451	85.6	119.7	40.8
1972	2,926	1,208	70.4	99.7	41.3
1973	2,167	902	52.2	74.4	41.6
1974	1,498	646	36.2	53.3	43.1

[a] Sample includes 6803 male and 2886 female respondents in the 1969 RHS.

[b] Values in 1967 US dollars as measured by the consumer price index.

These data on the earnings of a group of men and unmarried women do not indicate a worsening of the relative earnings position of women as they age. Instead, the ratio of earnings of women to that of men consistently rises as the average age of the group increases from 44 to 65. These findings may seem to contradict the usual conclusion that female age-earnings profiles do not rise as steeply as the men's profile (Sawhill 1973; Blinder 1973). The apparent contradiction is due to restriction of the age range to 42-68 years of age. Despite the finding that females tend to have flatter and lower lifetime earnings profiles, most studies find women's earnings peak later and, as a result, they have rising earnings ratios during the latter stages of worklife. Figure 1 helps to clarify this distinction by showing a male earnings profile that rises more rapidly during the first half of working life but peaks earlier than the lower female earnings path. Thus, the relative earnings of women fall early in life but subsequently rise. The vertical line indicates the earliest age contained in this sample and shows how after the early 1940s the relative earnings of women are rising.*

The rising relative earnings of the nonmarried women is in part due to the increasing labor force participation during the period. If the sample is restricted to persons who were not government workers in 1969 and who had positive covered earnings in each year, the trend in relative earnings for those persons with continuous work histories can be observed. This restriction of the sample raises the average earnings of men and women but lowers the growth rate of earnings. Those earnings patterns are shown in Table 2 which also indicates that the increase in the relative earnings of the women with earnings in every year is substantially less than is shown in Table 1. Thus, much of the rising relative earnings of females can be attributed to the increasing proportion of women who were working. However, even for persons who had earnings in every year, there is an increase

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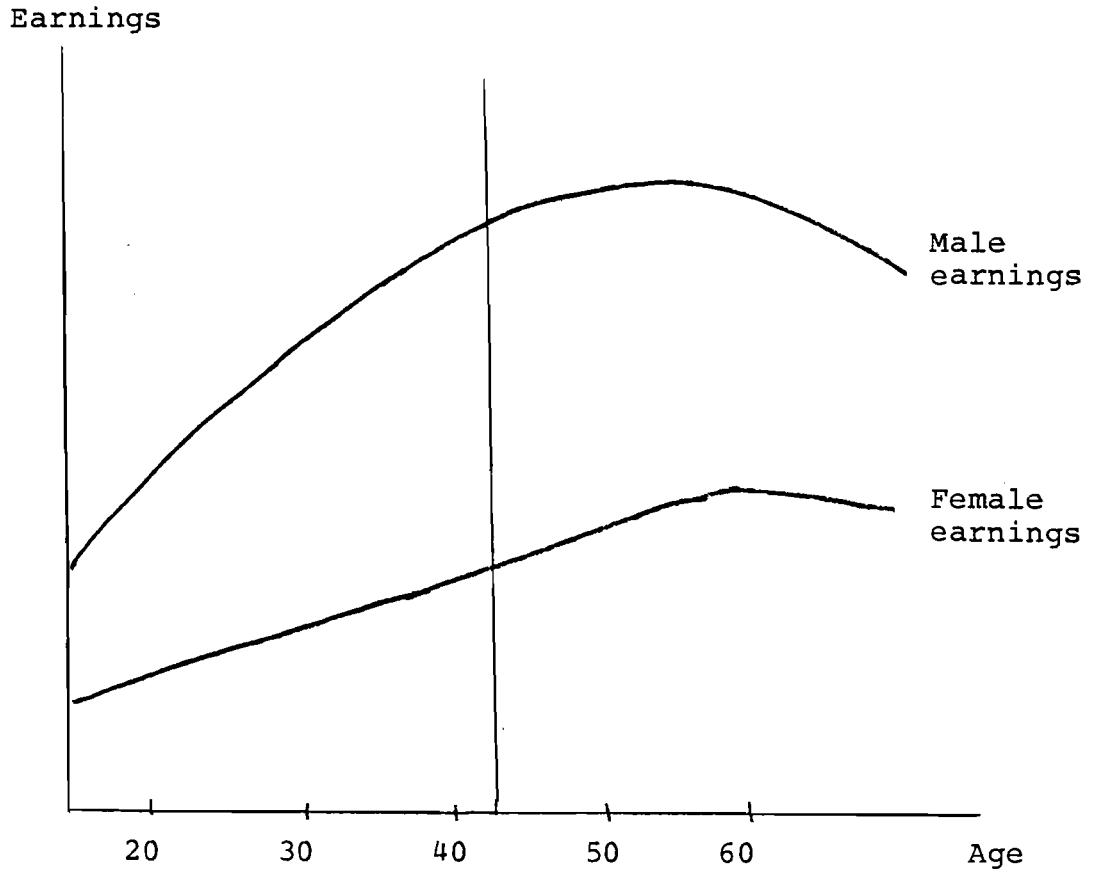*This idea was clarified in helpful discussions with Lucy Mallan of the Social Security Administration.

Figure 1. Age-earnings profiles by sex.

Table 2. Mean real earnings for persons with earnings in every year, by sex.[a]

Year	Mean real earnings[b]		Percent of 1953 earnings		Female earnings as percent of male earnings
	Male	Female	Males	Female	
1953	6,282	3,108	100.0	100.0	49.5
1954	6,213	3,221	98.9	103.6	51.8
1955	6,643	3,403	105.7	109.5	51.2
1956	6,822	3,547	108.6	114.1	52.0
1957	6,868	3,564	109.3	114.7	51.9
1958	6,586	3,583	104.8	115.3	54.4
1959	7,082	3,736	112.7	120.2	52.8
1960	7,166	3,750	114.1	120.7	52.3
1961	7,451	3,917	118.6	126.0	52.6
1962	7,481	4,015	119.1	129.2	53.7
1963	7,474	4,076	119.0	131.1	54.5
1964	7,679	4,326	122.2	139.2	56.3
1965	7,872	4,257	125.3	137.0	54.1
1966	8,234	4,431	131.1	142.6	53.8
1967	8,332	4,522	132.6	145.5	54.3
1968	8,466	4,662	134.8	150.0	55.1
1969	8,478	4,833	135.0	155.5	57.0
1970	8,300	4,406	132.1	141.8	53.1
1971	7,953	4,405	126.6	141.7	55.4
1972	8,087	4,293	128.7	138.1	53.1
1973	7,258	3,814	115.5	122.7	52.5
1974	5,623	2,918	89.5	93.9	51.9

[a]Sample includes 1165 men and 212 women who have positive earnings in each year and meet 1969 restrictions.

[b]Values in 1967 US dollars as measured by the consumer price index.

in the female earnings ratio from 49.5 percent in 1953 to 57.0 percent in 1969. As this group ages through its sixties, the earnings ratio begins to decline.

Racial Differences in Earnings Profile

The earnings profiles by race indicate that during the 1950s when members of the sample were in their forties and early fifties the ratio of male nonwhite to white earnings declined slightly (see Table 3). During the decade of the 1960s, when the average age rises from 51 to 60, the earnings ratio exhibits substantial increases. The relative earnings of nonwhite males rises from 47.6 percent of that of white males in 1960 to 56.9 percent in 1969. The earnings ratio for nonwhite males continues to rise as the cohort ages through their early sixties reaching 69 percent in 1973-1974. The increasing relative earnings of nonwhite men during the 1960s is consistent with the findings of Haworth et al. (1975), Smith and Welch (1977), and Carliner (1982).

The earnings of nonwhite females decline as a proportion of the earnings of white females throughout most of the sample period. Table 4 shows this earnings ratio declined from a high of 52.5 in 1953 to 35.3 in 1974. However, both white and nonwhite women had rising relative income in comparison to white men during this time. Thus, these data do not support the hypothesis that demographic groups with relatively low earnings have progressively lower relative income with advancing age.

IV. ESTIMATION OF AGE-EARNINGS PROFILES

These earnings history data are sufficient to estimate age-earnings profiles for the survey respondents. The earnings data on the respondents are pooled so that all cross-section and time-series observations are used in a single ordinary least squares regression. The regressions use a conventional specification with earnings assumed to be a function of education, age, age squared, race, sex, and health status. The earnings

Table 3. Mean real earnings of males by race.[a]

Year	Mean real earnings[b]		Percent of 1953 earnings		Nonwhite earnings as a percent of white earnings
	White	Nonwhite	White	Nonwhite	
1953	4,388	2,203	100.0	100.0	50.2
1954	4,271	2,056	97.3	93.3	48.1
1955	4,708	2,275	107.3	103.3	48.3
1956	4,951	2,407	112.8	109.3	48.6
1957	5,028	2,409	114.6	109.4	47.9
1958	4,820	2,254	109.8	102.3	46.8
1959	5,089	2,472	116.0	112.2	48.6
1960	5,147	2,448	117.3	111.1	47.6
1961	5,117	2,385	116.6	108.3	46.6
1962	5,261	2,591	120.0	117.6	49.2
1963	5,235	2,643	119.3	120.0	50.5
1964	5,372	2,765	122.4	125.5	51.5
1965	5,401	2,884	123.1	130.9	53.4
1966	5,553	2,829	126.5	128.4	50.9
1967	5,516	2,886	125.7	131.0	52.3
1968	5,347	2,966	121.9	134.6	55.5
1969	5,074	2,886	115.6	131.1	56.9
1970	4,373	2,509	99.7	113.9	57.4
1971	3,709	2,267	84.5	102.9	61.1
1972	3,045	1,933	69.4	87.7	63.5
1973	2,240	1,554	51.0	70.5	69.4
1974	1,549	1,067	35.3	48.4	68.9

[a]Sample includes 6077 white males and 726 nonwhite males in the RHS in 1969.

[b]Values in 1967 US dollars as measured by the consumer price index.

Table 4. Mean real earnings of females by race.[a]

Year	Mean real earnings[b]		Percent of 1953 earnings		Nonwhite earnings as a percent of white earnings
	White	Nonwhite	White	Nonwhite	
1953	1,298	682	100.0	100.0	52.5
1954	1,297	626	100.0	91.8	48.3
1955	1,451	686	111.8	100.6	47.3
1956	1,591	745	122.6	109.2	46.8
1957	1,670	781	128.7	114.5	46.8
1958	1,695	780	130.6	114.4	46.0
1959	1,802	803	138.8	117.7	44.6
1960	1,837	817	141.5	119.8	44.5
1961	1,904	823	146.7	120.7	43.2
1962	1,976	811	152.2	118.9	41.0
1963	2,000	847	154.1	124.2	42.2
1964	2,100	887	161.8	130.1	42.2
1965	2,147	886	165.4	129.9	41.3
1966	2,211	910	170.3	133.4	41.2
1967	2,222	953	171.2	140.0	42.9
1968	2,267	969	174.7	142.1	42.7
1969	2,082	911	160.4	133.6	43.8
1970	1,839	795	141.7	116.6	43.2
1971	1,574	691	121.3	101.3	43.9
1972	1,316	541	101.4	79.3	41.1
1973	985	385	75.9	56.5	39.1
1974	709	250	54.6	36.7	35.3

[a]Sample includes 2485 white females and 401 nonwhite females in the RHS in 1969.

[b]Values in 1967 US dollars as measured by the consumer price index.

data are from the summary earnings records and represent earnings reported to the Social Security Administration in each year between 1953-1974 while education, race, sex,and health status are those reported in 1969. The age of the respondents ranges from 42 for the youngest respondent in 1953 to 68 for the oldest in 1974. The dependent variable in all regressions is the logarithm of annual earnings. The sample is limited to persons working in 1969 who were not government employees.

Health status is measured by the Duke Health Index which is constructed from a series of questions in the RHS (Fillenbaum and Maddox, 1977). Values of the index range from 1 (good health) to 5(bad health). In the following analysis, persons with values of 1 and 2 are grouped together and form the omitted category in the regressions. Persons with values of 4 and 5 are grouped together and form the variables labeled bad health. Persons with an index value of 3 are said to have moderate health.

The earnings equations are estimated separately for men and women and are shown in Table 5. These numbers approximately indicate the percentage change in annual earnings from a one unit change in the indicated variable. The model described above is labeled the base case in the table. The results are consistent with other research findings on earnings patterns. The return to education for women is only two-thirds of that for men. Whites of both sexes are estimated to have greater earnings than non-whites, while the earnings of those with moderate and bad health are substantially less than the earnings of those in good health.*

The estimated effect of aging provides additional support for the rising relative earnings of females with advancing age. The combined effect of age and age-squared indicates the change in earnings from an additional year of age. The annual growth in earnings for men falls steadily from approximately 7 percent per year in their early forties to 2 percent at age 50. Estimated

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*An F test to determine if the response to the explanatory variables by sex was the same indicated significant differences in their reaction to changes in these variables; therefore, combining the sample by sex would be inappropriate.

Table 5. Earnings equations estimated with ordinary least squares.[a]

	Males		Females	
	Base case	With year dummies[f]	Base case	With year dummies[f]
Constant	-3.016	-1.685	-4.628	-2.074
Education[b]	0.073	0.073	0.046	0.047
Age	0.401	0.371	0.425	0.320
Age squared	-0.004	-0.004	-0.004	-0.003
Race[c]	0.282	0.286	0.550	0.550
Moderate health[d]	-0.146	-0.152	-0.192	-0.201
Bad health[e]	-0.739	-0.730	-0.617	-0.626
Number observations	81370	81370	18707	18707
R square	0.135	0.152	0.122	0.133

[a]Data are the pooled cross-section, time-series observations from the earnings history of RHS respondents. The dependent variable is the logarithm of annual earnings. All coefficients are significantly different from zero at the 99.99 percent level.

[b]Education is the number of years of schooling completed.

[c]Race is a dichotomous variable that has a value of one if the person is white, zero otherwise.

[d]Moderate health is dichotomous variable that has a value of one if the person has a value of three on the Duke Health Index.

[e]Bad Health is a dichotomous variable that has a value of one if the person has a value of four or five on the Duke Health Index.

[f]Regression model includes a series of dichotomous variables indicating the year of the earnings observation.

earnings peak at age 53.5 before declining at an increasing rate. Women's earnings rise by 9-10 percent during their early forties with the increase declining to 4 percent at age 50. Estimated women's earnings peak at age 55 before declining at an annual rate below that of the decline in men's earnings.

Adding a series of year variables to control for the rising average wage level does not qualitatively alter these findings. The difference in age of peak earnings rises to 5 years. The results indicate that the rising real wage level had a greater effect for men. Thus, rising real earnings during these 20 years favored the men in this sample and reduced some of the potential gains in relative earnings for women implied by the estimated age-earnings profile.

To examine racial differences in response to variations in education, age, and health, each sample is divided into whites and nonwhites and the year variables are included. The four sets of estimated coefficients are shown in Table 6. The return to education for nonwhites of both sexes is only about 75 percent of the gain from an extra year of education for whites. The lower return from education for women noted above is confirmed to be about two-thirds of that of men when comparing sexes of the same racial group. Poor health lowers the earnings of all four groups.*

Our results show women's earnings peaking later than men's earnings of both racial groups. This is a consistent finding and indicates that women workers do not face progressively lower relative wages as they age. For example, the results indicate that the earnings of white women peak at 54.8 years, while those of white men peak at 50.3 years. The estimated growth rate of women's earnings exceeds that of men's earnings for all ages within the age range of the sample.

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*An F test also indicated that the sample should not be combined by race or sex for statistical analysis. Thus, the most appropriate analysis is to estimate earnings equations separately for each of the four demographic categories.

Table 6. Earnings equations estimated with ordinary least squares, by race and sex.[a]

	White males	Nonwhite males	White females	Nonwhite females
Constant	-1.493	0.894	-2.248	3.582
Education[b]	0.075	0.056	0.048	0.038
Age	0.372	0.305	0.351	0.071
Age squared	-0.004	-0.003	-0.003	-0.0004
Moderate health[c]	-0.156	-0.130	-0.193	-0.363
Bad health[d]	-0.714	-0.810	-0.580	-0.797
Number observations	75033	6337	16703	2004
R squared	0.135	0.099	0.080	0.103

[a] Data are the pooled cross-section, time-series observations from the earnings history of RHS respondents. The dependent variable is the logarithm of annual earnings. All coefficients are significantly different from zero at the 99.99 percent level. Regression model includes a series of dichotomous variables indicating the year of the earnings observation in addition to the variables shown in the table.

[b] Education is the number of years of schooling completed.

[c] Moderate health is a dichotomous variable that has a value of one if the person has a value of three on the Duke Health Index.

[d] Bad health is a dichotomous variable that has a value of one if the person has a value of four or five on the Duke Health Index.

The combined age effects indicate that nonwhite men's earnings begin to decline prior to the decline of white men. However, the general rise in the earnings indicated by the year variables suggests that this rise in earnings is sufficient to offset the slower wage growth along the estimated age-earnings profile.

For example, when the year variables are included nonwhite earnings peak at age 47.6 while white earnings peak at 50.3. Deleting the year variables so that general productivity increases are confounded with age effects, raises the earnings peak for nonwhites to 54.6 years but for whites the age of maximum earnings rises only 52.8. These data suggest that improving labor market conditions for blacks during these two decades account for much of the rising relative earnings of the nonwhite survey members. Similar findings are reported by Chiswick (1974, pp. 116-8), Smith and Welch (1977), and Carliner (1982).

The effect of rising real earnings is illustrated in Figure 2, which shows two age-earnings profiles for white and nonwhite men based on age-earnings data in year t and year t+1. The greater rise in the nonwhite profile between time periods indicates that the lifetime earnings profile of a group of nonwhites will be steeper relative to the white group profile than either of the age-earnings profiles based on earnings in a given year. This implies that the cross-sectional data could produce declining earning ratios for nonwhites while an analysis of a group of individuals could have stable or rising ratios.

V. CONCLUSIONS

Only a few previous studies have attempted to use social security earnings histories to estimate life-cycle earnings. This paper differs from those by Rosen and Taubman (1982) and Ruggles and Ruggles (1977) by examining the earnings histories that are matched with the Retirement History Study. This survey is limited to a single cohort of persons born between 1906-1911. The basic findings are in general conformable with the results of other studies using different data sources. They indicate
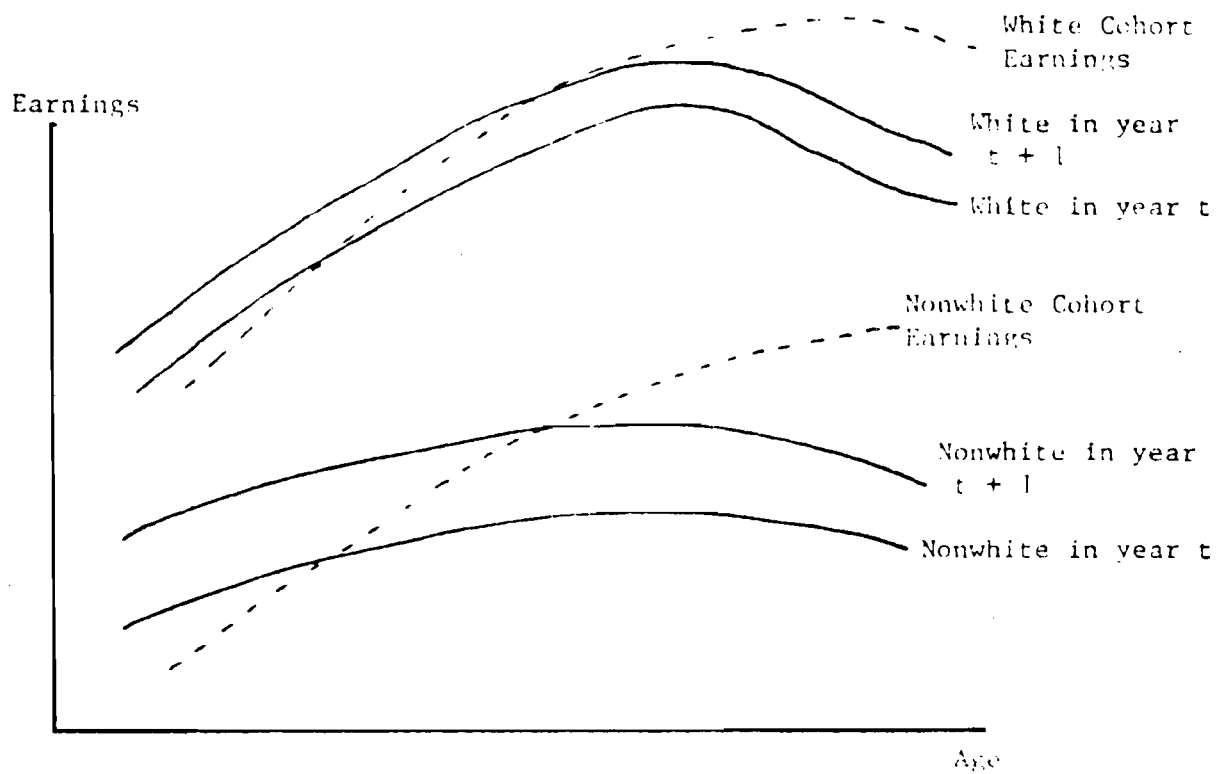
Figure 2. Male age-earnings profiles by race.

that for this cohort the earnings of unmarried women rose rela-
tive to males between 1953 and 1974. There is no evidence to
support the hypothesis that after their mid-forties, unmarried
women have declining earnings with age.

The earnings of nonwhite males do not decline relative to
white males during the later working years. The trend in
earnings ratios shows some deterioration in their relative
earnings when the group is approximately 40 to 50 years of age;
however, the nonwhite earnings ratios rise during the next 10
years. The regression analysis indicates that improving labor
market conditions for nonwhites has shifted their age-earnings
profile upward during the 1960s more than the rise in the pro-
file of whites. This increase has been more than sufficient to
offset the flatter age-earnings profile of nonwhites. Additional
years of education raise the lifetime earnings profile for each
of the educational groups. An extra year of education adds more
to the earnings of whites than nonwhites and of males than females.

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