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THE DISTRIBUTIONAL IMPACT OF SOCIAL SECURITY

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Abstract

THE DISTRIBUTIONAL IMPACT OF SOCIAL SECURITY

In the first part of the paper we report estimated transfers in the Social Security system for the Retirement History Survey sample. We define transfers to be the difference between the expected present value of benefits less the present value of taxes paid in, where the latter is adjusted for the probability of living to reach retirement age. Unlike previous researchers we, therefore, account for the taxes paid by people who died before retirement, and it turns out this adjustment is important for some groups. The Retirement History Survey cohort will receive large transfers: roughly benefits will be about four times taxes, and the real internal rate of return will be about eight percent. We study how transfers vary by a comprehensive measure of wealth. People in the highest wealth quartile have the largest absolute transfers, and their internal rate of return is as high as that of any wealth quartile.

In the second part of the paper we study transfers for six synthetic cohorts, the heads of which are age 65 in the ten-year intervals 1970 through 2020. Within each cohort 12 families are defined according to earnings levels. We find that transfers are positive and large for the 1970 cohort, and that they decline steadily until they are negative for most groups in the 2020 cohort. Although high earners initially have the largest transfers in the 1970 cohort, they have the largest negative transfers in the 2020 cohort.

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## Introduction

Although Social Security retirement benefits are often thought of as a repayment of past contributions, it is now becoming a matter of general knowledge that the generation currently retired is receiving far more in retirement annuities than it contributed in taxes during their working lives (see Boskin, et. al, 1983; Burkhauser and Warlick, 1981; Leimer and Petri, 1981; Aaron, 1977). This is partly due to the state of the Social Security system: The retired generation is still receiving some of the windfall start-up gains received by the elderly as such a system is begun or enlarged. These gains will abate as the system matures and approaches a steady state. The excess of benefits over taxes for the presently retired is also due to the generosity of Congress in the early 1970s: Between 1968 and 1974 benefits were raised at a rate considerably higher than the rate of inflation; therefore, if the system had been actuarially fair in real terms prior to 1968, it certainly would not have been after 1974.

A natural question is what is the magnitude of the gains or transfers (i.e., benefits less contributions in expected present value terms) of the elderly and how are they distributed? If the transfers are exceptionally large or concentrated among the affluent, a reform of the Social Security system might logically include the present retired generation giving up some of their gains. It is likely that additional funds or payout reductions will be required in the next ten years and that major adjustments are necessary to operate the system over the next 75 years. The revenue sources or saving could include an increase in payroll taxes for workers, an advancement of the

retirement age, or a decrease in the benefits of some of the currently retired. These measures to ensure the financial solvency of Social Security will have intergenerational impacts. Raising the taxes of workers or increasing the retirement age will reduce the rate of return of the present working generation; cutting benefits, perhaps by making them taxable, will lower the gains of today's elderly. Because a substantial fraction of the elderly are far from wealthy, an across the board reduction in benefits is probably neither socially desirable nor politically feasible. However, the wealthy retired could have their benefits reduced without causing undue economic hardship. If they have received large windfall gains through the Social Security system, fairness in restoring the financial soundness of the program would dictate a reduction in their benefits.

In this paper we calculate the present value of lifetime contributions to the Social Security system of a sample of the elderly, and the present value of their expected benefits. The difference between the two we call Social Security transfers. We also compute for each family in our sample the internal rate of return to the retirement program. That is, we determine the discount rate which equates the present value of taxes to the present value of benefits. Our data are the Social Security Administration's Retirement History Survey. It originally interviewed slightly over 11,000 households in 1969. The head-of-household was between 58 and 64 years of age in 1969. These households were reinterviewed every two years through 1979. In this paper we calculate Social Security transfers and internal rates of return for the sample in 1969, 1975, and 1979, but use the other interview years to fill in missing values for our three years of primary interest.

Our primary results are that Social Security transfers and rates of return were very high for this population in 1969 and remained high throughout the decade. People in our sample could expect to receive three to four times as much in benefits as they made in contributions, even using a three percent real rate of time discount and calculating death probabilities using current life tables. Further, and more surprising, we find that the wealthy received the largest transfers, and in many cases they even had the highest rates of return. One must conclude that the Social Security system as now constituted has a substantial transfer element, and much of the transfer is from average workers to the wealthy retired.

We have attempted to calculate how the rates of return and transfers of the Social Security system will evolve as the system matures over the next 40-50 years. We have done this by creating some synthetic work and retirement histories for six different age cohorts and examining how the Social Security program, as currently constituted, would treat them. The households in this synthetic file are subject to the life hazards given by the 1969 life tables. We do not project changes in life expectancies which may occur. We find that the transfer components monotonically decrease with each succeeding cohort (spaced in age by ten years) and that the median two earner household of the cohort now aged thirty-eight will receive negative transfers. This simply implies, of course, that they experience an internal rate of return lower than the three percent real rate we used in calculating transfers.

## II. Methods and Data

The Retirement History Survey interview data has been merged with the Social Security Administration's Earnings Record (through 1974). We have extended the earnings history of each household by using the 1975, 1977, and 1979 interview responses. We then seek to calculate Social Security transfers and internal rates of return for this cohort of households as of 1969, 1975, and 1979. However, we want to calculate the ex-ante rate of return and transfers for the cohort with only the path of the Social Security program taken as given. As far as we know, no one has pointed out that calculations of transfers to the currently retired overstate transfers to the cohorts of the retired, because the calculations do not take into account taxes paid by members of the cohort who did not live to retirement age. That is, the currently retired are the winners in the annuity gamble: to study the intergenerational transfer component of Social Security, we need to account for all the taxes and benefits of cohort members whether they are alive or not at the time of the sample. As we shall see, for some groups among the retired this is quite an important adjustment, substantially lowering our estimates of their rate of return from Social Security. Our method of accounting for taxes paid and benefits received by deceased members of the cohort is described in some detail in the Appendix, but it may be briefly summarized here.

From sex- and race-specific life tables and actual Social Security contribution data of married survivors, we estimate taxes paid by deceased married members of each cohort. Some of these taxes are allocated to widows to reflect the taxes paid on behalf of the widows by their deceased husbands. The remainder are allocated to the surviving couples. Each single person's

history is adjusted upward in a similar way to account for deceased singles from the same cohort. Benefits received are treated in the same manner. That is, benefits already received by deceased members of this cohort are attributed to the survivors. In this way, we examine how an entire cohort (in this case, alive in 1937 at the start-up of the system) has fared with Social Security. These adjustments treat the future and the past symmetrically: future benefits are discounted, weighted by the probabilities of living to collect the benefits, and then summed to get the discounted expected discounted present value; past benefits are multiplied by the appropriate interest rates and by a multiple reflecting cohort size at the time benefits were collected. In 1969, for example, the taxes paid by the cohort and the benefits received and to be received by the cohort are assigned to the surviving members of the cohort.

### III. Results

The first of our results are shown in Tables 1-3, where we report Social Security taxes paid and transfers received by race and marital status for 1969, 1975, and 1979. The taxes are calculated according to earnings records to the interview year, and the benefits under the assumption that the person makes no more contributions to Social Security. Table 1 shows that the life table adjustment makes little difference for couples in the sample. This is because extra taxes are attributed to interviewed couples according to the probability that both partners of an original couple died before 1969, and this event has low probability. However, the taxes of widows and widowers (referred to in this paper as widows only because they predominate) are more than doubled. This occurs because the Social Security Earnings History only records the widows' own earnings record and contribution profile. When we attribute to widows the contributions made by their deceased spouses, it naturally raises substantially the total taxes assigned to widows. Even so, all groups, including widows, have substantial transfers both in absolute value and in the return ratio, the ratio of the present value of benefits to the present value of taxes. It is the case, however, that widows have smaller transfers and lower return ratios than other groups: they only receive the husband's benefit rather than the husband's and wife's benefit; in most cases the taxes paid by the widow herself do not contribute to her benefit because the husband's benefit is larger. It should be noted that if account is not made of taxes paid by deceased husbands, one gets a completely different impression of the return ratio of widows. For example,



if average actual taxes and average benefits are used, the return ratio is 4.9, higher than that of couples. If average adjusted taxes are used, the return ratio is 2.03.

The internal rate of return is that interest rate that will equate the real life-table-weighted stream of taxes to the real life table-weighted stream of benefits, assuming future benefits will be paid according to the law in effect. The median rate of return of couples in 1969 was 8.39. This is a real rate of return, and is very much greater than what is generally assumed to be offered by other investments. For example, in our present value calculations for the first three columns of these tables, we have used a three percent real rate; the Social Security actuaries often use a 2.5 percent real rate. Over a number of years the difference between such rates and our calculated internal rate of return is enormous. For example, a 60 year-old in 1969 would have been 28 in 1937, the year in which Social Security taxes were first paid. At a real rate of 2.5 percent, a dollar contributed in 1937 would have grown to \$2.20 in real terms by 1969; at a real rate of 8.39 percent, a dollar contributed in 1937 would have grown to \$13.17 in real terms by 1969. At 6.01 percent, the widow's rate of return, it would have grown to \$6.47. Over the 70 years that some people will be paying to or receiving from the Social Security system, even small differences in the rates of return will produce large differences in the present values. In interpreting the very high internal rates we calculate, one should also note that Social Security contributions and benefits are very heavily sheltered from the personal income tax. The benefits are completely tax free, the "compounding" is done on a tax free basis, and only half the contributions (the employee's share) are subject to personal income tax.

TABLE 1  
SOCIAL SECURITY TAXES AND TRANSFERS BY MARITAL STATUS AND RACE, 1969

|                        | Taxes<br>(life table<br>adjusted) | Actual<br>Taxes | Mean Benefits<br>Less Life<br>Adjusted Taxes | Median<br>Return<br>Ratio | Median<br>Rates of<br>Return |
|------------------------|-----------------------------------|-----------------|--|---------------------------|------------------------------|
| Married                | \$7,203                           | \$7,046         | \$16,422                                     | 3.35                      | 8.39                         |
| Widows and<br>Widowers | 5,406                             | 2,345           | 6,011  | 2.03                      | 6.01                         |
| Other Singles          | 3,844                             | 3,398           | 6,863  | 2.91                      | 7.80                         |
| White                  | 6,536                             | 5,764           | 13,345                                       | 3.14                      | 7.97                         |
| Non-white              | 4,249                             | 3,198           | 7,690  | 2.91                      | 7.66                         |

In 1968 dollars.

In 1969 the rate of return of couples was the highest of the marital groups. Many researchers have stressed how the system discriminates against two earner couples in the sense that the contributions of the wife are wasted in that they do not increase the benefits of the family. Certainly this is true relative to one earner couples. However, married couples as a group obviously do at least as well as singles since they are offered their choice at time of retirement between being treated as two singles or calculating their benefits as a married couple. As a group, the married couples receive the highest rates of return from Social Security.

Nonwhites have slightly lower rates of return than whites, and significantly lower absolute transfers. These outcomes are determined by the higher mortality rates of nonwhites, meaning that fewer live to collect benefits. Our "fallen comrade" calculation of attributing taxes of deceased cohort members is more important for nonwhites. Nonwhites also have lower earnings records on average (reducing the size of the absolute transfer) and a larger fraction of nonwhite couples have two earners which tends to reduce the rates of return.

Tables 2 and 3 show Social Security taxes, transfers, and rates of return for 1975 and 1979 by race and marital status. By 1975, taxes and transfers of all groups had risen. The rate of return of whites had increased even further, yet the rate of return of blacks had fallen slightly. The difference is undoubtedly due to the difference in mortality: a higher fraction of nonwhites than whites in our sample died before reaching retirement age between 1969 and 1975. The difference between life table-adjusted taxes and actual taxes of widows continues to be large, and it begins to widen for other categories. By 1979, the rates of return had begun to fall for reasons to be

TABLE 2

## SOCIAL SECURITY TAXES AND TRANSFERS BY MARITAL STATUS AND RACE, 1975

|                        | Taxes<br>(life table<br>adjusted) | Actual<br>Taxes | Mean Benefits<br>Less Life<br>Adjusted Taxes | Median<br>Return<br>Ratio | Median<br>Rates of<br>Return |
|------------------------|-----------------------------------|-----------------|--|---------------------------|------------------------------|
| Married                | \$16,222                          | \$15,282        | \$40,041                                     | 3.58                      | 8.76                         |
| Widows and<br>Widowers | 12,947                            | 4,999           | 15,224                                       | 2.11                      | 6.38                         |
| Other Singles          | 9,871                             | 7,632           | 15,879                                       | 2.73                      | 7.63                         |
| White                  | 14,752                            | 11,609          | 30,422                                       | 3.23                      | 8.19                         |
| Non-white              | 11,029                            | 7,002           | 19,116                                       | 2.85                      | 7.58                         |

In 1974 dollars

TABLE 3

## SOCIAL SECURITY TAXES AND TRANSFERS BY MARITAL STATUS AND RACE, 1979

|                        | Taxes<br>(life table<br>adjusted) | Actual<br>Taxes | Mean Benefits<br>Less Life<br>Adjusted Taxes | Median<br>Return<br>Ratio | Median<br>Rates of<br>Return |
|------------------------|-----------------------------------|-----------------|--|---------------------------|------------------------------|
| Married                | \$26,778                          | \$23,719        | \$58,865                                     | 3.34                      | 8.32                         |
| Widows and<br>Widowers | 22,335                            | 7,499           | 23,118                                       | 2.04                      | 6.24                         |
| Other Singles          | 17,335                            | 11,528          | 21,544                                       | 2.41                      | 6.82                         |
| White                  | 24,466                            | 16,815          | 42,319                                       | 2.84                      | 7.55                         |
| Non-white              | 19,400                            | 9,991           | 27,457                                       | 2.52                      | 6.95                         |

In 1978 dollars.

discussed later. It was still the case that couples had higher rates than the other marital groups, and that whites had higher rates than nonwhites. The life table adjustment has become important for all groups. The 1979 samples are those aged 68-74 years and these are certainly a sample of winners in the annuity game.

Tables 4-6 present results on taxes and transfers by age in 1969, 1975, and 1979. In general, the internal rates of return and the absolute transfers are higher for the older households in the sample in all three interview years. This is presumably due to the maturing of the Social Security system. The older members of this population enjoyed more of the start-up gains of a pay-as-you-go retirement plan. The difference is most striking in 1969. Recall our assumption that no future contributions are made to the system. In 1969, the youngest cohort must wait four years to retire, so discounting has a substantial effect.

Table 7 collects some of the rate of return results from Tables 4-6. It shows that the real internal rate of return to Social Security increased from 1969 to 1975 for the younger cohorts in our sample, even when both taxes and benefits are life table adjusted. The real return decreased for the oldest two cohorts between 1969 and 1975 and also decreased for households of all ages between 1975 and 1979. The net change was an increase in the rate of return between 1969 and 1979 for the youngest two cohorts and a fairly sharp decline for the oldest three. These differences are probably the result of two factors: first, the law changes between 1969 and 1975 increased the rates of return, but after 1975 the law changes only increased the future real payments of workers through double indexing. This, however, had no

TABLE 4  
SOCIAL SECURITY TAXES AND TRANSFERS BY AGE, 1969

| Age of Household Head | Mean Taxes (life table adjusted) | Mean Actual Taxes | Mean Benefits Less Life Adjusted Taxes | Median Return Ratio | Median Rates of Return |
|-----------------------|----------------------------------|-------------------|--|---------------------|------------------------|
| 58                    | \$6,087                          | \$5,471           | \$10,024                               | 2.75                | 6.99                   |
| 59                    | 6,367                            | 5,707             | 10,529                                 | 2.71                | 7.05                   |
| 60                    | 6,384                            | 5,647             | 11,754                                 | 2.98                | 7.57                   |
| 61                    | 6,365                            | 5,534             | 12,514                                 | 3.12                | 7.92                   |
| 62                    | 6,270                            | 5,414             | 13,466                                 | 3.26                | 8.30                   |
| 63                    | 6,363                            | 5,477             | 14,896                                 | 3.47                | 8.80                   |
| 64                    | 6,024                            | 5,043             | 15,617                                 | 3.73                | 9.40                   |

In 1968 dollars.

TABLE 5  
SOCIAL SECURITY TAXES AND TRANSFERS BY AGE, 1975

| Age of Household Head | Mean Taxes (life table adjusted) | Mean Actual Taxes | Mean Benefits Less Life Adjusted Taxes | Median Return Ratio | Median Rates of Return |
|-----------------------|----------------------------------|-------------------|--|---------------------|------------------------|
| 64                    | \$14,986                         | \$12,325          | \$28,241                               | 3.0                 | 7.8                    |
| 65                    | 15,119                           | 12,616            | 29,004                                 | 3.1                 | 8.0                    |
| 66                    | 14,939                           | 12,106            | 28,737                                 | 3.1                 | 7.9                    |
| 67                    | 14,457                           | 11,440            | 29,541                                 | 3.2                 | 8.2                    |
| 68                    | 14,225                           | 11,082            | 30,496                                 | 3.3                 | 8.3                    |
| 69                    | 14,077                           | 10,749            | 31,216                                 | 3.4                 | 8.6                    |
| 70                    | 13,269                           | 9,820             | 32,228                                 | 3.7                 | 9.2                    |

In 1974 dollars.



TABLE 6

## SOCIAL SECURITY TAXES AND TRANSFERS BY AGE, 1979

| Age of Household Head | Mean Taxes (life table adjusted) | Mean Actual Taxes | Mean Benefits Less Life Adjusted Taxes | Median Return Ratio | Median Rates of Return |
|-----------------------|----------------------------------|-------------------|--|---------------------|------------------------|
| 68                    | \$24,515                         | \$17,709          | \$37,815                               | 2.7                 | 7.2                    |
| 69                    | 24,786                           | 18,766            | 39,459                                 | 2.7                 | 7.3                    |
| 70                    | 24,905                           | 18,208            | 40,043                                 | 2.8                 | 7.4                    |
| 71                    | 23,954                           | 16,755            | 42,200                                 | 2.9                 | 7.7                    |
| 72                    | 23,911                           | 16,325            | 43,589                                 | 3.0                 | 7.8                    |
| 73                    | 23,954                           | 15,702            | 45,677                                 | 3.1                 | 8.1                    |
| 74                    | 22,484                           | 14,077            | 47,438                                 | 3.3                 | 8.5                    |

In 1978 dollars.

TABLE 7

RATE OF RETURN BY COHORT

| Cohort | 1969 |     | 1975 |     | 1979 |     |
|--------|------|-----|------|-----|------|-----|
|        | Rate | Age | Rate | Age | Rate | Age |
| 7      | 7.0  | 58  | 7.8  | 64  | 7.2  | 68  |
| 6      | 7.0  | 59  | 8.0  | 65  | 7.3  | 69  |
| 5      | 7.6  | 60  | 7.9  | 66  | 7.4  | 70  |
| 4      | 7.9  | 61  | 8.2  | 67  | 7.7  | 71  |
| 3      | 8.3  | 62  | 8.3  | 68  | 7.8  | 72  |
| 2      | 8.8  | 63  | 8.6  | 69  | 8.1  | 73  |
| 1      | 9.4  | 64  | 9.2  | 70  | 8.5  | 74  |

effect on the real payments of retired people. Second, because delayed retirement between ages 62 and 65 is roughly actuarially fair at a three percent real interest rate, a delay in retirement will decrease the internal rate from the high values shown here. Of course, the internal rate will decrease even faster when someone works after the age of 65.

Tables 8-10 show Social Security transfers, return ratios and internal rates of return by wealth quartile and by age in 1969, 1975, and 1979. The wealth variable is quite comprehensive in that it includes the value of home, business, and farm equity, other real property, stocks, bonds, bank accounts, pensions, the capitalized value of welfare payments, and the capitalized insurance value of Medicare. It excludes Social Security wealth and human capital. Table 8 indicates that Social Security transfers increase sharply by wealth quartile, especially if taxes are adjusted by the life tables. We feel such an adjustment is necessary to get a true picture of the way a cohort has fared with Social Security. The median life table adjusted transfer to those in the top wealth quartile is more than \$6,000 higher than that to those in the lowest wealth quartile, a 69 percent difference. The reason that the increase with wealth is greater for the life table adjusted numbers is that widows are heavily represented in the lower part of the wealth distribution, and the fallen comrade tax adjustment is much greater for them than for other groups. The increasing transfers with wealth are also due to the greater contributions of the wealthy to Social Security, a system which offered this generation a rate of return far greater than our three percent discount rate. The importance of using life-adjusted taxes is also shown in the return ratios: with unadjusted taxes, it appears that the lowest wealth quartile has a somewhat higher ratio of benefits to taxes than the other quartiles, yet when account is made of taxes paid by the deceased, the return ratio is almost flat across the quartiles.

TABLE 8

SOCIAL SECURITY TRANSFERS AND RATES OF RETURN BY  
NON-SOCIAL SECURITY, NON-HUMAN CAPITAL  
WEALTH QUANTILES, 1969

|                                      |    | Wealth Quartiles |                         |                         |              |  |
|--------------------------------------|----|------------------|-------------------------|-------------------------|--------------|--|
|                                      |    | W < \$16,572     | \$16,572 < W < \$32,188 | \$32,188 < W ≤ \$64,691 | \$64,691 < W |  |
| <hr/>                                |    |                  |                         |                         |              |  |
| Median Actual Transfers              |    |                  |                         |                         |              |  |
|                                      | 58 | \$ 8,570         | \$12,700                | \$13,035                | \$13,300     |  |
|                                      | 59 | 8,472            | 12,398                  | 14,266                  | 13,683       |  |
|                                      | 60 | 9,594            | 13,899                  | 15,599                  | 15,321       |  |
|                                      | 61 | 10,597           | 14,215                  | 15,805                  | 16,005       |  |
|                                      | 62 | 10,626           | 15,809                  | 16,997                  | 18,135       |  |
|                                      | 63 | 12,251           | 17,227                  | 19,410                  | 20,899       |  |
|                                      | 64 | 14,237           | 18,947                  | 20,702                  | 19,135       |  |
| Entire Sample                        |    | \$10,542         | \$14,508                | \$15,830                | \$15,802     |  |
| <hr/>                                |    |                  |                         |                         |              |  |
| Median Life Table Adjusted Transfers |    |                  |                         |                         |              |  |
|                                      | 58 | \$ 8,108         | \$11,678                | \$12,851                | \$13,222     |  |
|                                      | 59 | 7,529            | 11,999                  | 14,123                  | 13,414       |  |
|                                      | 60 | 8,310            | 13,230                  | 15,233                  | 15,241       |  |
|                                      | 61 | 9,185            | 13,708                  | 15,418                  | 15,678       |  |
|                                      | 62 | 9,164            | 15,211                  | 16,535                  | 17,838       |  |
|                                      | 63 | 11,056           | 16,348                  | 18,944                  | 20,573       |  |
|                                      | 64 | 12,818           | 18,117                  | 19,871                  | 18,248       |  |
| Entire Sample                        |    | \$9,230          | \$13,868                | \$15,504                | \$15,567     |  |
| <hr/>                                |    |                  |                         |                         |              |  |
| Median Actual Return Ratio           |    |                  |                         |                         |              |  |
|                                      | 58 | 3.3              | 3.0                     | 2.8                     | 3.0          |  |
|                                      | 59 | 3.4              | 2.9                     | 2.8                     | 3.0          |  |
|                                      | 60 | 3.5              | 3.3                     | 3.1                     | 3.2          |  |
|                                      | 61 | 3.8              | 3.5                     | 3.3                     | 3.4          |  |
|                                      | 62 | 4.2              | 3.7                     | 3.4                     | 3.6          |  |
|                                      | 63 | 4.5              | 4.8                     | 3.7                     | 3.8          |  |
|                                      | 64 | 4.7              | 4.1                     | 4.0                     | 4.5          |  |
| Entire Sample                        |    | 4.0              | 3.5                     | 3.3                     | 3.4          |  |

TABLE 8---continued

|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
| Median Life Table<br>Adjusted Return<br>Ratio                 | 58  | 2.9 | 2.7 | 2.6 | 2.8 |
|   | 59  | 2.8 | 2.7 | 2.7 | 2.8 |
|   | 60  | 2.9 | 3.0 | 3.0 | 3.0 |
|   | 61  | 3.2 | 3.1 | 3.0 | 3.2 |
|   | 62  | 3.3 | 3.4 | 3.2 | 3.2 |
|   | 63  | 3.6 | 3.4 | 3.5 | 3.5 |
|   | 64  | 3.7 | 3.6 | 3.7 | 4.0 |
| Entire Sample   | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 |
| Median Internal<br>Rate of Return<br>(life table<br>adjusted) | 58  | 7.1 | 7.0 | 6.9 | 7.0 |
|   | 59  | 7.1 | 7.1 | 6.9 | 7.2 |
|   | 60  | 7.4 | 7.6 | 7.6 | 7.5 |
|   | 61  | 8.1 | 7.8 | 7.7 | 8.0 |
|   | 62  | 8.3 | 8.5 | 8.0 | 8.2 |
|   | 63  | 9.0 | 8.7 | 8.7 | 8.4 |
|   | 64  | 9.6 | 9.0 | 9.4 | 9.8 |
| Entire Sample   | 8.0 | 7.9 | 7.8 | 7.8 | 8.1 |

Wealth and transfer amounts are in 1968 dollars. The number of households is 10,715.

TABLE 9

SOCIAL SECURITY TRANSFERS AND RATES OF RETURN BY  
NON-SOCIAL SECURITY, NON-HUMAN CAPITAL  
WEALTH QUANTILES, 1975

|   | Wealth Quartiles |                         |                         |              |          |
|---|------------------|-------------------------|-------------------------|--------------|----------|
|   | W < \$19,752     | \$19,752 < W < \$43,678 | \$43,678 < W < \$83,804 | \$83,804 < W |          |
| <u>Median Actual Transfers</u>              |                  |                         |                         |              |          |
| 64  | \$23,522         | \$31,911                | \$36,793                | \$39,541     |          |
| 65  | 23,371           | 29,155                  | 39,858                  | 42,435       |          |
| 66  | 21,959           | 31,762                  | 39,574                  | 41,643       |          |
| 67  | 25,289           | 29,524                  | 39,313                  | 41,531       |          |
| 68  | 28,152           | 31,317                  | 39,455                  | 42,554       |          |
| 69  | 27,418           | 31,298                  | 37,632                  | 43,631       |          |
| 70  | 30,271           | 38,189                  | 40,639                  | 38,933       |          |
| Entire Sample                               | \$25,563         | \$30,701                | \$40,639                |              | \$41,477 |
| <u>Median Life Table Adjusted Transfers</u> |                  |                         |                         |              |          |
| 64  | \$18,420         | \$27,905                | \$34,207                | \$38,519     |          |
| 65  | 19,082           | 26,734                  | 38,618                  | 41,611       |          |
| 66  | 15,496           | 29,454                  | 38,304                  | 40,361       |          |
| 67  | 19,314           | 27,221                  | 37,942                  | 40,458       |          |
| 68  | 21,641           | 28,632                  | 37,423                  | 41,568       |          |
| 69  | 23,185           | 29,411                  | 35,910                  | 42,084       |          |
| 70  | 25,363           | 36,140                  | 39,511                  | 37,253       |          |
| Entire Sample                               | \$20,066         | \$27,541                | \$36,102                |              | \$40,050 |
| <u>Median Actual Return Ratio</u>           |                  |                         |                         |              |          |
| 64  | 4.2              | 3.7                     | 3.2                     | 3.4          |          |
| 65  | 3.9              | 3.5                     | 3.4                     | 3.5          |          |
| 66  | 4.3              | 3.8                     | 3.4                     | 3.6          |          |
| 67  | 4.5              | 3.9                     | 3.6                     | 3.8          |          |
| 68  | 4.9              | 5.1                     | 3.6                     | 4.0          |          |
| 69  | 5.3              | 4.4                     | 3.9                     | 4.0          |          |
| 70  | 5.9              | 4.9                     | 4.0                     | 4.4          |          |
| Entire Sample                               | 4.8              | 4.0                     | 3.6                     |              | 3.7      |

TABLE 9--continued

|   |    |     |     |     |     |     |     |     |     |
|---|----|-----|-----|-----|-----|-----|-----|-----|-----|
| Median Life Table<br>Adjusted Return<br>Ratio                 |    |     |     |     |     |     |     |     |     |
|   | 64 | 3.0 | 3.1 | 2.8 | 3.1 | 3.1 | 2.8 | 3.1 | 3.1 |
|   | 65 | 3.1 | 3.0 | 3.1 | 3.0 | 3.1 | 3.1 | 3.2 | 3.2 |
|   | 66 | 2.6 | 3.4 | 3.0 | 3.4 | 3.4 | 3.0 | 3.4 | 3.4 |
|   | 67 | 3.1 | 3.0 | 3.2 | 3.0 | 3.2 | 3.2 | 3.5 | 3.5 |
|   | 68 | 3.0 | 3.3 | 3.2 | 3.3 | 3.2 | 3.2 | 3.5 | 3.5 |
|   | 69 | 3.3 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.6 | 3.6 |
|   | 70 | 3.6 | 4.1 | 3.4 | 4.1 | 4.0 | 3.4 | 4.0 | 4.0 |
| Entire Sample   |    | 3.0 | 3.2 | 3.1 | 3.1 | 3.1 | 3.4 | 3.4 | 3.4 |
| Median Internal<br>Rate of Return<br>(life table<br>adjusted) |    |     |     |     |     |     |     |     |     |
|   | 64 | 7.8 | 7.9 | 7.6 | 7.9 | 7.9 | 7.6 | 8.0 | 8.0 |
|   | 65 | 8.1 | 7.9 | 8.0 | 7.9 | 8.0 | 8.0 | 8.3 | 8.3 |
|   | 66 | 7.1 | 8.3 | 7.9 | 8.3 | 8.2 | 7.9 | 8.2 | 8.2 |
|   | 67 | 8.2 | 7.8 | 8.2 | 7.8 | 8.2 | 8.2 | 8.7 | 8.7 |
|   | 68 | 8.4 | 8.3 | 8.1 | 8.3 | 8.1 | 8.1 | 8.7 | 8.7 |
|   | 69 | 8.5 | 8.3 | 8.7 | 8.3 | 8.7 | 8.7 | 9.2 | 9.2 |
|   | 70 | 9.2 | 9.5 | 8.8 | 9.5 | 8.8 | 8.8 | 9.5 | 9.5 |
| Entire Sample   |    | 8.1 | 8.0 | 8.0 | 8.0 | 8.0 | 8.8 | 8.5 | 8.5 |

Wealth and transfer amounts are in 1974 dollars. The number of households is 8,070.

TABLE 10

SOCIAL SECURITY TRANSFERS AND RATES OF RETURN BY  
NON-SOCIAL SECURITY, NON-HUMAN CAPITAL  
WEALTH QUANTILES, 1979

|                                      |    | Wealth Quartiles |                         |                          |               |  |
|--------------------------------------|----|------------------|-------------------------|--------------------------|---------------|--|
|                                      |    | W < \$19,797     | \$19,797 < W < \$50,548 | \$50,548 < W ≤ \$103,511 | \$103,511 < W |  |
| Median Actual Transfers              |    |                  |                         |                          |               |  |
|                                      | 68 | \$39,618         | \$44,030                | \$47,245                 | \$51,808      |  |
|                                      | 69 | 38,888           | 38,477                  | 49,842                   | 53,643        |  |
|                                      | 70 | 38,977           | 45,507                  | 46,972                   | 52,251        |  |
|                                      | 71 | 44,741           | 42,266                  | 52,542                   | 49,430        |  |
|                                      | 72 | 51,341           | 46,162                  | 47,541                   | 50,907        |  |
|                                      | 73 | 52,099           | 44,097                  | 50,156                   | 51,073        |  |
|                                      | 74 | 61,877           | 46,068                  | 47,144                   | 48,087        |  |
| Entire Sample                        |    | \$46,499         | \$41,854                | \$47,733                 | \$50,631      |  |
| Median Life Table Adjusted Transfers |    |                  |                         |                          |               |  |
|                                      | 68 | \$27,171         | \$35,901                | \$42,525                 | \$48,059      |  |
|                                      | 69 | 25,877           | 32,452                  | 44,583                   | 49,697        |  |
|                                      | 70 | 26,951           | 37,885                  | 41,081                   | 47,985        |  |
|                                      | 71 | 33,703           | 32,805                  | 44,358                   | 46,256        |  |
|                                      | 72 | 39,610           | 36,223                  | 40,359                   | 45,193        |  |
|                                      | 73 | 41,473           | 36,121                  | 42,690                   | 48,139        |  |
|                                      | 74 | 46,532           | 34,853                  | 41,624                   | 42,101        |  |
| Entire Sample                        |    | \$34,042         | \$32,802                | \$40,354                 | \$45,814      |  |
| Median Actual Return Ratio           |    |                  |                         |                          |               |  |
|                                      | 68 | 5.2              | 3.9                     | 3.2                      | 3.1           |  |
|                                      | 69 | 4.2              | 3.7                     | 3.3                      | 3.3           |  |
|                                      | 70 | 4.5              | 4.0                     | 3.3                      | 3.2           |  |
|                                      | 71 | 5.2              | 3.9                     | 3.6                      | 3.8           |  |
|                                      | 72 | 5.5              | 4.3                     | 3.4                      | 3.4           |  |
|                                      | 73 | 5.7              | 4.5                     | 3.8                      | 3.8           |  |
|                                      | 74 | 6.3              | 5.3                     | 4.0                      | 4.0           |  |
| Entire Sample                        |    | 5.4              | 5.2                     | 3.5                      | 3.5           |  |



TABLE 10---continued

|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
| Median Life Table<br>Adjusted Return<br>Ratio                 | 68  | 2.4 | 2.9 | 2.7 | 2.5 |
|   | 69  | 2.7 | 2.7 |     | 2.8 |
|   | 70  | 2.6 | 3.1 |     | 2.8 |
|   | 71  | 3.0 | 2.8 |     | 3.1 |
|   | 72  | 2.9 | 3.2 |     | 2.9 |
|   | 73  | 3.1 | 3.0 |     | 2.9 |
|   | 74  | 3.5 | 3.2 |     | 3.2 |
| Entire Sample   | 2.9 | 2.8 | 2.7 |     | 3.3 |
|   |     |     |     |     | 2.9 |
| Median Internal<br>Rate of Return<br>(life table<br>adjusted) | 68  | 7.2 | 7.6 | 7.3 | 7.0 |
|   | 69  | 7.4 | 7.1 | 7.3 | 7.6 |
|   | 70  | 7.3 | 7.9 | 7.2 | 7.4 |
|   | 71  | 8.1 | 7.4 | 7.5 | 7.9 |
|   | 72  | 8.2 | 8.1 | 7.3 | 7.7 |
|   | 73  | 8.4 | 7.9 | 7.5 | 8.3 |
|   | 74  | 9.2 | 8.2 | 7.9 | 8.2 |
| Entire Sample   | 7.9 | 7.4 | 7.2 |     | 7.6 |

Wealth and transfer amounts are in 1978 dollars. The number of households is 7,137.

Finally, the rates of return shown in Table 8 are almost the same for the wealth groups. Most researchers would find this result surprising because the Social Security benefit schedule has considerable progressivity. Apparently, that is neutralized by the taxes paid by the deceased and, possibly, by a different time pattern of contributions. For example, holding constant total undiscounted nominal contributions, the rate of return will increase if the contributions are made late in life rather than early.

Table 8 also shows how the transfers, return ratios, and rates of return vary by age within quartiles. It is important to disaggregate by age because both wealth and the rate of return vary positively by age. Table 8 shows that at each age the transfers to those in the wealthiest quartile are much greater than the transfers to those in the lowest wealth quartile. In fact, for a couple of age groups the transfers are almost twice as great to the wealthy as to the poor. Table 8 shows that the internal rates of return are fairly flat across wealth quartiles; the highest rate of return recorded is for the upper wealth quartile among our eldest cohort, the 64 year-olds.

Table 9 contains similar results for 1975. The wealth and transfer figures are in 1974 dollars. The difference between adjusted and unadjusted taxes has become more important as reflected in the difference between the two transfer measures. Even more than in 1969, the unadjusted median return ratio gives a substantially different impression than the adjusted median return ratio: the one indicates that in percentage terms the poorer elderly gained more than the wealthy elderly, whereas the second indicates they did worse. The life table adjusted transfers to the wealthiest quartile are roughly double the transfers to the poorest quartile at every age except 70. Even their rates of return are higher at every age.

The results for 1979 as shown in Table 10 are similar to the 1975 results: the adjustment for taxes according to the life table is important, and, in fact, removes the negative correlation of the median return ratio with wealth quartile. The internal rates of return are down somewhat from 1975, most particularly for those in the wealthiest quartile. The apparent explanation is that those who worked past age 65 lowered their rates of return, and that more of the relatively wealthy did that than those in the lower wealth quartiles. The overall result of Tables 8-10, however, still remains that among the current elderly the wealthy have enjoyed the same high rate of return from Social Security as the poorer members of their age cohort.

#### IV. Simulations

In this section we calculate the projected transfers and rates of return for six age cohorts, four household types, and three levels of earnings histories. This gives us some information about the intergenerational transfers implied by the Social Security system and predicts how the intragenerational transfers will change for later cohorts. It also shows the effects of the maturing of the system on the rate of return it offers.

The household types examined are single males, single females, and one and two earner married couples. We have collected data on median annual earnings for men and women by age from 1937 to 1977. These data were extended through the year 2020 with the assumption that median earnings grow at ten percent from 1977 to 1982 and six percent thereafter. The accuracy of this assumption is not critical to our analysis because we use it only to generate the nominal earnings histories of our simulated households; that our profiles exactly match median values is relatively unimportant. We project two percent productivity growth, and therefore four percent CPI inflation beyond 1982. For the simulated single men and women, we create three earnings profiles from age 20 to 65, or, for the older cohorts, from 1937 until retirement at age 65. The low earnings profile is set at one-half the median earnings pattern, while the high earnings profile is set at the maximum earnings level subject to Social Security payroll taxes or five times the median, whichever is less. The one earner married couples are assigned earnings histories equivalent to the single males, while the taxes of the two earner married couples are the sum of those of a low earning single male and female, a median earning male and a low earning woman and, finally, a high earning male and a median earning woman. All told, there are 12 simulated households in each age cohort; three

earnings profiles for each of four household types. The age cohorts are people who reach age 65 in 1970, 1980, 1990, 2000, 2010, and 2020.

Husbands and wives are assumed to be the same age.

Unlike in the previous section, our simulations do not include widows. The single households have been life-long singles and their taxes reflect their own contributions plus the contributions of singles who, according to the life tables, die before age 65. The taxes of marrieds are also life table adjusted, but only for married couples where both spouses fail to reach age 65. After retirement, assumed to take place at age 65, we keep track of the joint survival probabilities of married couples and credit the benefits received during the resulting widowhood after the death of the first spouse.

Table 11 shows the internal rates of return for the 12 simulated households in six age cohorts. Several clarifications are necessary before these can be properly interpreted. First, these rates of return are done in an "ex ante" sense from age 65. By that, we mean that individuals assume that the annuities they receive will remain constant in real terms (except for reduced survivor benefits) and they do not take into account changes which may take effect ex post. Second, and similarly, the benefits and taxes paid out and collected after 1983 in our calculations are those projected in the Annual Statistical Supplement of the Social Security Bulletin (1980). Thus, these are not adjusted for changes which appear to be necessary to balance aggregate Social Security retirement benefits and taxes.

The effect of the proposed changes will be to drive down the real rates of return for the younger cohorts, almost certainly making them negative for high earning single males and some two earner couples. The rates of return

TABLE 11

PROJECTED INTERNAL RATES OF RETURN BY HOUSEHOLD TYPE AND  
BY AGE COHORT<sup>a</sup>

| Demographic Status | Earnings Profile | Year in Which Head of Household Becomes 65 |      |      |      |      |      |
|--------------------|------------------|--|------|------|------|------|------|
|                    |                  | 1970                                       | 1980 | 1990 | 2000 | 2010 | 2020 |
| Single Males       | Low              | 7.5  | 5.3  | 3.2  | 2.4  | 2.2  | 2.1  |
|                    | Median           | 6.3  | 4.5  | 2.4  | 1.6  | 1.3  | 1.3  |
|                    | High             | 5.4  | 4.0  | 2.3  | 1.4  | .9   | .7   |
| Single Women       | Low              | 10.7                                       | 7.7  | 5.9  | 5.0  | 4.5  | 4.4  |
|                    | Median           | 9.1  | 6.6  | 4.6  | 3.8  | 3.4  | 3.3  |
|                    | High             | 6.7  | 5.1  | 3.5  | 2.6  | 2.1  | 1.8  |
| Married Couples    | Low/Zero         | 9.7  | 7.4  | 5.3  | 4.3  | 4.1  | 4.0  |
|                    | Median/Zero      | 8.5  | 6.7  | 4.5  | 3.6  | 3.3  | 3.2  |
|                    | High/Zero        | 7.5  | 6.0  | 4.4  | 3.5  | 2.9  | 2.6  |
| Married Couples    | Low/Low          | 8.8  | 6.4  | 4.4  | 3.5  | 3.3  | 3.2  |
|                    | Median/Low       | 7.7  | 6.0  | 3.9  | 3.1  | 2.7  | 2.6  |
|                    | High/Median      | 6.7  | 5.1  | 3.4  | 2.6  | 2.2  | 1.9  |

<sup>a</sup>Benefits and taxes were projected according to the law at time of retirement except in 1970 where inflation indexation was assumed.

reported in Table 11, then, should be taken as absolute upper bounds for these households and age cohorts since all signs indicate that they will pay more taxes and receive lower benefits than those officially projected in the Social Security Bulletin and used in these calculations.

The internal rates of return calculated for the 1970 cohort are consistent with our earlier examination of the Retirement History Survey population. Again, it should be emphasized that our simulated singles do not include widows. Within each household type the high earnings household has a lower rate of return. However, our earlier results indicated that this did not imply that wealthier retired households had lower rates of return on Social Security. The projected decline with cohort age in real internal rates of return is monotonic and substantial. For example, the median single female retiring in 1970 has an expected real rate of return of 9.1 percent. If she reached age 65 in 2000, however, she would only enjoy an expected 3.8 percent return. Single women earn higher rates than single men, not only due to their longer life expectancy but also due to their lower earnings profiles.

The results of Table 11 indicate that those reaching age 65 in 1970 and 1980 were among those receiving windfall gains from the start-up and expansion of a pay-as-you-go Social Security scheme. The 1970 cohort enjoyed higher rates partly because it had a shorter history of tax payments (this generation was age 32 in 1937). The 1980 cohort and to a lesser extent the 1990 cohort did well because Social Security tax rates were low during a substantial fraction of their work lives. Consistent with the results of the previous section, we find that the start-up and expansion gains are diminishing, but that they extend over a longer period than is commonly realized. Those who retired on Social Security from 1940 to 1990 will enjoy some of these

TABLE 12

PROJECTED TRANSFERS IN 1980 \$ BY COHORT<sup>a</sup>

| Demographic Status | Earnings Profile | Year in Which Head of Household Becomes 65 |        |         |         |          |          |
|--------------------|------------------|--|--------|---------|---------|----------|----------|
|                    |                  | 1970                                       | 1980   | 1990    | 2000    | 2010     | 2020     |
| Single Males       | Low              | 20,980                                     | 20,718 | 2,524   | -12,556 | -19,052  | -25,410  |
|                    | Median           | 25,615                                     | 23,994 | -13,690 | -48,670 | -69,237  | -88,482  |
|                    | High             | 23,332                                     | 18,748 | -19,301 | -64,713 | -121,610 | -179,654 |
| Single Women       | Low              | 25,784                                     | 28,270 | 23,746  | 22,255  | 21,513   | 24,649   |
|                    | Median           | 32,027                                     | 34,660 | 21,169  | 14,915  | 9,825    | 9,377    |
|                    | High             | 41,861                                     | 45,819 | 13,921  | -17,324 | -56,982  | -96,659  |
| Married Couples    | Low/Zero         | 46,077                                     | 60,296 | 45,282  | 38,150  | 36,693   | 42,649   |
|                    | Median/Zero      | 63,425                                     | 87,293 | 51,960  | 30,664  | 16,596   | 16,596   |
|                    | High/Zero        | 63,907                                     | 88,025 | 53,996  | 27,707  | -7,351   | -41,365  |
| Married Couples    | Low/Low          | 47,704                                     | 55,587 | 33,651  | 19,139  | 11,759   | 10,858   |
|                    | Median/Low       | 58,052                                     | 76,031 | 33,758  | 5,250   | -17,564  | -25,915  |
|                    | High/Median      | 59,384                                     | 68,934 | 19,265  | -23,122 | -75,670  | -126,388 |

<sup>a</sup>Benefits and taxes were projected according to the law at time of retirement except in 1970 where inflation indexation was assumed.



gains, and a noticeable fraction of the elderly population will be in this category until the year 2010.

The life table adjusted expected Social Security transfers in 1980 dollars are shown in Table 12 for our simulated households. Again, the results are roughly in accord with our examination of the Retirement History Survey population. As in the previous section, the real discount rate used in the transfer calculations was three percent. For the households retiring in 1970, Social Security was "a good deal" and in most cases the higher earnings households received larger transfers because they were allowed to participate in this good deal to a larger extent. This effect offset the somewhat lower internal rate earned by households with higher earnings profiles as shown in the previous table. For the younger cohorts, the level of transfers is much lower (and in some cases, negative) and their pattern across earnings profiles is very different. Consider the higher earnings households retiring in the year 2010 or later; rather than being allowed to participate in a larger extent in a good deal (which was the case for the high earners earlier), those with high earnings in the later cohorts are forced to participate to a larger extent in a program which offers them a poor return. Each of our high earnings household types retiring in the year 2010 has negative transfers. The progressive nature of the program, which has had essentially no impact on those who have retired to date, is strongly evident by the year 2010. The reforms currently being discussed will not only further lower the transfer numbers of the young cohorts, but may add to the strong progressive pattern of the transfer figures already projected for them under current law.

## V. Conclusion

We have examined the real rates of return and the transfers in the retirement (OASI) component of Social Security. Most of our analysis uses the Retirement History Survey population which ranged in age from 58 to 64 in 1969 and which was interviewed six times from 1969 to 1979. Our primary result is that this generation did extremely well on Social Security, earning a real rate of return of roughly eight percent. We calculated this number taking into account the taxes paid by the unfortunate cohort members who did not live to retirement age, and found this to be an important correction. Without it, we would get even higher rates of return for the RHS household population.

We examined the rates of return and transfers by marital status, race and age. The results were that the married couples had higher rates of return than singles in the RHS population, and that non-whites did less well than whites. The lowest rates of return were for widows when account is taken of the taxes paid by the deceased spouses.

Perhaps our most interesting result, other than the high rate of return itself, is that the rate of return does not decline with wealth for this population sample. In fact, the wealthy in the RHS population have earned roughly the same high rate of return as their poorer cohort members and have enjoyed far higher absolute transfers.

In the final section of the paper we simulated the evolution of the impact of the Social Security system on 12 household types. We project that the high rates of return would have declined monotonically and significantly even before the Social Security changes now contemplated. The transfer components become negative for some households; for example, the negative

transfer is projected at \$180,000 (1980 \$) for high income single males currently age 27. The intergenerational transfers are extremely large and the intragenerational distribution of transfers is quite different (more progressive) for the currently young than it is for the presently elderly.

The results of this paper should be useful in assessing how the Social Security system could be revised. It indicates that the idea that all current retirees should be protected from cuts and only those who will retire in 20 or more years should be asked to rescue the system would lead to a policy of protecting those who have done well at the expense of those who are already projected to do poorly. Of course, this consideration must be weighed against the financial flexibility of the young relative to the currently elderly.

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## APPENDIX

CALCULATION OF PRESENT VALUE OF TAXES AND BENEFITS,  
AND RATE OF RETURN

The basic principle is that all taxes paid and benefits received by a cohort will be allocated to surviving members of the cohort. Unless this is done the survivors will appear to have received above average rates of return even under an actuarially fair annuity system. We distinguish groups according to marital status (married, single or widowed), sex and race.

Consider first a single person of age A with a stream of past taxes,  $t_i$ , and of past benefits,  $b_i$ . Let  $P_i$  be the probability that a person will live to age A given that he has reached age i. Thus, for each person of age A there were  $1/P_i$  persons living at age i. There were on average  $t_i(1/P_i - 1)$  taxes paid at age i by people who died before reaching age A and who had similar tax histories to the surviving person in the sample. The present value of these taxes over all ages less than A is

$$\sum_{i=1}^A t_i (1/P_i - 1) \beta_i (1 + r_i)^{A-i}$$

where  $\beta_i$  is the price level adjustment.  $r_i$  was taken to be a constant three percent. This number was added to the present value of taxes actually paid to get the total of taxes paid by the person in the sample and by similar people who did not survive until age A. Because the sample is self-weighting, aggregating over all singles will give a good estimate of total taxes paid by the cohort, provided mortality rates are independent of tax contributions.

The mortality probabilities are race and sex specific; they are calculated from the 1969 life tables.

The present value of past benefits received by the cohort is calculated in a way symmetric to the calculation of taxes.

Now consider a widow in the 1969 sample. The data only include her tax contributions, which will be treated in the same way as the taxes of a single person. However, in almost all cases her benefits are based on the taxes of her deceased husband, and a rate of return calculation should take those into account. This is done by allocating part of the taxes paid by deceased husbands to the widows. The general reasoning is that for each surviving couple, there were additional couples who paid taxes but did not survive as couples. Some survived as widows, some as widowers, and some had no survivors. From the life tables and our data on the tax histories of husbands, we can calculate taxes paid by deceased husbands in the same way as was done for singles. That amount multiplied by the probability that the wife lived is allocated to widows; the remainder is allocated to surviving couples. More specifically, if  $t_i$  is the tax stream of a husband in the sample,  $ET = \sum_{i=1}^A t_i (1/P_i - 1) \beta_i (1 + r_i)^{A-i}$  is the present value of taxes paid by deceased husbands who were similar to the surviving husband.  $ET$  multiplied by the probability the wife survives until the survey year is allocated to widows and the remainder is allocated to married couples in the sample. The allocation for widows is summed over all couples. That amount divided by the number of widows is added to the life table-adjusted taxes actually paid by each widow on her own earnings record. In principle, the taxes paid by deceased wives should be similarly allocated between the

couple and widowers, but for simplicity we allocated all of them to the couples: wives have small tax contribution histories and the probability that the husband outlives the wife is small. Again, it is assumed that the mortality rates are independent of taxes. In addition, we assume independence between mortality rates of husbands and wives. Past benefits are treated symmetrically to taxes.

The present value of future benefits uses the 1969 life tables. Mortality probabilities of husbands and wives are assumed to be independent. The following provisions of the law were taken into consideration: actuarial reduction for early retirement; one percent benefit increase for work past age 65; a wife may draw on her own record or her husband's record; a widow may draw at age 60 at a reduced fraction of her husband's PIA, but at age 62 she can switch to her own record if it yields a higher benefit; the PIA calculation is based on the law in effect in the year of the calculation; a widow's benefit is reduced if her former husband drew benefits before he was 65 or if she draws benefits before she is 65.

The rate of return in year  $T$  is calculated in the following way. Let  $t_i$  and  $b_i$  be the life table-adjusted real stream of taxes and benefits of an individual. The  $t_i$  will be zero prior to year of employment and after retirement. The  $b_i$  will be zero before retirement; after  $T$ , they will be calculated according to the Social Security law in effect in year  $T$ . The rate of return in year  $T$  solves the equation 
$$\sum_{i=0}^N b_i (1+r)^{T-i} = \sum_{i=0}^T t_i (1+r)^{T-i},$$
 where  $N$  is the maximum age and  $0 < T < N$ .