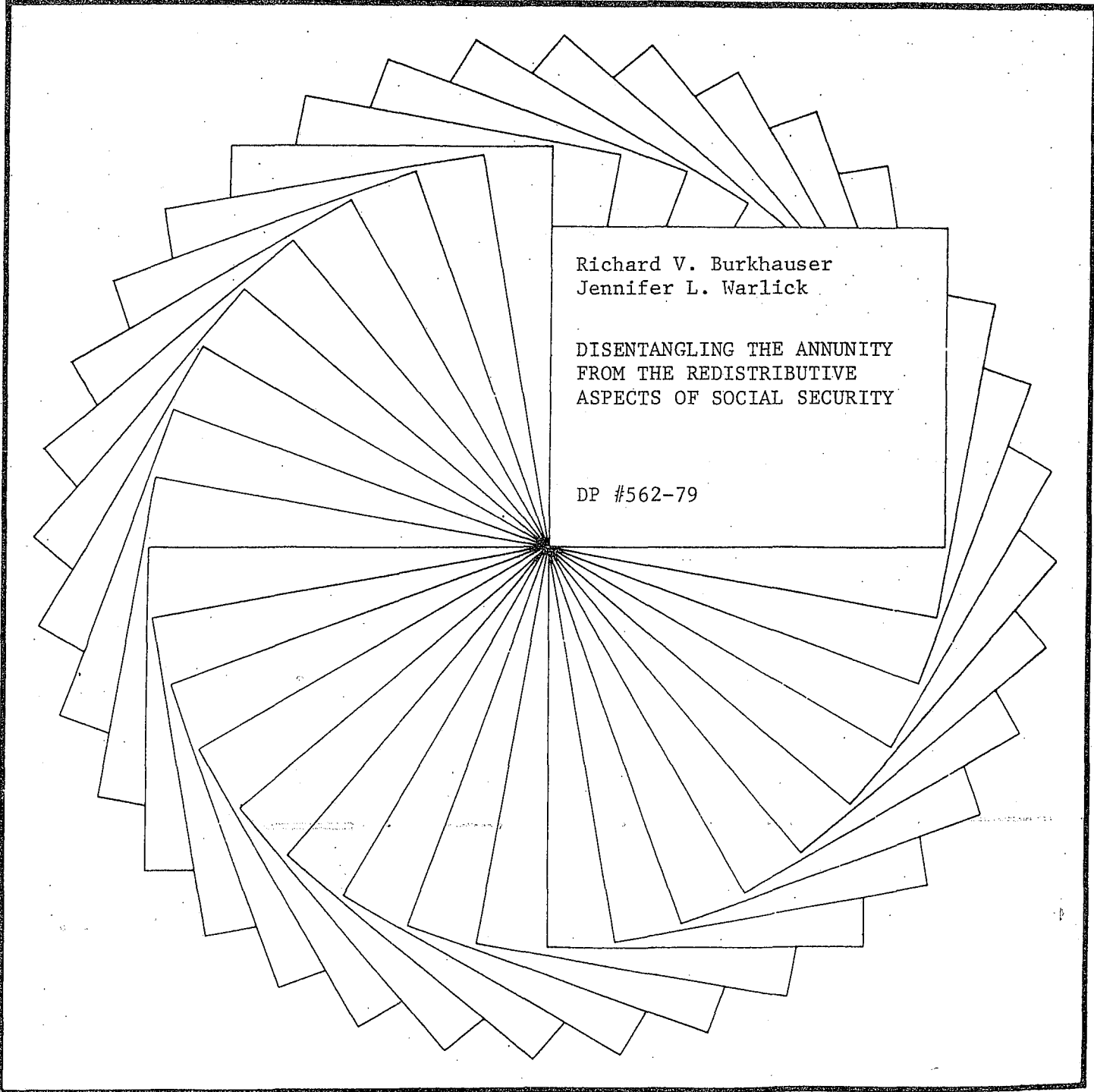# Institute for Research on Poverty

## Discussion Papers

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DISENTANGLING THE ANNUNITY
FROM THE REDISTRIBUTIVE
ASPECTS OF SOCIAL SECURITY

Disentangling the Annuity from the Redistributive

Aspects of Social Security

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November 1979

Financial support for this study was provided in part by the Institute for
Research on Poverty, University of Wisconsin--Madison, through funds granted
by the Office of Economic Opportunity pursuant to the provisions of the
Economic Opportunity Act of 1964, and by the Office of Income Security Policy,
U.S. Department of Health, Education, and Welfare.  Much of the work for this
paper was performed while the authors were employed by the Institute for
Research on Poverty and the Office of Income Security Policy, respectively.
Earlier versions of this paper were presented at the 1978 Meetings of the
Western Economic Association and the 1978 Meetings of the Econometric Society.
The authors wish to thank Mike Watts and Luise Cunliffe for their programming
assistance in designing and executing necessary computations.  Useful comments
on earlier drafts were received from participants of seminars given at NBER-
West; the Long Run Research Division, ORS-SSA; and at the Institute for
Research on Poverty.  The authors are particularly grateful for the helpful
suggestions of John Turner, John Hagens, David Betson, and Thomas Gustafson.

# ABSTRACT

The life-cycle relationship between initial Social Security contributions and subsequent benefits causes the impact of Social Security on income distribution to be overestimated in a single-period analytical framework. By separating the annuity from the redistributive aspects of Social Security we provide a life-cycle framework for measuring its net impact on redistribution. To this point in its history, we find all income classes have received positive net life-cycle income transfers and, in an absolute sense, upper-income groups have done at least as well as lower-income groups. This suggests a reason for the near-universal support of Social Security by past generations, as well as the controversy which now surrounds it. As it becomes apparent to younger cohorts of taxpayers that many of them will be net losers, it is inevitable that Social Security will be subject to the same controversy as other welfare programs which attempt to redistribute income.

Few government programs reach the proportion of the Social Security system with so little controversy. Second only to the federal income tax in size, OASI (old-age-survivor's insurance) taxes were over $68 billion in 1977, and yet only recently has there been more than token opposition to further increases in this tax. Classified as a social insurance system, OASI is nevertheless credited by many analysts as being the most successful government program in redistributing income. This paper argues that the single-period analysis used in such studies greatly overstates the true impact of OASI on income distribution. Because benefits are based on contributions made at younger ages such benefits are a mixture of return on past contributions, distribution within an age cohort and distribution across cohorts.

To achieve an accurate measure of the true redistributive impact of the transfer portion of OASI, we must first distinguish its annuity aspects. We do so by using data from the 1973 Social Security Exact Match File to compare the present pattern of OASI benefits with that which would result from a fair market return on individual lifetime taxes paid into the system. We then determine the incidence of redistributive benefits in the present system where such benefits are defined as the difference between actual benefits received and fair annuity benefits. Because our analysis takes a life-cycle approach to income distribution, in addition to showing the incidence of benefits across current income groups, we show the incidence of OASI across permanent income groups.

The results suggest a reason for the past near-unanimous support of this program and offer a clue to the erosion of that support. Despite

the redistributive aspects of the system, up to 1977 all income classes
were net gainers and at about the same absolute amount. This net across-
generational gain is decreasing, however, and may eventually disappear.

The remainder of the paper is organized as follows: in section I
we discuss differences between a single-period and life-cycle analysis
of the impact of government programs on income distribution and the
difficulty of estimating this impact for a program like OASI. In section
II we actually estimate the annuity and redistributive aspects of OASI
across income classifications. In section III we show how the methodology
developed in this paper provides an insight into the current controversy
over "double-dippers."

1. THE DUAL NATURE OF OASI: SOCIAL INSURANCE VERSUS WELFARE

Taxonomies of government programs usually make distinction between
social insurance programs and transfer or welfare programs. In principle
this is a useful distinction, but in fact government programs are rarely
one or the other.[1] Rather than consider in detail the differences between
these two types of programs, we focus on one factor that we consider to
be crucial to the difference between the two: the relationship between
contributions made into a program and the benefits derived from that program.

We define a pure social insurance program as one in which the benefits
that an individual expects exactly match the contributions that he makes.
Such a program would perform in exactly the same way as a private
insurance system: actual benefits might not equal actual payments, but
the expected value of all future benefits would be equal to such payments.

A pure transfer program, in contrast, is defined as one in which benefits
are completely divorced from contributions. The actual method of redis-
tribution is not crucial; it can range from a universal demogrant to a
means-tested program.

If we focus on the relationship between contributions and benefits
in looking at OASI, we are forced to turn from a single-period analytic
framework to a life-cycle one, especially in determining the true impact
of this government program on income distribution. A pure social insurance
system will significantly affect the pattern in which income is received
over an individual's lifetime, but will have no impact on income distri-
bution across individuals. A pure welfare system has an impact on both.

A pure social insurance program whose purpose was to provide benefits to
workers at older ages would, in effect, take a form equivalent to an
actuarially fair annuity. Whether or not OASI ever was intended to function
as this type of publicly administered annuity system, the 1939 Amendments
to the Social Security Act subsumed that objective within a much broader
mandate. Certain aspects of the system--e.g., the earmarked nature of
the tax and the use of a worker's wage history as a determinant of
benefits--distinguish it from a pure transfer program, but social welfare
has long been a major objective, and such mechanisms as the progressive
benefit formula, the minimum benefit, the uniform dependent's benefit,
and the work test attempt to redistribute income within the present
system. The result is a mixture of annuity and redistributive forces which
clearly distinguish this program from either of the two pure systems
discussed above.

Recognition of the link between OASI taxes (contributions) and benefits has important implications for studies of income distribution.[2] This relationship is usually ignored, with the result that benefits are considered a pure transfer and contributions a pure tax. Since most OASI taxpayers in any single period are young, full-time workers, while those receiving OASI benefits are old, mostly retired workers, the impact of OASI on across-person transfers appears to be large, and its effect on income equality great. But if we adopt a life-cycle perspective, it becomes clear that this conclusion overestimates both the level of true redistribution among individuals and the real change in lifetime income quality.

## Measuring Redistribution under an Actuarially Fair System

Let us examine more carefully the pattern of benefits in an actuarially fair OASI system. It is immediately apparent from Table 1 that there is no change in either across-individual distribution or in lifetime income equality. What is changed is the pattern of an individual's lifetime income.

Table 1

Lifetime Income in an Actuarially Fair System

|  | Period 1<br>Post-tax<br>Income Rec'd | Period 2<br>OASI<br>Benefits Rec'd | Total Life-<br>time Income |
|---|---|---|---|
| Person A | $ 9,000<br>($10,000) | $1,000 | $10,000 |
| Person B | $10,000 | $ 0 | $10,000 |

Note: The table assumes no growth and a zero interest rate.

In this simple two-person, two-period model, OASI taxes of $1,000 are
assessed on person A in period 1, but benefits are received by that person
in period 2. Because of OASI, person A's pattern of post-tax income has
changed (from $10,000/$0 to $9,000/$1,000) but there has been no change in
his lifetime income position vis-à-vis person B, who did not take part in
OASI. Growth in the size of this actuarially fair OASI system would
continue to change an individual's lifetime income pattern, but would
have no effect on comparisons of the lifetime income of several persons.

Now consider the first row in Table 1 as two generations. The first
generation in period 1 pays $1,000 in OASI taxes; this will be returned in
period 2. The second generation receives $1,000 in OASI benefits, on the
basis of contributions from the previous generation. Consider the second
row as the same society in the absence of OASI. Single-period analysis
of these two worlds proclaims the former more equal than the latter. But
from the perspective of the individual's life cycle, they are identical.
Table 1 shows that, to the degree that OASI is actuarially fair, single-
period analysis of OASI confuses a more equal distribution of income
across an individual's life with a measure of income equality across
individuals.

To disentangle the annuity and redistributive aspects of OASI, it
is necessary to differentiate payments going to OASI recipients on
the basis of contributions during earlier periods from those due to
transfers both within and across cohorts. Such a disentanglement is
useful in calculating the initial incidence of OASI benefits within age
cohorts as well as in estimating its trend over time.

The value of the individual's total contributions $(C_R)$ at the point of retirement is equal to the sum of OASI taxes paid both by the individual $(t_a w_i)$ and by the individual's employer $(t_v w_i)$, compounded by a rate of interest $(r_i)$.[3] Thus,

$$C_R = \left[ \sum_{i=1}^{R} w_i (t_{ai} + t_{bi}) \right] \prod_{j=1}^{R} (1 + r_i). \tag{1}$$

The expected present value of future benefits $(B_R)$ at the point of retirement is equal to the sum of expected OASI benefits over the worker's remaining life $(b_k)$, discounted by the probability of survival $(p_k)$ in each period $(k)$ and the interest rate $(r)$.

$$B_R = \sum_{k=R}^{n} p_k b_k / (1 + r)^{k-R+1}. \tag{2}$$

Thus in such a system, at any age of retirement $(r)$,

$$C_R = B_R. \tag{3}$$

## Measuring Redistribution Within the OASI System

OASI, of course, functions differently. The concern of those who established it with providing a minimum standard of living (social adequacy) has resulted in several features including mechanisms whose purpose is to redistribute benefits toward the low-income classes of the aged population, and thus OASI may not be actuarially fair for individuals within an age cohort $(C_{Ri} \gtrless B_{Ri})$. Nor, of course, has it been inter-generationally neutral. From almost the beginning of the system, benefits were paid to individuals as if they had been contributing over their

entire lives. As we will show this resulted in a redistribution across generations which is narrowing as the system matures.[4] Thus the summation of aggregate contributions for any age cohort may be greater, equal to, or less than its aggregate benefits--that is,

$$\sum_{i=1}^{n} C_{Ri} \quad \gtreqless \quad \sum_{i=1}^{n} B_{Ri} \ . \tag{4}$$

In the next section we determine the redistributional impact of the current OASI system on individual households across income classes and age cohorts, where redistribution is defined as the difference between actuarially fair benefits and what is currently received.[5]

## 2. ESTIMATION OF THE ANNUITY AND REDISTRIBUTIVE COMPONENTS OF OASI

The 1973 Social Security Exact Match File merges individual records from the 1973 Current Population Survey with OASI earnings and benefit records. With these data, the pattern of actual OASI benefits, as well as lifetime contributions into the system by all individuals, can be found. Such data permit redistribution within and across cohorts to be separated from the annuity aspect, and enable us to estimate values for individual households.

The pattern of actual OASI benefits in 1972 is compared with the pattern produced by an actuarially fair system, holding all decision variables constant. An actuarially fair benefit is defined as one resulting from satisfying equation 3. The comparison is not with $(B_R)$, which is the stock value of all expected future benefits, but with $(b_k)$, its flow equivalent. The complete derivation of $(b_k)$ and of all other values used in the analysis is found in Appendix A.

## Current OASI Benefits

In 1972, $27.1 billion in benefits were distributed through the OASI system to households with at least one member aged 65 or over (Table 2, col. 1).[6] This includes retired worker, spouse, survivor, and special age-72 benefits. The benefits are actual payments and are affected both by the actuarial and redistributive elements of the system. The worker's wage history is capsulized into an average monthly wage (AMW) but is then adjusted by a progressive benefit formula to arrive at a primary insurance amount (PIA). The age of benefit acceptance, spouse's benefits, and the earnings test are all factors affecting total household benefits.

## Actuarially Fair OASI Benefits

The aggregate actuarially fair benefits set out in Table 2, col. 2, approximates the insurance coverage of actual OASI. The relationship between worker, spouse, and survivor benefits is maintained. A married worker and spouse receive a full benefit, and two-thirds of that benefit continues to a survivor (joint and two-thirds survivor rule). Reductions in benefits due to early acceptance or to the earnings test rules are maintained (see Appendix A). There are several differences, however, between this insurance scheme and OASI: (1) The full benefit is not based on the worker's PIA, but is a function of actual payments into the system. (2) Benefits are based on the assumption that purchase is made at the time of retirement--the scheme ignores those households in which all members died before receiving benefits. (3) A potentially more important problem is that the actuarially fair calculation is a fixed benefit based on a single rate of return.[7]

Table 2

Distributional Impact of Social Security Benefits Under Alternative Annuity Assumptions

| | OASI Benefits, 1972 (1) | Actuarially Fair OASI[a] (2) | Difference (1) - (2) (3) | Population by Income Class (%) (4) |
|---|---|---|---|---|
| Total Program Benefits | $ 27.1[b] | $7.4[b] | $ 19.7[b] | 100%[c] |
| Mean Benefit | $1,652 | $454 | $1,198 | |
| Mean Dollar Benefit by Household Income Class: | | | | |
| $ 0 - 500 | 13 | 1 | 12 | 3 |
| 501 - 1,000 | 622 | 35 | 587 | 5 |
| 1,001 - 1,500 | 934 | 107 | 827 | 9 |
| 1,501 - 2,000 | 1,337 | 249 | 1,088 | 13 |
| 2,001 - 2,500 | 1,540 | 350 | 1,190 | 13 |
| 2,501 - 3,000 | 1,769 | 421 | 1,348 | 8 |
| 3,001 - 3,500 | 2,034 | 532 | 1,502 | 7 |
| 3,501 - 4,000 | 2,193 | 666 | 1,427 | 6 |
| 4,001 - 5,000 | 2,331 | 746 | 1,585 | 9 |
| 5,001 - 6,000 | 2,396 | 824 | 1,572 | 8 |
| 6,001 - 8,000 | 2,220 | 771 | 1,449 | 7 |
| 8,001 - 10,000 | 1,941 | 697 | 1,244 | 4 |
| 10,001 - 20,000 | 1,780 | 609 | 1,171 | 6 |
| 20,001 + | 1,721 | 526 | 1,195 | 2 |

Note:  For a complete description of the methodology used to estimate the variables, see Appendix A.

[a]Actuarially fair benefits, assuming OASI contributions yielded a rate of return equal to the annual yield plus the rate of increase of average stock prices.

[b]In billions of dollars.

[c]May not sum to 100 percent due to rounding.

Tax considerations have been ignored in this analysis, as have behavioral adjustments. It is assumed that the acceptance behavior of all recipients would not change under an actuarially fair system.[8]

Table 2, col. 3, presents our estimate of the transfer portion of current OASI benefits. For those who received benefits in 1972, $19.7 billion, or 73 percent of current OASI benefits, are the result of intercohort redistributive transfers. Such a result is sensitive to the assumptions made in estimating it. Using different rates of return on contributions and different rates of discount will affect the total transfer component of the system. When this was done, however, we found that it did not change the distributional impact across income groups. (See Appendix A, Table A1.)

The net effect of within- and across-cohort distribution by income class can be seen in Table 2. Every income class in 1972, even those in the $20,000 and above category, received positive redistributive benefits. Surprisingly, in terms of absolute dollars, redistribution was at least as great for higher-income classes as it was for lower-income classes. Although those in the very highest income categories received more than those in the lowest, those with incomes in the $4,000-$8,000 range received the largest absolute amount of redistributive benefits. Such a result shows that despite its many intracohort transfer mechanisms, to this point in its history OASI has yielded a positive return to beneficiaries in all income classes. This is one explanation of the strong support for the system by previous generations of taxpayers.

Table 3

Distributional Impact of Social Security Benefits for Married Couples by Age Under Alternative Annuity Assumptions

| | Age 66-67 | | | Age 72-75 | | | Age 81-85 | | |
|---|---|---|---|---|---|---|---|---|---|
| | OASI Benefits 1972 (1) | Actuarially Fair OASI[a] (2) | Difference (1) - (2) (3) | OASI Benefits 1972 (4) | Actuarially Fair OASI[a] (5) | Difference (4) - (5) (6) | OASI Benefits 1972 (7) | Actuarially Fair OASI[a] (8) | Difference (7) - (8) (9) |
| Total Program Benefits | 2.2[b] | $1.1[b] | 1.1[b] | 3.1[b] | 0.9[b] | 2.2[b] | 1.0[b] | -.1[b] | .9[b] |
| Mean Benefit | $1,874 | 904 | .970 | 2,710 | 781 | 1,929 | 2,585 | 317 | 2,268 |
| Mean Dollar Benefit by Household Income Class: | | | | | | | | | |
| $    0 -    500 | 43 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 0 |
| 501 -  1,000 | 244 | 18 | 226 | 547 | 19 | 528 | 323 | 0 | 323 |
| 1,001 -  1,500 | 790 | 227 | 563 | 894 | 44 | 850 | 646 | 78 | 568 |
| 1,501 -  2,000 | 1,227 | 377 | 850 | 1,216 | 142 | 1,074 | 1,413 | 31 | 1,382 |
| 2,001 -  2,500 | 1,430 | 507 | 923 | 1,646 | 243 | 1,403 | 1,846 | 76 | 1,770 |
| 2,501 -  3,000 | 2,138 | 761 | 1,377 | 2,213 | 423 | 1,790 | 2,303 | 187 | 2,116 |
| 3,001 -  3,500 | 2,094 | 888 | 1,206 | 2,669 | 707 | 1,920 | 2,802 | 409 | 2,393 |
| 3,501 -  4,000 | 2,213 | 1,086 | 1,127 | 2,815 | 780 | 2,035 | 2,594 | 256 | 2,338 |
| 4,001 -  5,000 | 2,420 | 1,098 | 1,322 | 3,103 | 997 | 2,106 | 2,922 | 396 | 2,526 |
| 5,001 -  6,000 | 2,607 | 1,395 | 1,212 | 3,186 | 1,039 | 2,147 | 2,940 | 434 | 2,506 |
| 6,001 -  8,000 | 2,116 | 1,141 | 975 | 2,913 | 934 | 1,979 | 2,903 | 301 | 2,602 |
| 8,001 - 10,000 | 2,018 | 1,019 | 999 | 2,762 | 932 | 1,830 | 2,173 | 233 | 1,940 |
| 10,000 - 20,000 | 1,333 | 682 | 651 | 2,949 | 799 | 2,150 | 3,268 | 532 | 2,736 |
| 20,001 + | 1,208 | 642 | 566 | 3,266 | 909 | 2,357 | 3,626 | 631 | 2,995 |

[a]Actuarially fair benefits, assuming OASI contributions yielded a rate of return equal to the annual yield plus the rate of increase of average stock prices.

[b]In billions of dollars.

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## Across-Time Changes in Distributional Impact

In the current population of OASI beneficiaries, all income classes
have attained intergenerational gains, but Table 3 shows that the maturing
of the system is decreasing the importance of this source of transfers.
As one might expect, older age cohorts have experienced the greatest
intercohort redistribution (from current workers to beneficiaries);
only $0.1 billion of their current $1.0 billion of OASI benefits is based on
contributions into the system.  But what is somewhat surprising is that
within cohorts aged 66-67, who were aged 31-32 when OASI began in 1937,
50% of benefits are still derived from current workers.  The general
pattern of greater benefits to higher-income classes is repeated
across income classes within age cohorts.  For those aged 66-67, redis-
tributive benefits increase at each income level up to the $4001-$6000
range, but then decrease somewhat.

The earnings test has long been a controversial aspect of OASI.  Its
critics complain that it is a form of means testing which discourages
work at older ages.  Its supporters argue that it is necessary to accomplish
redistributive goals.  In 1972, the earnings test was waived for workers
aged 72 and above.  Table 3 suggests that this differential treatment of
workers importantly affects the size of mean OASI benefits across income
classes.  This can be seen by comparing the pattern of benefits for workers
aged 66-67, who are subject to the earnings test, with that for workers
aged 72 and over, who are not affected.  At income classes below the
minimum earnings level, mean OASI benefits are about the same across

age cohorts, but at higher-income classes, mean OASI benefits are higher for older age cohorts. In the $10,000 and over income classes, mean OASI benefits are twice as high for those over age 72 as they are for those aged 67-72.[9]

Such a finding with respect to the earnings test emphasizes the problem caused by the dual nature of OASI. In order to provide increased benefit for low-income people in the name of social welfare, OASI benefits have been increased across the board. At the same time, to maintain the actuarial aspect of the system, the work test has been relaxed. It is clear that both system goals can be accommodated only by continually increasing the system's expenditures.

## Single-Period Versus Lifetime Income Criteria

Tables 2 and 3 both use a single-year concept of income to look at the transfer portion of OASI benefits. But since most people in this age cohort no longer work, income at this age does not reflect an individual's lifetime financial well-being, or even his or her relative lifetime well-being within the age cohort.

Tables 4 and 5 both use a permanent-income measure of economic well-being (see Appendix B). The results of these tables are not dramatically different from those in Tables 2 and 3. Intergenerational transfers overwhelm the intragenerationally redistributive mechanisms of OASI even for those just retiring. Those with the lowest permanent income again receive the smallest absolute transfer, but in Table 4, transfers peak around the $3001 to $6000 range and then fall. Holding age constant

in Table 5 shows that once again the earnings test is most likely

responsible for the dip in benefits at upper-income levels. For those

aged 72 and over, the absolute value of the transfer elements of OASI

tends to increase with income. Those with permanent income above $10,000

receive the largest transfers. For those aged 66-67, transfers peak

within the $2501 to $6000 range and then fall.

## 3. "DOUBLE-DIPPERS" AND THE OASI SYSTEM

The methodology developed above, which separates the redistributive

from the actuarially fair portion of OASI, presents a clear picture of

the way OASI redistributes income across individuals. An example of the

insight that such a methodology can provide is seen in the current controversy

over "double-dippers."

Federal government, some state, and some local government jobs are

not covered by OASI. Workers who hold these jobs are not subject to a

payroll tax, but they may be eligible for OASI benefits because of other

work experience in covered employment. In an actuarially fair system,

this is no problem, since OASI benefits would be a simple function of

lifetime contributions. But in our current dual OASI system, redistri-

butive mechanisms do not distinguish truly low lifetime earnings from

low lifetime earnings as counted by OASI.

Table 6 contrasts those currently receiving both a government

pension and OASI benefits with other recipients of OASI benefits. The

mean income of those receiving very low ($1-$1250) OASI benefits together

Table 4

Distributional Impact of Social Security Benefits for
Married Couples Under Alternative Annuity Assumptions

| | OASI Benefits 1972 | Actuarially Fair OASI | Difference | Population by Income Class (%) |
|---|---|---|---|---|
| Total Program Benefits | $14.2[a] | $4.6[a] | $ 9.6[a] | 100% |
| Mean Benefits | $2,301 | $ 749 | $1,552 | |
| Mean Dollar Benefit by Household Permanent Income Class[b] | | | | |
| $ 0 | 1,280 | 271 | 1,009 | 6 |
| 1 - 500 | 1,393 | 239 | 1,154 | 4 |
| 501 - 1,000 | 1,791 | 260 | 1,531 | 3 |
| 1,001 - 2,000 | 2,003 | 300 | 1,703 | 7 |
| 2,001 - 3,000 | 2,016 | 356 | 1,660 | 7 |
| 3,001 - 4,000 | 2,217 | 489 | 1,728 | 6 |
| 4,001 - 5,000 | 2,160 | 498 | 1,662 | 6 |
| 5,001 - 6,000 | 2,375 | 735 | 1,640 | 6 |
| 6,001 - 7,000 | 2,392 | 779 | 1,613 | 8 |
| 7,001 - 8,000 | 2,864 | 1,117 | 1,747 | 14 |
| 8,001 - 9,000 | 2,240 | 1,085 | 1,155 | 11 |
| 9,001 - 10,000 | 2,547 | 1,160 | 1,387 | 5 |
| 10,001 - 12,500 | 2,732 | 1,244 | 1,488 | 7 |
| 12,501 - 15,000 | 2,876 | 1,402 | 1,474 | 3 |
| 15,001 - 17,500 | 3,228 | 1,470 | 1,758 | 2 |
| 17,501 + | 2,577 | 336 | 2,241 | 5 |

[a]In billions of dollars.

[b]The average of the ratio of Social-Security-earned income over
median Social-Security-earned income during the last ten years of work
prior to acceptance of OASI benefits for a worker and spouse multiplied
by median Social-Security-earned income in 1972 (See Appendix B for a
fuller description).

Table 5

Distributional Impact of Social Security Benefits for Married Couples
by Age Under Alternative Annuity Assumptions

| | Age 66-67 | | | | Age 72-75 | | | |
|---|---|---|---|---|---|---|---|---|
| | OASI Benefits 1972 | Actuarially Fair OASI | Difference | Population by Income Class | OASI Benefits 1972 | Actuarially Fair OASI | Difference | Population by Income Class |
| Total Program Benefits | $ 2.2[a] | $1.1[a] | $1.1[a] | 100% | $ 3.1[a] | $.9[a] | $ 2.2[a] | 100% |
| Mean Benefits | $1,874 | $ 904 | $ 970 | | $2,710 | $781 | $1,929 | |
| Mean Dollar Benefit by Household Permanent Income Class[b] | | | | | | | | |
| $ 0 | 628 | 210 | 418 | 4 | 1,116 | 241 | 875 | 5 |
| 1 - 500 | 784 | 189 | 595 | 4 | 1,180 | 170 | 1,010 | 4 |
| 501 - 1,000 | 1,157 | 390 | 767 | 2 | 1,486 | 225 | 1,261 | 3 |
| 1,001 - 2,000 | 1,365 | 402 | 963 | 4 | 1,972 | 275 | 1,697 | 6 |
| 2,001 - 3,000 | 1,298 | 315 | 983 | 7 | 2,253 | 264 | 1,989 | 7 |
| 3,001 - 4,000 | 1,788 | 637 | 1,151 | 7 | 2,472 | 406 | 2,066 | 7 |
| 4,001 - 5,000 | 1,578 | 579 | 999 | 7 | 2,641 | 410 | 2,231 | 7 |
| 5,001 - 6,000 | 1,842 | 856 | 986 | 7 | 2,898 | 784 | 2,114 | 7 |
| 6,001 - 7,000 | 1,911 | 920 | 991 | 7 | 2,834 | 748 | 2,086 | 11 |
| 7,001 - 8,000 | 2,403 | 1,166 | 1,237 | 11 | 3,248 | 1,161 | 2,087 | 21 |
| 8,001 - 9,000 | 2,061 | 1,158 | 903 | 18 | 2,915 | 1,081 | 1,834 | 8 |
| 9,000 - 10,000 | 1,966 | 1,020 | 946 | 5 | 3,188 | 1,208 | 1,980 | 6 |
| 10,001 - 12,500 | 2,059 | 1,169 | 890 | 10 | 3,670 | 1,467 | 2,203 | 6 |
| 12,501 - 15,000 | 2,785 | 1,624 | 1,161 | 5 | 3,718 | 1,609 | 2,109 | 2 |
| 15,001 - 17,500 | 3,008 | 1,929 | 1,079 | 2 | 4,393 | 1,351 | 3,042 | 1 |
| 17,501 + | 2,656 | 1,172 | 1,484 | 0.2 | 2,737 | 591 | 2,146 | 0.6 |

[a] In billions of dollars.

[b] The average of the ratio of Social-Security-earned income over median Social-Security-earned income during the last ten years of work prior to acceptance of OASI benefits for a worker and spouse multiplied by median Social-Security-earned income in 1972.

Table 6

The Treatment of Government Pensioners by OASI

| Mean Dollar Benefit by Current Yearly Household OASI Class[d] | Government Pensioners | | | | All Others | | | |
|---|---|---|---|---|---|---|---|---|
| | Actuarially Fair OASI[a] | Difference[b] | Income[c] | Population by Current Benefit Class | Actuarially Fair OASI[a] | Difference[b] | Income[c] | Population by Current Benefit Class |
| $ 0 | -- | -- | $7,407 | 22% | -- | -- | $5,591 | 14% |
| 1 - 1,500 | $ 148 | $ 886 | 5,802 | 29 | $ 135 | $ 910 | 2,820 | 23 |
| 1,501 - 1,750 | 335 | 1,301 | 5,869 | 7 | 346 | 1,285 | 3,293 | 10 |
| 1,751 - 2,000 | 453 | 1,411 | 6,224 | 8 | 525 | 1,346 | 3,928 | 11 |
| 2,001 - 2,250 | 383 | 1,740 | 8,272 | 7 | 605 | 1,515 | 4,721 | 8 |
| 2,251 - 2,500 | 483 | 1,929 | 7,020 | 5 | 752 | 1,620 | 5,018 | 6 |
| 2,501 - 2,750 | 587 | 2,023 | 9,712 | 4 | 936 | 1,675 | 6,408 | 4 |
| 2,751 - 3,000 | 1,021 | 1,822 | 7,001 | 3 | 828 | 2,050 | 5,771 | 3 |
| 3,001 - 3,250 | 861 | 2,272 | 9,419 | 3 | 950 | 2,172 | 6,419 | 3 |
| 3,251 - 3,500 | 935 | 2,407 | 7,935 | 1 | 1,108 | 2,271 | 7,070 | 4 |
| 3,501 - 3,750 | 1,075 | 2,542 | 7,485 | 3 | 1,422 | 2,193 | 6,960 | 3 |
| 3,751 - 4,000 | 1,107 | 2,756 | 9,601 | 2 | 1,750 | 2,108 | 8,098 | 2 |
| 4,001 - 4,250 | 1,246 | 2,880 | 11,842 | 2 | 1,697 | 2,420 | 7,707 | 1 |
| 4,251 + | 1,261 | 3,267 | 14,779 | 1 | 1,942 | 2,812 | 12,394 | 1 |

[a]From Table 2.

[b]Mean current OASI benefit minus mean actuarially fair OASI benefits.

[c]Total household income in 1972.

[d]From Table 1.

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with a government pension is twice that of other low OASI beneficiaries.[10]

The 1977 Amendments to the Social Security Act, by freezing the minimum

benefit at its June 1978 level, attempted to reduce this windfall for

high-income government workers.

But a close look at Table 6 shows that government workers have a

special advantage at all OASI benefit levels, not just at the minimum

benefit level. Government pensionholders receive OASI benefits at every

benefit level. The table shows that their mean actuarially fair benefit

is lower, and thus their redistribution share is greater, than that of

other OASI beneficiaries.

The redistributive aspects grow in magnitude with total benefit

for all OASI recipients, but are greater for government workers, owing

to their ability to shelter part of their earnings from the OASI payroll

tax. Since benefits are based on only a portion of their lifetime

earnings, they may selectively contribute to the system. This advantage

will decrease as the number of years considered in benefit estimates

increases, but government workers still will benefit from the progressive

benefit formula.

## Conclusions

The current OASI system has properties of both a pure social insurance

system and a pure social transfers system. Because there is a relation-

ship between contributions made into the system and future benefits, a

single-year approach to the effect of OASI on income distribution will

mix its social insurance effect of distributing income more smoothly across

a single individual's lifetime with its social transfer effect of distri-

buting income across individuals. After establishing this distinction between the social insurance and social transfer effects, this paper estimates the true redistributive impact of OASI on life-cycle income and finds that, in an absolute sense, upper-income groups have fared as well as lower-income groups. In the early days of the system, the overwhelming share of OASI benefits was in the form of pure transfers, and the social insurance effect of OASI could be ignored. But as the system matures, this is less true. Those attempting to measure the real impact of OASI on across-person income distribution will overestimate this impact to a larger and larger extent as across-generation (intercohort) transfers diminish. In the future this will lead to the paradoxical result that those who, in a lifetime sense, have received less than fair returns through OASI will be counted as positive recipients of government transfers in old age.

Disentangling these two effects has shown that up to this point in its history, across-generational transfers have dominated OASI benefits. Whether we count income from a single-year or lifetime perspective, all recipients of OASI, even those with the highest income, have received positive redistributive benefits. A surprising finding is that, in an absolute sense, upper-income groups do as well as lower-income groups. Such findings suggest a reason for the near universal support of OASI by past generations, as well as for the controversy which now surrounds the program. As it becomes apparent to younger cohorts of taxpayers that many of them may be net losers, it is inevitable that OASI will be subject to the same political controversy as other welfare programs which attempt to redistribute income.

APPENDIX A

Algorithms Used to Establish Actuarially Fair Annuities

The cost to a household of purchasing a fixed-dollar immediate annuity will vary with the rate of discount and life expectancy chosen in the calculation. In this paper, lifetime contributions made into the OASI system by each member of a household were known. Given this information, the value of these contributions was then estimated for the age at which OASI benefits were first taken. This value was considered as the purchase price, and the size of the guaranteed yearly income purchased was then estimated for each household. Table 1A shows the effect of varying both the rate of return on OASI contributions and the rate of discount on future annuity values.

The yearly expected probability of survival is based on Public Health Service mortality tables and is a function of age and sex. It was assumed that each member of the household purchased their joint and two-thirds annuity separately, with the provision that benefits do not begin until the age when actual OASI benefits are taken. Thus,

$PM(i/j)$ = probability that a male will live to age i

given that he is alive at age j when acceptance

age $\leq$ i $\leq$ 100 else 0.

$PF(i/j)$ = same as (1) for females.

The cost of a one-dollar annuity for a single man is estimated by equation (A1):

$$PVM_i = \sum_{j=0}^{n} PM((i + j)/i) \cdot (1 + r)^{-j}. \tag{A1}$$

Table A1

Total Benefits for an Actuarially Fair
OASI System Using Different Rates of Return

| Rates of Interest Used to Discount Future Annuity Benefits | Interest Received on OASI Contributions | |
| --- | --- | --- |
| | U.S. Government Bond Rate (billions) | Average Stock Market Rate (billions) |
| 2% | $2.3 | $5.7 |
| 5 | 3.0 | 7.4 |
| 10 | 4.3 | 10.6 |

Note: Interest received on OASI contributions is based on values
estimated on 1973 Social Security Exact Match File.

The cost of a one-dollar annuity for a single female is estimated by equation (A2):

$$PVF_i = \sum_{j=0}^{n} PF((i + j)/i) \cdot (1 + r)^{-j}. \tag{A2}$$

The cost of a one-dollar joint and two-thirds-to-survivor annuity for a couple is estimated by equation (A3):

$$PVMF_{ij} = \frac{PVM_i + PVF_j + PVC_{ij}}{3}, \tag{A3}$$

where $PVC_{ij}$ is the cost of a one-dollar annuity paid if either member of a married couple survives. This is seen in equation (A4):

$$PVC_{ij} = \sum_{k=0}^{n} [PM((i + k)/i) + PF((j + k)/j) - PM((i + k)/i) \tag{A4}$$

$$\cdot PF((j + k)/j)] \cdot (1 + r)^{-k}.$$

## Construction of Flow Estimates

In order to make actuarially fair benefits consistent with actual OASI benefits, adjustments were made to take into account the following problems: (1) Age of acceptance. Actuarial benefits were based on the age of the worker and spouse when OASI benefits were actually taken. (2) Earnings test. Since actual OASI benefits were affected by the earnings test, in the calculations actual benefits were reduced to take this into account. An estimate of the earnings-test effect on actual benefits was made and the same percentage decrease was used to decrease actuarial benefits. In the case where no benefits were accepted, actuarial benefits were zero. (3) Deceased spouse earning records. Since data did not exist for deceased spouses, it was necessary to estimate

the contribution stream of these workers. For survivors whose benefits were at least partially based on their deceased spouse's earnings, deceased spouse's PIA was known. Instrumental variable regressions were used to assign estimated contribution records to these deceased workers. It was assumed that if the survivor's benefits were based solely on his or her own record, then the deceased spouse's earnings record was zero.

APPENDIX B

Algorithms Used to Calculate Permanent Income


The concept of permanent income is approximated by measuring an individual's earnings in each of the ten years immediately preceding the year of entitlement to Social Security as a percentage of the median earnings for all workers covered by Social Security in the corresponding year. The ratio of reported earnings to median earnings is summed over the ten years and a simple arithmetic mean is computed. This mean ratio is then multiplied by a constant equal, in all cases, to median reported earnings of all covered workers in 1972. It is this absolute dollar amount which is reported as permanent income in Table 4 and 5.

The Social Security Summary Record Earnings data tape reports a single total for all reported earnings from 1937-1950. Only after 1950 can the earnings reported in any one particular year be identified. Consequently, reported earnings in each of the ten years preceding entitlement are not available for individuals whose entitlement occurred prior to 1950. When this was the case, earnings are created for the indistinguishable years among the ten years prior to entitlement by calculating the arithmetic mean for total earnings from 1937-1950. This arithmetic mean then becomes the numerator in the ratio of reported earning to median earnings for all covered workers, and the calculation of the mean ratio for the ten years prior to entitlement follows as before.

The algorithm described in the paragraphs above applies exactly to the case of the single individual. The permanent income of a married

couple is found by summing the permanent incomes of the individuals composing the couple. This calculation involves a four-step procedure. First, the permanent income of each member of the couple is calculated on the basis of his or her own year of entitlement. Second, these income amounts are compared to determine which is greater. Third, permanent income is recalculated for the member with the smaller income. The recalculation differs from the initial calculation in that it is based on reported earnings for the same ten-year period used for the spouse found (in step 2) to have the greater initial income. This revised permanent income amount is then added to the other spouse's permanent income, calculated in step 1, to arrive at total income for the couple. Couples are classified by this total income variable in Table's 4 and 5.

The purpose of the algorithm described above is to establish comparability of the earnings records of individuals retiring in different years. In the absence of some adjustment, older couples would appear poorer than younger couples because their nominal wages are lower. Use of this particular algorithm more than compensates older couples for their lower nominal wages, however, because maximum taxable earnings, and hence maximum credited earnings, have been falling through time as a percentage of median total earnings of all covered workers. The decrease is most dramatic for the period 1938-1950, when maximum reported earnings as a percentage of median total earnings fell from 4.48 to 1.56. Between 1950 and 1972 this ratio fluctuated between the relatively narrow boundaries of 1.56 and 1.98.

As one might expect, the maximum value of the average of this ratio calculated over the ten years prior to the year of entitlement displays a similar pattern over time. The maximum ten-year average for an individual retiring in 1947 is 3.17. This ratio falls consistently to a value of 1.60 for individuals retiring in 1958. It varies by only .01 - .02 thereafter until 1968, when the average ratio begins a steady climb reaching 1.72 in 1972.

To see how this variation in maximum average ratios biases upward the permanent income of older couples compared to that of younger couples, let us examine the case of two couples whose actual earnings as a percentage of total median earnings are equal to 2.0 in each of the ten years prior to entitlement. Thus each couple has a ten-year ratio of 2.0. If we assume that the year of entitlement of one of the couples is 1947, the algorithm yields a ten-year average ratio of reported earnings to total median earnings of 2.0. Now assume that the year of entitlment for the second couple is 1962. In each of the ten years preceding 1962, the ratio of maximum taxable earnings to median total earnings is less than 2.0. Thus in contrast to the actual ten-year average of 2.0, the algorithm yields a ten-year average equal to only 1.61. Although these two couples have identical actual earnings when measured as a percentage of total median earnings, the algorithm shows the older couple to have a higher ten-year average ratio and thus greater permanent income.

## NOTES

[1]Food stamps are generally considered a part of the welfare system. Yet, until recently, recipients were required to purchase them at some fraction of their market value.

[2]Recognition of the link between OASI taxes and benefits has previously led some economists to consider the impact of OASI on labor supply from a life-cycle perspective. To the degree that OASI benefits are positively related to OASI taxes, the effect of the tax on labor supply is decreased. Were OASI a pure social insurance system, it would be neutral with respect to a worker's labor supply decision. (See Browning, 1975; Burkhauser and Turner, 1978.)

[3]This assumes that the full incidence of the Social Security payroll tax is shifted to the employee. Because of the taxable maximum, taxes are paid into the system only up to $W_{max}$ for those earning above the maximum.

[4]In this case, as in all cases which will be discussed, we consider only the initial change in distribution caused by the system. Barro (1974) and others argue that the final intergenerational incidence of transfers could be zero.

[5]Throughout this paper, a standard of actuarial fairness is used to determine what participants would have received in a private market transaction. In the Social Security literature, a replacement-rate concept is often used as the measure of equity. In general, a replacement-rate concept is not equivalent to a fair-market-return measure since it has

no adjustment for the timing of contributions. Thus, even if a lifetime average wage is used in the replacement-rate measure, those whose earnings increase over time will pay lower total costs for equivalent benefits.

[6]Total cash benefits paid to individuals during 1972 for the OASI trust fund amounted to $37.1 billion (U.S. HEW, 1977, Table 110). Excluded from our estimate are lump-sum death payments, and retired workers', dependents', and survivors' benefits when no one in the household is 65 or over.

[7]Actuarially fair benefit calculations are sensitive to the rate of return used on contributions, the discount rate used in estimating expected benefits, life expectancy tables used, and assumptions about future benefit changes. In the tables shown in the paper the rate of return of contributions into the system equals the annual yield plus rate of increase of average stock prices. The discount rate on expected benefits was 5%. Life expectancies were differentiated by sex and based on Bureau of Vital Statistics figures for 1972.

[8]By ignoring behavioral responses, Table 2 provides only an approximation of the effects of changing the current OASI system to an actuarially fair system. Recent studies by Boskin (1977), Burkhauser (forthcoming), Pellechio (1978), and Quinn (1977) all attribute labor supply adjustments to the current OASI system. Browning (1975) and Burkhauser and Turner (1978) argue that an actuarially fair system would have important labor supply effects across the life cycle. Savings behavior would also be expected to change in such a system.

[9]For several reasons the relationship between the earnings test and the mean OASI benefits can only be approximated by Table 3. Income is not identified by source. Earnings which can potentially reduce OASI benefits are not distinguished from nonmarket earnings which are not subject to the earnings test. In addition, OASI benefits are included in the definition of household income. Finally, it is probable that a higher percentage of spouses or heads aged 72-75 are receiving OASI in their own right or as dependents than in the 66-67 age group.

[10]It is important to note that not all government pensionholders were in jobs not covered by OASI. Many state and local government pensioners paid OASI payroll taxes throughout their working lives. Assuming no significant difference between the contribution and benefit relationship for this type of government pensioner and nongovernment pensioners who receive OASI benefits, the true advantage for those able to avoid payroll taxes by working in noncovered employment is underestimated in Table 6.

REFERENCES

Barro, Robert J.  1974.  Are government bonds net wealth?  _Journal of
Political Economy_, _82_ (5), 1095-1118.

Boskin, Michael.  1977.  Social Security and retirement decisions.
_Economic Inquiry_, _15_, 1-25.

Browning, Edgar.  1975.  Labor supply distortions of Social Security.
_Southern Economic Journal_, _42_ (2), 243-252.

Burkhauser, Richard V.  forthcoming.  The Early Acceptance of Social
Security--An Asset Maximixation Approach.  _Industrial and Labor
Relations Review_.

Burkhauser, Richard V. and John A. Turner.  1978.  A time series analysis
of Social Security and its effect on the market work of prime age
men.  _Journal of Political Economy_, 86 (4), 701-715.

Pellechio, Anthony J.  1978.  Social Security and retirement behavior,
Ph.D. dissertation (unpublished), Harvard University.

Quinn, Joseph.  1977.  The micro-economic determinants of early retirement:
A cross-sectional view of white married men.  _Journal of Human
Resources_, _12_ (3), 329-346.

U.S. Department of Health, Education and Welfare; Social Security
Administration.  1977.  _Social Security Bulletin, Annual Statistical
Supplement, 1975_.  Washington, D.C.:  Government Printing Office.