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UNDERSTANDING THE POSTWAR DECLINE IN U.S. SAVING: A COHORT ANALYSIS

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ABSTRACT

Since 1980, the U.S. net national saving rate has averaged less than half the rate observed in the 1950s and 60s. This paper develops a unique cohort data set to study the decline in U.S. national saving. It decomposes postwar changes in U.S. saving into those due to changes in cohort-specific consumption propensities, those due to changes in the intergenerational distribution of resources, those due to changes in government spending on goods and services, and those due to changes in demographics.

Our findings are striking. The decline in U.S. saving can be traced to two factors: The redistribution of resources from young and unborn generations with low or zero propensities to consume toward older generations with high consumption propensities, and a significant increase in the consumption propensities of older Americans. Most of the redistribution to the elderly reflects the growth in Social Security, Medicare, and Medicaid benefits. The increase in the elderly's consumption propensities may also reflect government policy, namely the fact that Social Security, Medicare, and Medicaid benefits are paid in the form of annuities and that, in the case of Medicare and Medicaid, the annuities are in-kind and must, therefore, be consumed.

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I. Introduction

In 1950, the U.S. rate of net national saving was 12.3 percent. In 1994, it was only 3.5 percent.[1] The difference in these saving rates is illustrative of a dramatic long-term decline in U.S. saving. The U.S. saving rate averaged 9.1 percent per year in the 1950s and 1960s, 8.5 percent in the 1970s, 4.7 percent in the 80s, and just 2.7 percent in the first five years of the 1990s.[2]

The decline in U.S. saving has been associated with an equally dramatic decline in U.S. domestic investment. Since 1990, net domestic investment has averaged 3.6 percent per year, compared with 8.2 percent in the 1950s, 7.9 percent in the 1960s and 1970s, 6.1 percent in the 1980s. The low rate of domestic investment appears to have limited growth in labor productivity and, consequently, real wages. Since 1980, labor productivity has grown at less than half the rate observed between 1950 and 1979, and total real compensation (wages plus fringe benefits) per hour has grown at only one-seventh its previously observed rate.

This paper develops a unique cohort data set to study the decline in U.S. saving. It focuses on four periods for which Consumer Expenditure Surveys are available: 1960-61, 1972-73, 1984-1986, and 1987-1990. These and a host of other micro surveys are combined with national income account and other aggregates to form measures of cohort-specific consumption and resources. The benchmarking of our cohort data set to national

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1 The net national saving rate is defined as net national product less national consumption (household consumption plus government purchases) divided by net national product. The NIPA data used in the body of this paper do not incorporate recently revised NIPA data for the years starting in 1959.

2 The recently released revised NIPA data also show a dramatic decline in U.S. net national saving rate. For example, during the 1960s, the saving rate based on the revised data averaged 12.1 percent compared with 4.6 percent during the period 1990-1995. Saving rates in the revised data are higher than in the unrevised data because government consumption has been redefined to exclude government purchases of durables, but to include the imputed rent on the

income account aggregates ensures that our findings relate directly to the decline in net national saving measured by these aggregates.

We use our cohort data within a simple life-cycle framework to decompose postwar changes in U.S. saving into those due to changes in the following factors: the intergenerational distribution of resources, cohort-specific consumption propensities, the rate of government spending on goods and services, and demographics. Our findings are striking. Most of the decline in U.S. saving can be traced to two factors: 1) the government's redistribution of resources toward older generations with high consumption propensities from younger ones, including those not yet born, with low or zero consumption propensities and 2) a dramatic rise in the consumption propensities of older Americans. The form taken by government transfers to the elderly -- the fact that they are annuitized and, in the case of health care, are in kind -- may help explain the rise in the elderly's spending rate. For the young and middle aged, the findings are different. Most young generations' consumption propensities have declined slightly or remained constant over time, and this has bolstered U.S. saving.

The paper continues in Section II with a brief discussion of related research. Section III presents some stylized facts about recent trends in U.S. saving and consumption. Section IV describes our method for decomposing changes in national saving. Section V discusses data construction and data sources in general terms, relegating details to the Appendix. Section VI presents our findings. Section VII relates the increase in the propensity of the elderly to consume to the increase in the

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stock of government durables. The Commerce Department appears, however, to be understating this imputed rent because it includes in its measure only the depreciation on the stock of government durables.

annuitization of their resources recently documented in Auerbach, Kotlikoff, and Weil (1992) and Auerbach, Gokhale, Kotlikoff, Sabelhaus, and Weil (1994). Section VIII addresses a number of questions about the reliability of our findings. Section IX examines the paper's implications for future rates of U.S. saving. The final section, X, summarizes and concludes the paper.

II. Related Studies

Several recent studies of U.S. saving focus on Americans' personal saving, defined as saving out of disposable income. Summers and Carroll (1987) suggest that younger cohorts may be hoping to rely on Social Security in their retirement and, are, as a consequence, saving too little on their own. In contrast, Bosworth, Burtless, and Sabelhaus (1991) compare personal saving rates in the 1960s, 1970s, and 1980s and conclude that all age groups are now saving at lower rates than used to be the case. Attanasio (1993) reaches a third conclusion. He places the blame for current low levels of personal saving on the failure of a particular subset of cohorts to save, namely those born between 1925 and 1939.

The Bosworth, et. al. and Attanasio studies use consumer expenditure data which directly cover only 80 percent of aggregate consumption. Although Bosworth et. al. impute some missing consumption components, they, as well as Attanasio, ignore health care. This is a significant omission. Health care is a large and growing component of national consumption. Moreover, as medical consumption has grown as a share of output, so too has overall consumption, suggesting that medical consumption, or at least its method of finance, may play a key role in the decline in the U.S. rate of saving.

Even were all studies of personal saving in agreement, it would be hard to assess their implications for national saving. From a theoretical perspective, personal saving bears no necessary relationship to national saving. This point can be understood by considering the standard life-cycle model under certainty. According to this model, the appropriate measure of household saving is the propensity of households to consume out of the present value of their remaining lifetime resources. This propensity will be invariant to present-value neutral changes in the timing of after-tax income flows, each of which will produce a different value of personal saving.

For example, an increase in households' current Social Security taxes that is offset, in present value, by higher projected Social Security benefits will leave their consumption and, thus, national saving unchanged, but lower their personal saving. The postwar period has witnessed an enormous growth in Social Security and other government transfer programs. Hence, changes over time in U.S. personal saving rates may simply reflect the life-cycle pattern of these tax/transfer programs, rather than some underlying change in household consumption and saving behavior.

The problem with studying national saving via personal saving is actually deeper than this discussion suggests. The reason is that the tax and transfer labels of government receipts and expenditure programs are not unique (see, for example, Kotlikoff, 1993). Assuming agents are rational, the same fiscal policy can be re-labeled countless ways with no impact on economic outcomes, including national saving. But each re-labeling will result in a different measure of personal saving. For example, suppose the U.S. government had historically labeled Social Security contributions as "loans" to the government rather than as "taxes" and current and past Social Security benefit payments

as "repayment of past loans, plus an old age tax" rather than as "transfer payments."[3] Doing so would have produced an entirely different postwar reported path of personal saving, but it would not have altered national saving, assuming rational consumption and saving behavior. In 1993, as an example, the personal saving rate would have been almost three times larger than the rate reported!

Studies that focus directly on household consumption and, by implication, on national saving are few and far between. Cutler, et. al. (1990) is one example. This study employs an infinite horizon model to study the response of household consumption to demographic change. Its findings suggest that high rates of household consumption and low rates of national saving reflect households' projections of higher future per capita income levels arising from the aging of the U.S. population. There are two major problems with this analysis, however. First, the assumed intergenerational altruism underlying the infinite horizon model is strongly rejected by household and cohort panel data (see Altonji, Hayashi, and Kotlikoff, 1992; Abel and Kotlikoff, 1994; Hayashi, Altonji, and Kotlikoff, 1996, and Altonji, Hayashi, and Kotlikoff, 1995). Second, the study's results are highly sensitive to the assumption about the economy's initial position.

Boskin and Lau (1988a and 1988b) estimate an aggregate consumption function taking into account aggregation over different cohorts. Their results suggest that a decline in saving by generations born after the Great Depression is largely responsible for the postwar decline in U.S. saving -- a finding at odds with those reported here. On the

[3] Such relabelling is not simply a hypothetical possibility. The so-called "privatization" of the Chilean social security system amounts, in large part, to relabeling workers' social security contributions as loans, rather than as taxes. Under the Chilean "reform," workers contribute to pension funds. But the pension funds turn around and lend most of these funds to the government, which uses them to make benefit payments to current social security recipients.

other hand, they find that the age-distribution of resources is an important determinant of aggregate consumption – a finding consistent with those reported here.

III. The Postwar Decline in U.S. Saving -- Some Stylized Facts

Table 1 reports average values of the net national saving rate for the 1950s, 1960s, 1970s, and 1980s, as well as the first four years of the 1990s. The net national saving rate is defined as (Y-C-G)/Y, where Y refers to net national product, C to household consumption, and G to government spending (purchases of goods and services). The table also reports rates of government and household consumption out of output, G/Y and C/Y. In addition, the table reports our preferred measure of private-sector saving, which we call the household saving rate. It's defined as (Y-G-C)/(Y-G) -- the share saved of the output left over to the household sector after the government has consumed (that is, the share of Y-G that is not consumed by the public). Unlike the personal saving rate, the household saving rate isn't affected by present-value neutral changes in the timing of income flows. Nor is it altered by pure changes in the labeling of government receipts and expenditures, assuming agents are rational and aren't deceived by the government's choice of language.

As Table 1 indicates, government spending is not responsible for reducing the rate of national saving. Indeed, the rate of government spending, G/Y, has declined since the 1970s. Furthermore, government spending in the 1990s has averaged just 21.0 percent of output -- as low a rate as any observed in the five periods. The rate of household consumption spending, on the other hand, rose from 69.9 percent of output in the 1950s

to 76.6 percent in the early 1990s.[4] The increased rate of household consumption was associated with a decline in the household saving rate from 11.5 percent in the 1950s to 3.4 percent in the 1990s.

Table 2 considers the role of health-care spending in the growth of household spending. It shows that medical expenditures have increased from 3.9 percent of NNP in the 1950s to 12.8 percent in the 1990s. In the 1950s, health-care spending represented less than 6 percent of household consumption. So far, in the 1990s, it has represented almost 17 percent. The increase in the rate of medical spending was associated with only a modest reduction in the rate of nonmedical spending. In the 1950s, nonmedical consumption averaged 66.0 percent of NNP. In the 1990s, it averaged 63.8 percent. Thus, although the rate of medical consumption rose by 8.9 percentage points between the 1950s and 1990s, the rate of nonmedical consumption fell by only 2.3 percentage points.

IV. Decomposing Changes in National Saving

We adopt the no bequest, life-cycle model under certainty as an initial framework for decomposing postwar changes in national saving. In so doing, we don't mean to belittle other determinants of saving, such as uncertainty and the desire to bequeath. Rather, we believe that this model is a useful starting place to begin investigating the decline in U.S. saving. Our analysis relates cohorts' consumption to their resources. In our base case, resources refers to net wealth plus the actuarial present value of future non

[4] The rise in the rate of household consumption began in the 1970s, not the 1980s. The household consumption rate rose by 1.6 percentage points between the late and early 1970s (i.e., 1975-79 versus 1970-1974), by 2.1 percentage

asset pre-tax income minus the actuarial present value of net taxes (taxes paid less transfer payments received).[5]

Our base case assumes that individuals correctly foresee their future resource streams (pre-tax non asset income, taxes, and transfer payments) through 1993 and form projections of these variables for years after 1993. We also present results based on the assumption of myopic expectations. Under myopic expectations, individuals are assumed to extrapolate current age- and sex-specific levels of non asset incomes, taxes, and transfers into the future based on recently observed rates of productivity growth.

Our results can also be considered from the perspective of a life cycle model with uncertainty in which expected, rather than actual realized resources, determines consumption. Note that realized future income, taxes, and transfers represent an unbiased estimate of the ex-ante expected values of these resources streams since they differ from their expected values by a mean-zero expectation error. If the expectation error in total resources is small, then our use of realized future resources rather than the theoretically more appropriate resource measure, namely expected future resources, will make little difference to our results. Note the expectation error in total resources could be small even if expectation errors with respect to particular components of resources are large. The reason is that these expectation errors may be offsetting. For example, the introduction and growth of Medicare after 1965 may have been unexpected by young cohorts making their consumption decisions in the early 1960s. But the slowdown in their future real wage growth was, presumably, also unanticipated. This unexpected decline in the human

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points between the early 1980s and the late 1970s, by 2.0 percentage points between the late 1980s and early 1980s, and by 1.6 percentage points between the early 1990s and late 1980s.

capital component of their resources may have offset much of the unexpected increase in the present value of their Medicare benefits.

Our interest is in the net national saving rate, which, at time t, is given by

$$(1) \quad \frac{S_t}{Y_t} = 1 - \frac{C_t}{Y_t} - \frac{G_t}{Y_t},$$

where S_t stands for net national saving.

In the standard life-cycle model with certainty and homothetic preferences, each cohort's consumption is proportional to the present value of its remaining lifetime resources (resources for short). We denote the per capita resources of cohort age i at time t as r_{it}. This is the sum of the cohort's per capita net wealth, nw_{it}, its per capita present value of future labor earnings (human wealth), hw_{it}, its per capita present value of private and government employee pension benefits (their pension wealth), pw_{it}, less its per capita present value of future tax payments net of the per capita present value of future transfer payments received (their generational accounts), ga_{it}.

Since our empirical analysis attributes all consumption to adult cohorts age 18 through 100,[6] we write aggregate consumption at time t as the sum of consumption of individual cohorts age 18 through 100, that is, as

$$(2) \quad C_t = \sum_{i=18}^{100} \alpha_{it} r_{it} P_{it},$$

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5 Discounting is at a constant real interest rate equal to either 3, 6, or 9 percent. The term "actuarial" refers to discounting income, taxes, and transfers received or paid in future years by the probability of surviving to these years.

6 Cohorts older than age 100 are grouped together with those age 100.

where i indexes age, α_{it} stands for the average propensity to consume of i year olds at time t, and P_{it} stands for the number of i-year-olds at ti ne t. We note for future reference that $\alpha_{it} = c_{it}/r_{it}$, where c_{it} is the average level of consumption of those age i at time t.

Our goal is to decompose changes over time in the net national saving rate into changes in the rate of government spending, G_t/Y_t, and changes in determinants of the rate of household spending, C_t/Y_t. These determinants are clarified by expressing the rate of household spending as:

$$(3) \qquad \frac{C_t}{Y_t} = \left[\sum_{i=18}^{100} \alpha_{it} \frac{r_{it}}{r_t} \frac{P_{it}}{P_t}\right] \frac{R_t}{Y_t},$$

where R_t stands for the time-t total value of resources of living generations (that is, $R_t=\Sigma_i r_{it}p_{it}$), P_t stands for the total population at time t, and r_t stands for the time-t resources per capita of living generations.

According to (3), changes over time in the rate of household consumption can be traced to changes over time in four factors: cohort-specific propensities to consume (the α_{it}s), the shape of the age-resource profile (the r_{it}/r_ts), the age-composition of the population (the P_{it}/P_ts), and the resource-output ratio -- the ratio of total resources of current generations to current output (R_t/Y_t).

In our empirical analysis we compute the values of five factors -- the above four plus government spending -- for each of four time-periods -- 1960-61, 1972-73, 1984-86, and 1987-90. We then consider how the national saving rate in each of these periods

would have differed had one of the five factors not taken its actual value, but had, instead, taken values observed in other periods.

This decomposition of changes in life-cycle saving into those due to changes in demographics, saving behavior, and age-resource profiles has a long tradition dating to Ando and Modigliani (1963). Their lessons bear repeating. First, increases in any cohort's propensity to consume will, all else equal, raise the rate of aggregate household spending and lower national saving. Second, given the value of R_t/Y_t, higher rates of population growth and real wage growth mean higher rates of national saving for the following reason. In the life cycle model, the propensity to consume is predicted to rise with age. Since both population and real wage growth raise the values of the P_{it}/P_t and r_{it}/r_t ratios for younger cohorts and lower them for older cohorts, such growth produces a re-weighting of the α_{it}s which reduces the rate of household spending and raises the rate of national saving.

The ultimate effect of population and real wage growth on national saving is, however, ambiguous because such growth is also likely to raise the ratio R_t/Y_t. Faster population growth means that the remaining lifetime resources and incomes of the young play a bigger role in determining the overall of R_t/Y_t. But, since the ratio of future resources to current income is larger for the young than it is for the old, population growth raises R_t/Y_t. Faster real wage growth also raises R_t/Y_t because it raises the resource to income ratio of the young, while leaving it unchanged for the old.

The final lesson is that redistribution across generations can alter national saving. It does so by altering the age-resource profile, the resource-output ratio, or both.

Government tax/transfer policy can, of course, produce such redistribution. Consider government redistribution among living generations -- specifically, from the young to the old at time t -- that leaves the resource-output ratio unchanged. Such redistribution is accomplished by raising the present value of taxes net of transfers of young generations (their generational accounts) and reducing the present value of taxes net of transfers of older generations while leaving unchanged the net tax burden facing current generations collectively. This policy lowers the values of the r_{it}/r_ts of the young and raises them for the old. This raises the weights applied to relatively high values of α_{it} and reduces those applied to relatively low values, producing a higher rate of aggregate household spending.

Next, consider redistribution from future to current generations that raises the resource-output ratio, but leaves the age-resource profile unchanged. This can be accomplished by reducing the generational accounts of each current generation by just the amount needed to produce the same percentage increase in its remaining lifetime resources. This policy raises the rate of household spending by an amount that depends on the resource- and population-weighted economy-wide propensity to consume (the bracketed term in (3)).

V. Data Construction and Sources

To decompose changes across our four periods in national saving, we need the value for each period of the five aforementioned factors. Two of these factors -- the rate of government spending and the age-composition of the population -- are readily available. This is not the case for the value of the c_{it}s or the r_{it}s, both of which are needed

to form the α_{it}s. The r_{it}s are also needed to form the age-resource profile and the resource-output ratio.

Our procedures for calculating the c_{it}s and r_{it}s are described in detail in the Appendix. Briefly, we form these variables or their constituent components by using cross-section profiles and population data to distribute aggregate variables by age and sex. For example, to determine the average value of consumption of, say, 53 year-old males and females in, say, the period 1960-61, we use CEX and other data to determine relative per capita consumption by age and sex during that period and use this age-sex relative consumption profile plus data on the age-sex composition of the population during this period to distribute aggregate NIPA personal consumption expenditures during this period by age and sex. As a second example, consider our calculation of the human wealth component of the resources of, say, 38 year-old females, in, say, 1972. For 1972 and subsequent years, we distribute actual or projected NIPA labor income by age and sex using profiles of relative average annual earnings by age and sex derived from annual CPS surveys as well as actual and projected population counts by age and sex. The resulting values of average earnings of 38 year-old females in 1972, of 39 year-old females in 1973, of 40 year-old females in 1994, etc. are then actuarially discounted back to 1973.

As just suggested, our study treats individuals, rather than households, as the life-cycle decision makers. Practically speaking it is impossible to conduct our cohort-method of analysis based on the household as the decision-making unit for the simple reason that households are transient entities that appear and disappear through time as the

result of marriage, divorce, separation, and death. The empirical issue arising from treating individual adults within a multi-adult household as separate decision makers is how to allocate household income and consumption among the multiple adults. Our method is to allocate the total income earned by married couples evenly between the husband and wife and to allocate income earned by other adults to those adults. In allocating married couples' incomes evenly among spouses we are implicitly viewing marriage, in effect, as the choice of an occupation that generates income (which may be negative) for each spouse. To examine the sensitivity of our results to this view of marriage, we also present results in which the income earned by spouses is allocated to the nominal recipient of that income.

As described in more detail in the Appendix, CEX-reported household consumption is allocated among adults in the following manner. Wherever it is possible to determine the particular consumer of a good or service within the household, such as the consumer of pipe tobacco, the individual doing this consumption is allocated this consumption. Consumption that is not so easily allocable -- such as expenditures on food -- is allocated among all adults and children using a child-adult equivalency scale and assuming equal consumption by all adults. After this initial allocation of household consumption, children's consumption is then reallocated equally to each co-resident parent.

Illustrating Our Data Construction

Our general method of distributing an aggregate variable in time t, say Z_t, by age and sex can be understood more precisely by considering the following equation:

$$(4) \qquad Z_t = z^m_{40t} \sum_{i=18}^{100} (v^m_{it} P^m_{it} + v^f_{it} P^f_{it}).$$

In (4), z^m_{40t} stands for the average value of Z of 40 year-old males at time t, v^m_{it} and v^f_{it} stand, respectively, for the ratios of average values of Z of males and females age i at time t to z^m_{40t}, and P^m_{it} and P^f_{it} stand, respectively, for the populations of males and females age i in year t. Given the value of Z_t from the NIPA or other source, the relative age-sex profile of Z (the v^m_{it}s and v^f_{it}s) calculated from a cross-section survey, and the P^m_{it}s and P^f_{it}s calculated from population data, we can use equation (5) to solve for z^m_{40t}. We can then multiply this value by v^m_{it} (v^f_{it}) to determine z^m_{it} (z^f_{it}) -- the average value of Z for males (females) age i in year t. Finally, we can form a population-weighted average of z^m_{it} and z^f_{it} to produce an average value of Z for age group i at time t.

In the case of the c_{it}s, we use the 1961-62, 1972-73, 1984-86, and 1987-1990 Consumer Expenditure Surveys (CEX) and the 1977 and 1987 National Medical Expenditure Surveys (NMES) to form relative profiles of total consumption by age and sex. By total consumption, we mean all of the components of household consumption that are included in the NIPA aggregate, including health care and imputed rent on owner-occupied housing. The age-sex relative consumption profiles for the four periods derived in these calculations are used, together with period-specific Social Security counts of population by age and sex, to distribute NIPA values of aggregate household consumption in each of the four periods.

Turning to the r_{it}s, recall that these variables are the sums of annuitized and non-annuitized resources. We form each of the components of the r_{it}s separately and then add

them. By annuitized resources we refer to the present values of future labor earnings (human wealth), Social Security benefits, private and government employee pension benefits, government health-care benefits, welfare benefits, and other government transfers, and, entering as negative annuities, the present values of future taxes. Taxes include labor and capital income taxes, indirect taxes, payroll taxes, and property and other taxes. Non annuitized resources refers simply to holdings of net wealth.

The computation of cohorts' non annuitized resources for the four periods involves distributing by age and sex each year's aggregate value of household net wealth and then averaging over the years defining the four periods. The computation of each annuitized resource component is more involved. First, for each year between 1960 and 1993, the national aggregate for a particular type of payment (or receipt) is distributed by age and sex according to the cross-section age-sex relative profile that is applicable to that payment (or receipt). For example, aggregate 1965 Social Security benefits are distributed according to the age-sex relative profile for these benefits in 1965. This yields estimates of the per capita amounts of the payment (or receipt) by age and sex for that year. The per capita annuity values for years after 1993 are estimated by either 1) distributing projected aggregate payments or receipts according to the latest available cross-section relative profile or 2) assuming that age- and sex-specific per capita values equal their respective values in 1993 or some later year except for an adjustment for productivity growth.

Second, for each generation in a given year t, the present value of all future per capita payments of a particular type (say, indirect tax payments) is computed by multiplying these future per capita payments by the generation's projected population in

those years, discounting these values back to year t, and dividing the sum of the discounted values by the number of members of the generation alive in the base year. This method produces actuarially discounted present values of the particular receipt or payment for each generation alive in period t. We consider three pre-tax real discount rates: 3 percent, 6 percent (our base case), and 9 percent.[7]

As an example of this method for calculating the different components of annuitized resources, consider our estimate of human wealth (HW). Our formula for human wealth in year t of sex x born in year k, HW^x_{tk}, is

$$(5) \qquad HW^x_{tk} = \frac{1}{P^x_{tk}} \sum_{s=t}^{k+D-t} e^x_{sk} P^x_{sk} R^{s-t},$$

where e^x_{sk} stands for the average earnings in year s of a member of the generation born in year k and of sex x, P^x_{sk} is the population in year s of the same sex-specific generation, R=1/(1+r), where r is the rate of interest, and D is the maximum age of life. The calculation of e^x_{sk} is given by

$$(6) \qquad e^x_{sk} = \frac{d^x_{sk} E_s}{\sum_{s=t}^{k+D-t} [d^m_{sk} P^m_{sk} + d^f_{sm} P^f_{sk}]}.$$

In (5) and (6), E_s is aggregate labor earnings in year s and d^x_{sk} is the ratio in year s of the average earnings of the generation born in year k of sex x divided by the average earnings

[7] These rates bracket the pre-tax real rate of return observed, on average, between 1961-1992, where the rate of return in year t is calculated as $[(NW_t-E_t-P_t+C_t+T_t)/NW_t-1] - 1$ and NW_t is household net worth in period t, E_t is aggregate labor income (excluding contributions to private pension funds), P_t is pension income including private pensions, government employee pensions, workers compensation and veterans benefits, C_t is personal consumption expenditure, and T_t is aggregate net tax payments.

in year s of our reference group -- those who were age 40 in year s (that is, those for whom k=s-40).

The construction of relative profiles by age and sex, d^x_{tk}, is described in equations (7) and (8):

$$(7) \qquad j^x_{sk} = \frac{\sum_{i=1}^{N^x_{sk}} w^x_{ski} j^x_{ski}}{\sum_{i=1}^{N^x_{sk}} w^x_{ski}},$$

and

$$(8) \qquad d^x_{sk} = \frac{j^x_{sk}}{j^m_{s,s-40}}.$$

In (7), j^x_{sk} is the weighted average (across cohort members indexed by i) of labor income. N^x_{sk} is the number of observations in year s of individuals of sex x born in year k, j^x_{ski} is the wage and salary income of the ith individual of sex x in year s who was born in year k, and w^x_{ski} is the person weight of this observation. Equation (8) shows the calculation in year s of the average labor income of members of the generation with sex x who were born in year k, relative to that of contemporaneous 40-year-old males.

The national aggregates used in our calculations come from the National Income and Product Accounts (NIPA), the Federal Reserve System's Flow of Funds (FOF), The American Council of Life Insurance (ACLI), the U.S. Census Bureau's Current Population Survey (CPS), and the Survey of Current Business (SCB). The sources for cross-section relative profiles are the CPS, the Survey of Income and Program Participation (SIPP), the Consumer Expenditure Survey (CES), the Survey of Consumer

Finances (SCF), the Social Security Administration's Annual Statistical Supplement (SSASS), and the Health Care Financing Administration (HCFA). The computations also use the historic and projected population counts of the Social Security Administration (SSA).

VI. Findings

A. Looking at the Data

Before decomposing past changes in the U.S. saving rate, it's worth considering some of the data we've constructed. Tables 3 and 4 present the average values of consumption, resources, and resource components for males and females within 10-year age groups in each of the four periods (1960-61, 1972-73, 1984-86, and 1987-90) under consideration.

Let's focus first on consumption. Figure 1 presents cross-section relative age-consumption profiles for total consumption in each of the four periods. Figure 2 does the same, except it considers only nonmedical consumption. The periods were chosen based on the availability of Consumer Expenditure Survey data. For each period, the average consumption of 40-year-olds is normalized to 1.

The figures document a remarkable increase in the relative consumption of the elderly. This increase is more pronounced if medical care is included in the measure of consumption, but the increase in the relative consumption of nonmedical goods and services is also striking. The four panels of Figure 3 depict the size of housing, medical, and other consumption for selected cohorts in 1960-61 and 1987-90. Panels 3a and 3b of the figure show these components in constant 1993 dollars. Consumption of all three

components was larger in the late 1980s compared to the early 1960s. Panels 3c and 3d show the shares of the three components for the same cohorts. These panels show that the share of medical consumption was significantly larger for all cohorts in the later period. For elderly cohorts, the increase in the share of medical consumption was accompanied by a decline in the share of both housing and other consumption in the late 1980s compared to the early 1960s.

Table 5 examines some of the numbers underlying Figures 1 and 2. It reports ratios of average levels of total as well as non medical consumption of 60, 70, and 80-year-olds to the respective levels of 20, 30 and 40-year-olds for each of the four periods. According to the table, 70-year-olds in 1960-61 consumed only 71 percent of the amount consumed by 30-year-olds in 1960-61, whereas their consumption now exceeds that of 30-year-olds by 18 percent. In the case of non medical consumption, 70-year-olds consumed only 63 percent of the amount consumed by 30-year-olds in 1960-61, compared with 91 percent now. The increase in relative consumption of the elderly based on other age pairings is equally dramatic.

Another way to summarize the increase in the relative consumption of the elderly is in terms of their share of total household consumption. In the early 1960s, the elderly (those 65 and over) accounted for 10.6 percent of U.S. household consumption and 14.1 percent of the U.S. population. By the late 1980s, the elderly accounted for 17.8 percent of total household consumption and 16.4 percent of the total population. Based on demographics alone, the elderly's share of consumption should have risen by 16.3 percent; instead, it rose by 67.9 percent.

This striking increase in the relative consumption of the elderly has coincided with an equally remarkable increase in their relative resources. Figure 4 depicts changes across the four time-periods in the age-distribution of resources (the r_{it}/r_ts).[8] Table 6 presents ratios of average resources of 60, 70, and 80 year-olds to those of 20, 30, and 40 year-olds. In 1960-61, the average resources of 70-year-olds were only 55 percent as large as those of 30-year-olds. In 1987-90, they were 81 percent as large. The resources of other older cohorts have also grown significantly relative to those of younger cohorts over the past three decades.

Figures 5 through 8 show the components of r_{it}/r_ts: the human wealth ratio, hw_{it}/r_t, nonhuman wealth ratio, nhw_{it}/r_t, pension wealth ratio, pw_{it}/r_t, and generational account ratio, ga_{it}/r_t.[9] Figure 5 indicates a sizable decline across the four periods in the human wealth ratio for young cohorts. Indeed, this decline accounts for most of the overall decline in r_{it}/r_t for young cohorts. The reduction in the human wealth to resources ratio at these ages is the result of a low projected rate of labor income growth compared to the 1960s and early 1970s. Figure 6 shows profiles of nhw_{it}/r_t for the four periods. Interestingly, although this ratio falls for all cohorts, it falls relatively more for the oldest age groups. Figure 7 presents the pension wealth-to-resources ratio, pw_{it}/r_t, for each of the four periods. As indicated, cohorts in their pre-retirement ages experienced especially rapid growth in pension wealth over the last three decades. The increase in pw_{it}/r_t accounts for a sizable part of the increase in r_{it}/r_t for these cohorts.

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[8] The kinks at age 80 in Figure 3 reflect our method of imputing relative nonhuman wealth for individuals age 80 and above. The small number of observations at these ages in the Survey of Consumer Finances precludes forming separate estimates of average nonhuman wealth at these ages. Here, we assume that the relative nonhuman wealth of those 80 or older equals that of 80-year-olds of the same sex.

Figure 8 shows changes over time in the ratios of generational accounts to resources. Note that all cohorts experienced declines in their ga_{it}/r_ts between the early 1960s and late 1980s. However, the reductions are much larger for cohorts aged 55 and older. In 1960-61, for example, the present value of net transfers to 70-year-olds amounted to 4 percent of per capita resources. In the late 1980s, the corresponding figure was about 25 percent. Changes in generational accounts are clearly responsible for most of the rise in the relative resources of the elderly in the postwar period.

Figure 9 graphs age-specific consumption propensities -- the α_{it}s -- in each of the four periods. In each period, the propensity to consume is roughly constant prior to about age 60 and then rises steadily. There is a local peak between ages 35 and 45 in the graphs which appears to reflect household expenditures on child rearing. Note that this local peak occurs at later ages through time -- a result that is consistent with the trend of parents having children at older ages.

The most striking feature of Figure 9, however, is the very substantial increase over time in the consumption propensities of older Americans. Take 80-year-olds, for example. Their propensity to consume rose from 8.7 percent in 1960-61 to 13.6 in 1987-90. Interestingly, there is no corresponding increase in the consumption propensities of the young and middle-aged.[10]

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9 Note that our base case calculations assume a 1.2 percent annual growth of labor productivity after 1993, and a discount rate of 6 percent.

10 These findings -- that the consumption propensities of the older old have risen and that those of the young and middle aged have remained relatively constant -- are robust to different assumed values of the discount rate. At a discount rate of 3 percent, for example, 80-year-olds' consumption propensity rises from 8.6 percent in 1960-61 to 12.4 percent in 1987-90. At a discount rate of 9 percent, it rises from 8.9 to 14.9 percent. Detailed consumption propensities by age under alternative discount rate assumptions are available from the authors upon request.

In presenting Figure 10, we digress briefly to illustrate the point made above that, unlike propensities to consume out of total remaining lifetime resources which are invariant to relabelling of government receipts and payments, propensities to consume and save out of disposal income are creatures of vocabulary. The figure presents propensities to save out of disposable income by age in the late 1980s for two different definitions of disposable income. *Conventional Disposable Income* is the sum of labor income, capital income, and pension income less net taxes. *Alternative Disposable Income* is identical to conventional disposable income, except that all social security contributions are classified as loans to the government and all social security benefits are classified as repayment of principal plus interest on past social security loans less an old age tax.[11] The figure is remarkable in two respects. First, based on the conventional definition, average propensities to save are negative -- indeed, substantially negative -- for the young and old.[12] Second, differences in propensities to save across the two definitions of disposable income are very large. Under the conventional definition, for example, both 40 and 65 year-olds have a propensity to save equal to zero, whereas under the alternative definition their propensities to save are 13 percent and -75 percent, respectively!

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11 The lifetime social security tax is negative (positive) if the social security benefits received by a cohort exceed the return of principal plus interest on the cohort's past social security contributions. The calculation assumes that the timing of the payment of this old age tax of the cohort's lifetime coincides with the timing of its actual receipt of social security benefits. For example, if the present value (to age zero) social security lifetime net tax of a generation is 30 percent as large as the present value (to age zero) of its lifetime social security benefits, we assume that the generation faces a tax each year equal to 30 percent of its receipt of social security benefits and otherwise treat payments to social security and benefits received from social security as equivalent to investing in a financial asset.

12 The fact that other studies (e.g., Bosworth, et. al., 1991) report positive propensities to save out of disposable income at all ages, notwithstanding their use of conventional labels, appears to reflect their failure to include all components of consumption, including consumption of medical goods and services.

Returning to the main strain of the paper, consider Figure 11 which shows changes over the four periods in the age composition of the U.S. population. The figure indicates a small rise since the early 1960s in the share of the population over age 65. It also indicates that compared with the early 1960s, there were relatively more adults in their twenties and thirties in the late 1980s and relatively fewer adults in their forties and fifties.

Figures 12 through 14 plot longitudinal profiles of labor and pension incomes and net tax flows. Figure 15 plots total non-asset income computed as labor plus pension income minus the net tax flow. Profiles are shown for cohorts at ten year intervals beginning with the cohort aged 18 in 1920. The labor and pension income profiles exhibit the expected hump shapes. Labor incomes peak at middle age and decline sharply at retirement ages. Pension income profiles increase steeply at retirement ages.[13] The longitudinal net tax profiles depict an interesting pattern. Generations arriving at middle ages later in time pay substantially more in net taxes than those arriving earlier. On the other hand, cohorts that retire later receive substantially more in net benefits from the government than do those that arrive earlier.

The total non-asset income profiles in Figure 15 are dominated by labor income during youth and middle ages. After retirement, however, the profiles are dominated by the higher pension incomes and negative net taxes. As a result, non-asset incomes rise sharply at retirement and continue on an upward course after retirement. As was true for those who retired in the 1940s, 1950s, and 1960s, future retirees are slated to receive

[13] Pension incomes include survivor, disability and retirement benefits from private and government employee pension plans, workers compensation, and veterans benefits.

higher non-asset incomes during retirement compared to their peak non-asset income when they were working. This picture differs dramatically from the text-book illustration of life-cycle longitudinal age-non asset income profiles.

B. Decomposing Postwar Changes in U.S. Saving

Table 7 examines the effect on U.S. saving of changes in the five factors mentioned above: the age-distribution of resources, $r_{it}/r_t s$, propensities to consume, $\alpha_{it} s$, the resource-output ratio, R_t/Y_t, the age-distribution of the population, P_{it}/P_t, and the rate of government spending (G_t/Y_t). The factors involving resources and consumption propensities are calculated using a 6 percent real discount rate.

The counterfactual analysis being undertaken here is partial equilibrium in nature. For example, in asking how much higher U.S. saving in the late 1980s would have been had the cohort-specific consumption propensities of the late 1980s been the same as those of the early 1960s, we are ignoring other factors that might also have changed as a consequence of a change in consumption propensities. The following exercises are meant to convey the potential importance of different saving determinants, rather than to indicate precisely what U.S. saving would have been had the world evolved differently.

Changes in the Age-Resource Distribution

In each of the panels of Table 7, the numbers along the diagonal are the actual rates of U.S. net national saving that were observed in the periods being referenced. The

off-diagonal numbers indicate the saving rate that would have been observed in the row period had the saving factor in question taken the column period's value.

Consider the first panel of Table 7, and take the first number in the last row -- 4.97. This is the saving rate which, ceteris paribus, would have been observed in 1987-90 had the 1960-61's age-resource distribution prevailed in 1987-90. Since 3.38 is the actual saving rate observed in 1987-90, we conclude that the 1987-90 saving rate would have been 47 percent higher had the age-resource distribution of the late 1980s been that of the early 1960s. A comparison of 5.53 -- the last number in the first row of the central panel of Table 9 -- with 7.85, the actual 1960-61 saving rate, provides another way to asses the importance of the change in the age-resource distribution. It shows that the saving rate would have been 30 percent lower if everything else had remained as it was in 1960-61, but the age-resource distribution had changed as it did over the three decades. The result that the shift in the age-resource distribution contributed to a decline in the national saving rate is robust to alternative discount rate assumptions.[14]

Of course, the changes in the age-resource profile observed between the late 1980s and the early 1960s did not occur overnight. Figure 4 points this out, and Table 9 shows that the shifting age-resource distribution has been responsible for a steady decline in U.S. national saving.

Changes in Average Propensities to Consume

[14] The conclusion that the change in the age-resource distribution between the early 1960s to the late 1980s contributed to the decline in national saving is sustained under the alternative discount rate assumptions of 3 and 9 percent. The results from all counterfactual experiments under thest two alternative discount rates are available from the authors upon request.

The second panel of Table 7 shows the effect on the net national saving rate of changes over time in average propensities to consume of both, young and old cohorts (those under age 65 and those over 65, respectively). The last number in the first column of the middle panel -- 4.85 -- indicates that, other things equal, the 1987-90 net national saving rate would have been 43 percent higher had the 1987-90 consumption propensities equaled those of 1960-61. This increase in the saving rate is not surprising given the much larger consumption propensities of elderly cohorts in 1987-90 displayed in Figure 9. However, the result that changing consumption propensities contributed to the decline in the national saving rate is not robust to the choice of the discount rate: At 3 percent, substituting the 1960-61 consumption propensities for the 1987-90 ones produces a lower saving rate of 2.55 percent.

We next decompose these saving changes into those due to changes over time in the consumption propensities of the young and of the old. The first panel of Table 8 shows the impact on saving rates of changing the consumption propensities of older generations -- those aged 65 and older: had only older generations' propensities remained at their 1960-61 level, the saving rate would have been 5.74 percent in 1987-90 instead of 3.38 percent. The conclusion that sharp increases in older generations' propensities to consume are partly responsible for the decline in national saving is sustained under alternative rates of discount.

The second panel of Table 8 shows that replacing younger generations' 1987-90 consumption propensities with their 1960-61 values would actually have slightly lowered the saving rate -- from 3.38 percent to 2.50 percent. The somewhat higher consumption propensities of those in their twenties and early thirties in the early 1960s compared with

the late 1980s is responsible for this result. This finding is strengthened if one discounts at 3 percent, but reversed if one discounts at 9 percent.

Changes in the Age Distribution of the Population

The third panel of Table 7 shows the effect on U.S. saving rates of changes over time in the age-composition of the population. As indicated, had the 1960-61 age-distribution of the population prevailed in 1987-90 rather than the actual 1987-90 distribution, the U.S. saving rate would have been 2.44 percent, rather than 3.38 percent. This result can be understood by recalling that the propensity to consume rises with age and, as shown in Figure 11, the age-distribution of the early 1960s featured relatively more middle-aged Americans and relatively fewer younger Americans than did the age-distribution of the late 1980s.

These results are independent of the choice of discount rate. To see why, note that the product α_{it} times r_{it} in (3) equals per capita consumption of cohort i in year t, which is, of course, the same regardless of how one decomposes this quantity between α_{it} and r_{it}. Also, R_t/r_t equals P_t which is also independent of the discount rate. Hence, changes in the ratios P_{it}/P_t on the national saving rate will be the same for all discount rates.

Changes in the Resources-Income Ratio

Values of R_t/Y_t and its components for the four periods are reported at the bottom of Table 7. This ratio rises over time from 12.53 to 12.96 between the early 1960s and

the late 1980s. As the table shows, the principal reason for the rise in R_t/Y_t is the decline in the ratio of aggregate generational accounts to income (GA_t/Y_t). In other words, the government's intergenerational redistribution of resources from future to living generations is the main reason for the increase in the resource-income ratio.

Recall that, ceteris paribus, a higher resource-output ratio means a higher rate of consumption out of net national income and a lower rate of net national saving rate. The fourth panel of Table 7 shows the impact of changes over time in the resources to output ratio, R_t/Y_t. The last row-first column number -- 5.90 -- indicates that saving rates would have been 75 percent larger if the 1960-61 R/Y ratio had prevailed in 1987-90. The first row-last column number, 5.42, shows that if the 1987-90 resource-output ratio had prevailed in 1960-61, the 1960-61 saving rate would have been one third smaller. The magnitude (but not the sign) of the saving effect of the increase in the resource-output ratio is sensitive to the choice of discount rate.[15]

Changes in the Government Spending Rate

The fifth panel of Table 7, considers how changes in the government spending rate, G_t/Y_t, has affected national saving. As reported at the bottom of Table 7, this rate fell slightly from 21.6 percent in 1960-61 to 21.2 percent in 1987-90. The numbers in the middle panel show that had G_t/Y_t in 1987-90 taken on its 1960-61 value, the 1987-90 U.S. saving rate would have been 12 percent smaller; that is, the change in the rate of

15 Assuming a discount rate of 3 percent yields a saving rate of 7.49 percent when the 1960-61 value of R/Y is substituted in place of the 1987-90 value; using 9 percent produces a saving rate of 4.46 percent.

government spending during the last 3 decades is not responsible for the low rate of national saving in the late 1980s.

VII. The Annuitization of the Elderly's Resources and the Increase in their Propensity to Consume

One likely explanation for the remarkable increase in the propensity of the elderly to consume is the equally remarkable postwar increase in the degree of annuitization of the elderly's resources. Another is that a significant share of these annuities are Medicare and Medicaid benefits which are provided in the form of in-kind consumption of medical goods and services.

Tables 9-12 are culled from Auerbach et. al. (1995). Tables 9 and 10 present the components of bequeathable resources -- nonhuman wealth plus the term value of life insurance -- as well as annuitized resources which equals the difference between bequeathable resources and total resources. Tables 11 and 12 report these components as a fraction of total resources. The degree of resource annuitization, Ra, is computed as the ratio of annuitized to total resources, that is:

$$(9) \qquad R^a = 1 - \frac{TERM + NHW}{HW+NHW+PW-GA},$$

where TERM stands for the average term value of life insurance, HW stands for average human wealth, NHW stands for average nonhuman wealth, PW stands for average private pension wealth, and GA stands for the generational account.

Table 11 shows that, for males age 65 and older, R^a was two-and-a-half times larger in 1990 than it was in 1960 reflecting an increase from 0.16 to 0.41. For elderly females, the increase (reported in Table 12) is even bigger -- from 0.18 in 1960 to 0.50 in 1990. This larger annuitized share of elderly persons' resources implies, of course, an equal and opposite decline in their share of bequeathable resources.

Increased resource annuitization means that the elderly have less reason to fear running out of resources as a result of living longer than expected. Consequently, they are likely to choose to consume at a higher rate. As demonstrated in Kotikoff and Spivak (1981), the availability of annuities can make large differences to the consumption levels of the elderly even when the elderly aren't very risk averse. For example, according to Kotlikoff and Spivak's simulations, moderately risk averse elderly with no bequest motive and no explicit or implicit means of acquiring annuity insurance, will, on average, fail to consume a third of their resources prior to their deaths.

Assuming that individuals do not have access to annuity insurance, either explicit or implicit, at the margin, their likely consumption plan will involve spending down their net wealth to zero and simply consuming their annuity income. At this point, their average propensity to consume is mechanically determined and guaranteed to rise with age. Why? Because consumption equals annuity income and resources equals the present expected value of annuity income. So the APC equals 1 divided by the actuarial value of $1.00. Assuming that survival probabilities decline with age, this ratio will rise with age. For example, if the discount rate is zero, the APC simply equals the individual's remaining life expectancy. This line of argument suggests that the government's

annuitization of the elderly has, effectively, forced the elderly to consume a larger share of their resources in each successive year.

VIII. Questioning the Findings

Allocating Couples' Incomes to Nominal Recipients

The results presented so far have been based on income, tax, and transfer profiles which were constructed from micro data sets by allocating equal amounts of these flows to both spouses in the case of married households. An alternative procedure is to allocate income to the person (head or spouse) who nominally receives it. Table 13 shows that the results from implementing the latter method are almost identical to those in the earlier tables. For example, the saving rate under the 1960-61 resource distribution, all else remaining the same, is 5.07 under the alternative method instead of 4.97 (see the first panel of Table 7). Using the 1960-61 consumption propensities yields a saving rate of 4.93 under the alternative method compared to 4.85 under the base-case procedure (the second panel of Table 7). Finally, using the 1960-61 R/Y ratio produces a saving rate of 5.81 under the alternative method instead of 5.90 under the base-case procedure (The fourth panel of Table 7).

The Case of No Annuity Markets

Our base-case analysis assumes that individuals can convert future income flows into current consumption at actuarially fair rates of discount -- that is, the pre-tax rate of interest plus the probability of death conditional on age. This is equivalent to assuming the existence of explicit or implicit actuarially fair annuity insurance. To investigate the

robustness of the results to this assumption, we now consider the opposite assumption -- that no annuity insurance is available at the margin. The appropriate rate for discounting future flows under this assumption is simply the pre-tax rate of interest.

Table 14 shows average resources for 10-year age groups in the four periods under the assumption of no annuity markets. Compared to the base case of Tables 3 and 4, total resources are higher under the no annuity markets case as expected because of the lower rate of discounting. Also, because of the greater annuitization of resources of older cohorts in the late 1980s compared to the early 1960s, the difference in resources under the two cases is greater for older cohorts in the late 1980s compared to the early 1960s.

Table 15 indicates that the no-annuity-insurance assumption does affect the magnitude, but not the sign, of the saving factors considered in Table 7.[16] Applying the 1960s' propensities to consume to the cohort-specific resource levels of the late 1980s increases the saving rate from 3.38 percent to 5.23 percent rather than to 4.85 percent under the base case (the second panel in Table 7). Substituting the 1960-61 age-resource distribution and the 1960-61 resources-to-income ratio in place of the 1987-90 values respectively also leads to an increase in national saving: In the case of the age-resource distribution, the saving rate increases from 3.38 percent to 6.23 percent instead of to 4.97 percent under the base case. Finally, using the 1960-61 R/Y ratio increases in the saving rate from 3.38 percent to 4.60 percent instead of to 5.90 percent under the base case. Substituting the 1960-61 population shares in place of the 1987-90 shares results in the same saving rate -- 2.44 percent -- as in the base case. The reason, as mentioned earlier, is that the rate of discount does not affect the calculated impact on national saving of

changes in the age composition of the population.[17]

Alternative Assumptions Concerning Future Growth in Medicare and Medicaid

The future course of fiscal policy is uncertain. However, we can consider the implications of alternative future policies by incorporating federal revenue and outlay projections that differ from the baseline. One alternative is the federal budget resolution passed by Congress in December of 1995 to balance the federal budget by the year 2002. This agreement proposes cuts in the future growth of Medicare and Medicaid and reduces projected government purchases. It also includes tax reductions mainly in the form of additional deductions against taxable income. As Table 16 shows, projecting future transfer payments based on the Republican budget does not materially alter the level or distribution of cohort resources.

Table 17 shows that the results of counterfactual exercises are quite similar to those in Table 7. The second panel of Table 17 shows that the saving rate would now be 5.52 percent if the 1987-90 consumption propensities are replaced by those of 1960-61. This is a bigger effect than in the base case results. The reason is that lower-than-baseline spending on Medicare and Medicaid under the balanced budget scenario reduces the resources of the 1987-90 middle-aged and elderly and raises their consumption propensities. Also, post 1990 reductions in federal health outlays relative to those in the base case have a relatively smaller affect on the resources of most 1960-61 middle-aged and elderly generations. Consequently, the increases in these age group's consumption

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16 All the results of table 15 use the base case value of r=6 percent.

17 In (2), $\alpha_{it}r_{it}$ is simply c_{it}, which is independent of the definition of resources.

propensities associated with this alternative fiscal policy scenario are larger for the late 1980s than they are for the early 1960s. This, in turn, means a l rger saving impact of substituting consumption propensities from the early 1960s for those of the late 1980s.

Replacing the 1987-90 age-resource distribution with that of 1960-61 results in a saving rate of 4.98 percent -- very close to the base-case rate of 4.97 percent. Applying the 1960-61 R/Y ratio results in a saving rate of 5.25 percent. This increase is less than that in the base case because the aggregate generational account component of the R/Y ratio falls, over the period, from 3.59 to only 3.02 in this case instead of from 3.56 to 2.88 as in the base case.

Does Error in Measuring Resources Bias the Decomposition?

Given income uncertainty, our preferred resource measure is expected, rather than actual realized, resources. But, as indicated above, our measure of a cohort's resources is not exactly actual realized resources. It is based partly on the cohort's actual realized future income streams and partly on projections of its income streams from the mid-1990s onward. Assuming our method of projecting cohorts' future incomes properly captures cohorts' own formation of expectations about future incomes, we'd expect the error we make in trying to measure expected resources to be smaller in the later periods compared with the earlier periods. Since the measurement error we introduce in using actual incomes is an expectation error, it has mean zero. It's presence will, then, impart an upward bias in our measurement of average propensities to consume because of Jensen's inequality and the fact that this error shows up in the denominator of the APC formula. Since, as just argued, this bias is likely to be greater in the earlier period than

the later period, our analysis is, more likely than not, understating the relative importance of rising APCs over time in reducing U.S. saving.

What If Expectations are Myopic?

Our measure of a cohort's resources in a given period, say 1972-73, assumes that the cohorts' members, on average, accurately foresaw the non asset income they would receive and the net taxes they would pay through 1993. In addition, our resource measure assumes that cohort members' expectations of post-1993 non asset income and net taxes correspond, on average, to the values that we project. These expectation assumptions may, of course, be invalid.

An alternative is to assume some form of myopic expectations concerning future non asset income and net taxes. Our approach assumes that cohorts expect, on average, to receive the same non asset income and pay the same net taxes at future ages as cohorts of the same sex currently experience at those ages except for an adjustment for growth; that is, we assume that cohorts expect the current cross-section age-non asset income and age-net tax profiles to shift proportionally through time due to economic growth, but not to twist.

The rate of economic growth projected for each period is assumed to equal the average growth rate of output per hour that prevailed in the 10 years prior to the period. The growth rates used for the four periods are 2.8 percent for 1960-61, 2.7 percent for 1972-73, 1.09 percent for 1984-86 and 1.03 percent for 1987-90. Table 18 shows total resources for different age groups under myopic expectations. For all except the youngest generations, total resources are somewhat lower under myopic expectations

compared to those under the base case.[18]

When resources are computed under the assumption of myopic expectations, Table 19 shows that the conclusions drawn from counterfactual saving-rate experiments under base case assumptions are sustained when changing the age-resource distribution and the resources to output ratio. Substituting the 1960-61 age-resource distribution in place of the 1987-90 distribution produces, under myopic expectations, a saving rate of 5.05 percent compared to 4.97 percent in the base case. Using the 1960-61 R/Y ratio instead of that of 1987-90 produces a saving rate of 6.77 percent--which, is even higher than the 5.90 percent under the similar base case experiment. The same experiment with consumption propensities produces a saving rate of 3.44 percent under myopic expectations -- only slightly larger than the actual saving rate of 3.38 percent.

Bequests and Intervivos Transfers

Our life-cycle framework ignores inherited resources and resources received through intervivos gifts. If we had data on cohort's expected future receipt of inheritances and gifts, we would include their present expected value in our resource measure. This would lower cohort's measured propensities to consume, particularly for young and middle-aged cohorts whose parents and grandparents are still alive, but raise the

[18] Both male and female working generations' levels of human wealth are higher for the 1960-61 period under myopic expectations compared to the base case. This results from the high growth rate used to compute 1960-61 human wealth under myopic expectations relative to the actual growth of labor income that occurred in subsequent years. The actual growth of pension income in later years, however, was more rapid than that used to form pension wealth under myopic expectations. In addition, all cohorts' generational accounts are much higher in 1960-61 under myopic expectations primarily because the creation and growth of the Medicare and Medicaid programs is excluded in forming myopic generational accounts for that period. For the 1960-61 period, the lower cohort pension wealth and higher generational accounts more than offset the higher cohort human wealth for all except the youngest generations. Cohort pension and human wealth are not much different under myopic expectations compared to the base case for 1987-90. Detailed data on resource components under myopic expectations are available from the authors upon request.

aggregate resource-to-income ratio. If, as we suspect, bequests and intervivos transfers have been declining over time in the U.S. relative to the size of the economy, our failure to include the present expected value of future inheritances and gifts in measured resources means that the propensities to consume in the earlier periods are biased upwards by more in the earlier periods than they are in later periods. This means that we may be overstating somewhat the degree to which the consumption propensities of the young and middle aged have declined and that we may be somewhat understating the degree to which the consumption propensities of older Americans have increased. It also means that we may be somewhat understating the degree to which the age-resource profile has titled toward the elderly. Finally, it means that we may be somewhat overstating the degree to which the resource-to-output ratio has risen.

Accounting for Uncertainty

An obvious critique of our analysis is that it ignores the fact that consumption decisions are made under uncertainty. As Deaton(1992) and Carrol(1992) remind us, propensities to consume out of certain resources will, in general, exceed those out of uncertain resources. We say, in general, because there are utility functions, specifically quadratic and constant absolute risk aversion functions, for which current consumption is a linear function of the present expected value of future resources.

But even if utility is of a different form, say isoelastic, one can still define the propensity to consume out of total expected resources. The difference is that this propensity to consume will depend on the degree of uncertainty facing consumers. The changes in propensities to consume out of expected resources that we've reported may, it

follows, reflect changes in the degree of resource uncertainty. This, indeed, is the point we argued in Section VII in relating the rise in the propensity of the elderly to consume to the increase in annuitization of their resources.

In addition to thinking somewhat differently about changes over time in measured consumption propensities, uncertainty in the context of, say, isoelastic preferences, requires one to think somewhat differently about the counterfactual experiments we've conducted. In addition to all the other things these experiments implicitly hold constant, they should also be understood to hold constant the degree of resource uncertainty.

Can considerations of uncertainty alter our conclusion that the government's intergenerational redistribution is the major cause of the postwar decline in U.S. saving? We think not. Although this redistribution has undoubtedly altered the nature and degree of resource uncertainty, government policy has certainly produced a major systematic change in the distribution of expected resources among current and future generations. This intergenerational redistribution of resources would, we believe, produce a predicted decline in national saving in any life-cycle model, with or without, uncertainty. Indeed, since the social insurance policies that have effected this intergenerational redistribution are likely, on balance, to have raised, rather than lowered, consumption propensities, the impact of these policies on U.S. saving is probably being understated by our findings that focus on changes over time in the age-resource distribution and the resource-to-income ratio.

Do Future Resources Affect Consumption?

A final concern is whether our cohorts are consuming in accordance with the life cycle model. There is, of course, a voluminous literature testing the life cycle model, most of which seems to us highly supportive of the life cycle model. But can our data also be used to test the life cycle model? Our answer, as we'll explain, appears to be no.

The tests that immediately come to mind involve regressing cohort consumption against variables capturing the level, composition, and timing of cohort resources. The life cycle model under certainty predicts that the level, but neither the composition nor the timing, of resources matters to current consumption. This point can be seen in the following linear model of cohort consumption:

(10) $c_{it} = h(i) + g(i)r_{it}$,

where h(i) and g(i) are functions of age, and g(i) represent the marginal propensity to consume out of resources. This model is appropriate if a) there is no uncertainty, b) preferences are identical across cohort members, and c) preferences are either homothetic or quadratic, or exhibit constant absolute risk aversion (cara).[19] In this case, since consumption depends on resources only through r_{it}, regressing consumption on a polynomial in age plus resource components (human wealth, net wealth, pension wealth, and the generational account) interacted with a polynomial in age will yield the same propensity to consume out of each resource component. Furthermore, if one decomposes those resource components that involve present values into a current flow and the present value of future flows, the propensities to consume out of the current flows and the present value of future flows will be identical. For example, if human wealth is divided into current labor earnings and the present value of future labor earnings, the propensity to

consume out of current labor earnings will equal the propensity to consume out of the present value of future labor earnings.

Although testing the equality of marginal propensities to consume out of resource components seems simple enough, a practical difficulty in a cohort data set is that the separate resource components are, themselves, nonlinear functions of age and other data making them highly co-linear. Take, for example, current labor earnings. This variable is large and positive at young and middle ages and essentially zero at older ages, so it has a definite pattern with age. Furthermore, if the cross-section age-earnings profile is fairly smooth between, say, ages 18 and 65, the current earnings for all cohorts under age 65 at a point in time will be proportion to a polynomial in age. As a second example, consider the present value of future social security benefits (excluding current benefits). This variable also has a definite age pattern; it's small for young cohorts who are years away from collecting benefits, large for middle age cohorts approaching retirement, and small for old cohorts approaching their maximum lifespan. Although variables such as current earnings and the present value of future social security benefits exhibit variation over time, our data set contains only four time periods.

Once one drops the assumption of certainty, the difficulty in using our data to test the life cycle model is compounded. First, if preferences are neither quadratic nor cara, the propensity to consume out of resources will depend not only on age, but also on the composition of resources as between those that are safe, like current net worth, and those

[19] The function h(i) equals zero if preferences are homothetic.

that are risky, like future labor earnings.[20] Since we don't know the form of this dependence, we have no way to control for it in testing for equality of marginal propensities to consume.

A possible saving grace here is for preferences to be quadratic or cara. In this case, consumption is linear in the expected value of resources, so that the propensity to consume depends only on age. That's the good news. The bad news is that the present value of our future resource-flow variables incorporates the actual realized values of these flows rather than their expected values. Consequently, our present value realized resource components will differ from their expected value counterparts by component-specific expectation errors. Hence, our use of realized rather than expected resources in a consumption regression introduces classical errors in variables. Furthermore, the errors in variables problem will contaminate not only the coefficients on the present values of future resource flows, but also the coefficients on current flows. Indeed, one can show that the coefficients on current flows will be biased upwards. Thus, coefficients on current flows may end up much larger than those on the present values of future flows not because cohorts ignore the future or fail to intertemporally optimize, but simply because current flows are, in part, proxying for expected future flows.

Of course, one can, in principal, instrument those variables measured with error to avoid these biases. Lagged income variables, such as a cohort's lagged labor earnings, represent natural instruments since they are presumably correlated with individuals' expected future incomes, but are uncorrelated with their expectation errors. The problem

[20] More precisely, the propensity to consume will depend on the amount of safe resources and the distributions of risky resources.

here, however, is that the orthogonality of lagged incomes and expectations errors is a time-series property, and we have only four time-series observations.

Notwithstanding this litany of admonitions, we present in Table 20 marginal propensities to consume (mpcs) at ages 20, 40, 60, and 80 predicted by four OLS regressions estimated for males and females separately. Each regression includes an intercept, age, age squared, and a third order polynomial in age interacted with each of the resource variables for which mpcs are listed in the table.

The first regression considers only total resources; as indicated, marginal consumption propensities are flat at around 6 percent for males and females through age 60 and rise to 10 percent for males and 8 percent for females at age 80. The second regression breaks total resources into networth, human wealth, pension wealth, and generational account components. Although an F test strongly rejects equality of mpcs out of these resource components, certain results, such as the generally negative predicted marginal propensities to consume out of generational accounts, provide support for the life cycle model.

This support evaporates when we, in regressions 3 and 4, further disaggregate the four main resource components as well as the components of the generational account into current flows and the present value of future flows. As these results indicate, both the signs and magnitudes of calculated mpcs are highly sensitive to the precise constellation of variables included in the regressions. This basic finding also pertains to mpc regressions using data constructed assuming 3 and 9 percent discount rates, data constructed using simple, rather than actuarial, discounting, and data constructed under the assumption of myopic expectations. Finally, the findings pertain to instrumented mpc

regressions in which we use, as instruments, age and age squared interacted with six lagged values each of per capita labor earnings, pension benefits, social security benefits, and other per capita taxes and transfers.[21]

What should one make of these results? Our conclusion is that our data, for the above-stated reasons, are not up to the task of testing the life cycle model. This does not, however, invalidate their use for the main purpose to which we've put them in this study, namely decomposing changes over time in U.S. saving.

IX. Implications of the Projected Demographic Change for Future Rates of U.S. Saving

Before concluding we turn to one final issue: the prognosis for U.S. saving resulting from projected demographic change. Table 21 addresses this question. It shows that, all else equal, projected changes in the population structure will produce a further decline in the U.S. saving rate. The projected rate for 2000 is only 1.7 percent. Over the period 2000-2020, the saving rate will oscillate around this value. But after 2020, when the baby boom generation is fully retired, the saving rate is predicted to decline to 1.2 percent.

X. Conclusion

This paper traces the dramatic postwar decline in U.S. saving to two factors: government redistribution from current young and future generations to current older

[21] Unfortunately, we don't have lagged values of resource flows on a generation-specific basis for years prior to 1960 that we could use as instruments.

ones and a sharp increase in the propensity of older Americans to consume out of their remaining lifetime resources. Absent these factors, the current U.S. rate of national saving would be roughly 3 times larger. The increase in the resources of the elderly relative to those of younger generations as well as the increase in their propensity to consume out of their resources has produced a remarkable increase in their relative consumption. Today's 70-year-olds are consuming, on average, roughly one-fifth more than 30-year-olds. Were this the early 1960s, they'd be consuming only about two-thirds as much. The increase in the relative consumption of the elderly remains dramatic even if one considers only nonmedical consumption.

The fact that propensities to consume are not systematically larger, and, indeed, are smaller for most young and middle aged cohorts in the late 1980s than in the early 1960s indicates that "spendthrift" young and middle-aged Americans are not to blame for the decline in U.S. saving. This is not to say that young and middle-aged Americans are saving enough. Given the severe imbalance in long-run U.S. fiscal policy, young and middle-aged Americans need to save significant sums simply to safeguard themselves against future tax increases or reductions in transfer payments.[22]

Since there is every reason to believe that U.S. intergenerational redistribution will continue apace, at least through the turn of this century, there is every reason to believe that U.S. saving rates will remain extremely low, if not decline even further. Anemic rates of U.S. saving will spell anemic rates of U.S. domestic investment, labor productivity growth, and real wage growth. This, unfortunately, is the legacy of the

22 See, for example, Auerbach and Kotlikoff (1994) and Bernheim (1993).

uncontrolled intergenerational redistribution from young savers to old spenders that has been fueling ever higher rates of U.S. consumption.

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Table 1: Saving and Spending Rates (percent)

Period	Net National Saving Rate (Y-C-G)/Y	Government Spending Rate G/Y	Household Consumption Rate C/Y	Household Saving Rate (Y-G-C)/(Y-G)
1950-59	9.1	21.0	69.9	11.5
1960-69	9.1	22.1	68.8	11.7
1970-79	8.5	21.4	70.1	10.8
1980-89	4.7	21.3	74.0	5.9
1990-94	2.7	20.7	76.6	3.4

Source: Authors' calculations from National Income and Product Accounts Data.

Table 2: The Growth of Household and Medical Consumption (percent)

Period	Rate of Household Consumption C/Y	Rate of Medical Consumption M/Y
1950-59	69.9	3.9
1960-69	68.8	5.2
1970-79	70.1	7.3
1980-89	74.0	10.1
1990-93	76.6	12.8

Source: Authors' calculations from National Income and Product Accounts Data

Table 3: Consumption, Total Resources and Resource Components -- Males

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
CONSUMPTION									
1960-61	12.0	15.2	15.6	14.0	11.5	9.4	8.8	13.5	9.9
1972-73	14.8	19.7	20.3	18.8	16.9	14.9	14.0	17.6	15.3
1984-86	15.3	20.6	23.6	22.2	21.7	20.0	21.5	20.0	20.9
1987-90	16.6	21.4	25.4	23.7	23.9	23.4	23.1	21.6	23.7
% Increase									
87-90/60-61	37.7	41.4	62.7	69.6	108.2	148.3	163.8	60.2	138.8
TOTAL RESOURCES									
1960-61	269.6	273.4	259.9	224.1	178.6	142.0	103.4	239.6	146.8
1972-73	316.4	338.9	335.2	307.9	255.8	201.1	130.0	304.8	205.3
1984-86	349.5	379.2	394.9	379.3	339.9	259.7	141.3	356.4	265.6
1987-90	364.5	393.6	410.0	399.3	362.3	281.3	154.6	373.6	286.0
% Increase									
87-90/60-61	35.2	44.0	57.8	78.2	102.8	98.1	49.5	55.9	94.8
HUMAN WEALTH									
1960-61	358.7	315.7	238.5	140.5	48.7	11.3	4.5	224.8	17.5
1972-73	425.6	395.4	292.9	168.9	53.5	10.2	3.8	275.9	16.8
1984-86	479.2	454.0	354.0	189.7	57.5	11.5	3.8	326.5	18.2
1987-90	499.7	471.8	369.9	200.0	59.8	12.9	4.1	339.8	19.8
% Increase									
87-90/60-61	39.3	49.4	55.1	42.4	22.8	14.8	-7.3	51.1	12.6
NON-HUMAN WEALTH									
1960-61	11.8	44.1	81.1	111.3	125.4	118.2	91.8	70.8	118.0
1972-73	13.1	48.9	99.7	141.1	159.7	142.2	88.7	83.4	140.8
1984-86	14.5	50.5	109.1	163.6	185.1	157.0	73.6	87.8	154.5
1987-90	15.5	52.9	113.3	170.8	193.6	164.0	77.0	92.6	161.3
% Increase									
87-90/60-61	31.2	20.2	39.7	53.5	54.4	38.8	-16.1	30.8	36.7
PENSION WEALTH									
1960-61	15.8	20.5	21.7	17.6	14.0	9.5	4.8	17.6	10.3
1972-73	18.2	26.4	36.9	39.5	29.3	18.6	12.1	27.9	20.5
1984-86	19.3	29.0	44.5	62.1	60.1	35.2	18.6	36.9	40.0
1987-90	20.0	29.6	45.3	65.3	65.4	41.0	21.6	39.1	45.4
% Increase									
87-90/60-61	26.8	44.4	108.9	270.5	367.0	331.4	352.5	122.1	339.7
GENERATIONAL ACCOUNT									
1960-61	116.7	106.9	81.4	45.3	9.5	-3.0	-2.3	73.6	-0.9
1972-73	140.5	131.8	94.3	41.6	-13.3	-30.1	-25.3	82.4	-27.2
1984-86	163.4	154.2	112.6	36.1	-37.2	-55.9	-45.3	94.8	-52.8
1987-90	170.6	160.7	118.5	36.8	-43.5	-63.3	-51.8	97.8	-59.6

Source: Authors' calculations.

Table 4: Consumption, Total Resources and Resource Components -- Females

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
CONSUMPTION									
1960-61	12.7	15.4	14.9	12.9	11.0	9.7	8.7	13.2	9.8
1972-73	15.5	20.6	19.7	17.6	16.2	14.6	13.7	17.4	14.8
1984-86	16.0	21.7	22.3	20.3	20.2	19.5	19.6	19.7	19.8
1987-90	17.2	22.6	24.2	22.3	22.2	22.2	21.8	21.5	22.2
% Increase									
87-90/60-61	35.7	46.8	62.5	72.8	101.8	129.7	149.6	62.6	126.8
TOTAL RESOURCES									
1960-61	247.7	255.1	255.4	222.3	166.4	119.3	92.4	223.1	127.0
1972-73	296.3	319.0	323.2	297.3	246.2	181.8	106.3	282.8	183.7
1984-86	346.1	380.7	378.1	357.8	325.4	234.0	105.2	337.8	229.7
1987-90	365.8	399.6	397.5	378.3	346.7	253.2	116.8	357.3	247.3
% Increase									
87-90/60-61	47.7	56.6	55.7	70.2	108.3	112.3	26.4	60.2	94.8
HUMAN WEALTH									
1960-61	328.1	280.0	204.3	109.9	32.1	5.5	1.2	188.1	9.7
1972-73	394.8	346.9	245.6	130.5	33.7	4.8	1.4	225.2	8.4
1984-86	451.1	418.2	303.5	143.1	37.2	6.1	1.7	272.4	9.5
1987-90	472.2	438.1	322.9	154.1	38.4	6.9	2.1	285.7	10.4
% Increase									
87-90/60-61	43.9	56.5	58.1	40.2	19.7	26.0	79.6	51.9	7.7
NON-HUMAN WEALTH									
1960-61	7.1	42.6	91.1	117.1	112.8	99.1	87.7	71.6	101.0
1972-73	12.3	54.7	105.6	138.9	144.4	114.7	65.7	83.9	114.0
1984-86	19.7	65.6	109.1	151.2	167.8	121.7	29.6	88.2	115.3
1987-90	21.4	68.7	113.6	157.9	175.5	126.8	31.0	93.0	119.8
% Increase									
87-90/60-61	202.3	61.4	24.7	34.8	55.5	28.0	-64.7	29.9	18.6
PENSION WEALTH									
1960-61	16.9	22.0	21.8	19.0	14.5	7.3	2.9	18.0	8.6
1972-73	19.1	28.6	38.8	38.1	28.3	16.3	7.5	27.9	17.6
1984-86	20.7	31.2	47.0	61.4	52.4	28.5	16.0	36.7	31.1
1987-90	21.4	31.9	47.9	64.3	57.3	32.2	17.9	38.7	35.0
% Increase									
87-90/60-61	26.4	45.0	119.9	238.9	296.4	341.5	526.8	115.7	305.7
GENERATIONAL ACCOUNT									
1960-61	104.4	89.4	61.8	23.7	-7.1	-7.4	-0.7	54.5	-7.7
1972-73	129.9	111.3	66.8	10.1	-39.8	-46.0	-31.6	54.2	-43.6
1984-86	145.4	134.2	81.5	-2.1	-68.1	-77.6	-57.9	59.5	-73.8
1987-90	149.1	139.1	86.9	-2.0	-75.5	-87.2	-65.9	60.1	-82.2

Source: Authors' calculations

Table 5: Consumption of the Elderly Relative to the Young

Comparison	1960-61	1972-73	1984-86	1987-90
Total Consumption				
Age 60/Age 20	1.17	1.37	1.58	1.59
Age 70/Age 20	0.97	1.21	1.56	1.64
Age 80/Age 20	0.89	1.16	1.61	1.60
Age 60/Age 30	0.86	0.93	1.09	1.15
Age 70/Age 30	0.71	0.82	1.07	1.18
Age 80/Age 30	0.65	0.79	1.11	1.16
Age 60/Age 40	0.77	0.83	0.87	0.91
Age 70/Age 40	0.64	0.73	0.86	0.94
Age 80/Age 40	0.58	0.70	0.89	0.92
Nonmedical Consumption				
Age 60/Age 20	1.11	1.28	1.43	1.42
Age 70/Age 20	0.86	1.04	1.22	1.28
Age 80/Age 20	0.75	0.91	1.16	1.11
Age 60/Age 30	0.81	0.86	0.97	1.02
Age 70/Age 30	0.63	0.70	0.83	0.91
Age 80/Age 30	0.55	0.61	0.78	0.80
Age 60/Age 40	0.73	0.78	0.77	0.80
Age 70/Age 40	0.57	0.63	0.66	0.72
Age 80/Age 40	0.49	0.55	0.62	0.63

Source: Authors' calculations.

Table 6: Resources of the Elderly Relative to the Young (r=6.0%)

Comparison	1960-61	1972-73	1984-86	1987-90
Age 60/Age 20	0.79	0.97	1.10	1.13
Age 70/Age 20	0.58	0.78	0.92	0.95
Age 80/Age 20	0.43	0.49	0.48	0.50
Age 60/Age 30	0.74	0.85	0.95	0.97
Age 70/Age 30	0.55	0.67	0.79	0.81
Age 80/Age 30	0.40	0.42	0.41	0.43
Age 60/Age 40	0.73	0.82	0.90	0.93
Age 70/Age 40	0.54	0.66	0.74	0.78
Age 80/Age 40	0.40	0.41	0.39	0.41

Source: Authors' calculations.

Table 7: The Impact of Changing Alternative Factors on the Net National Saving Rate

age-resource distribution (r_i/r) in period

Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	6.21	5.54	5.53
1972-73	11.10	9.87	9.42	9.37
1984-86	5.87	4.72	4.51	4.38
1987-90	4.97	3.74	3.51	3.38

consumption propensities (α_i) in period

Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	5.01	8.45	6.85
1972-73	12.49	9.87	12.86	11.22
1984-86	4.04	0.98	4.51	2.80
1987-90	4.85	1.73	5.06	3.38

population age-distribution (P_i/P) in period

Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	9.60	9.01	8.57
1972-73	7.97	9.87	9.23	8.69
1984-86	2.93	4.89	4.51	3.85
1987-90	2.44	4.24	4.01	3.38

resources to output ratio (R/Y) in period

Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	11.84	4.33	5.42
1972-73	5.75	9.87	2.11	3.24
1984-86	8.03	12.01	4.51	5.60
1987-90	5.90	10.01	2.26	3.38

government spending rate (G/Y) in period

Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	8.16	8.03	8.27
1972-73	9.57	9.87	9.74	9.98
1984-86	4.33	4.64	4.51	4.75
1987-90	2.96	3.27	3.14	3.38

Note:

R/Y^*	12.53	11.82	13.15	12.96
HW/Y	11.45	10.38	11.59	11.31
NHW/Y	3.69	3.20	3.21	3.18
PW/Y	0.95	1.10	1.37	1.36
GA/Y	3.56	2.86	3.02	2.88
G/Y	21.59	21.28	21.41	21.17

* $R/Y = [HW + NHW + PW - GA]/Y$, where Y is net national product, R is total resources, HW is human wealth, NHW is nonhuman wealth, PW is pension wealth, and GA is generational account. G denotes government purchases of goods and services.

Source: Authors' calculations.

Table 8: The Impact of Changing Propensities to Consume of Young and Old Cohorts on the Net National Saving Rate*

	consumption propensities in period			
Period	1960-61	1972-73	1984-86	1987-90
Old Cohorts				
1960-61	7.85	7.30	6.61	6.28
1972-73	10.52	9.87	9.06	8.70
1984-86	6.22	5.45	4.51	4.03
1987-90	5.74	4.91	3.88	3.38
Young Cohorts				
1960-61	7.85	5.57	9.69	8.42
1972-73	11.84	9.87	13.67	12.40
1984-86	2.33	0.03	4.51	3.28
1987-90	2.50	0.21	4.57	3.38

* "Old" cohorts are defined as those aged 65 or older and "young" cohorts as those younger than age 65.
Source: Authors' calculations.

Table 9: The Components of Bequeathable Resources -- Male Cohorts

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
TOTAL RESOURCES									
1960-61	269.6	273.4	259.9	224.1	178.6	142.0	103.4	239.6	146.8
1972-73	316.4	338.9	335.2	307.9	255.8	201.1	130.0	304.8	205.3
1984-86	349.5	379.2	394.9	379.3	339.9	259.7	141.3	356.4	265.6
1987-90	364.5	393.6	410.0	399.3	362.3	281.3	154.6	373.6	286.0
% Increase									
87-90/60-61	35.2	44.0	57.8	78.2	102.8	98.1	49.5	55.9	94.8
NON-HUMAN WEALTH									
1960-61	11.8	44.1	81.1	111.3	125.4	118.2	91.8	70.8	118.0
1972-73	13.1	48.9	99.7	141.1	159.7	142.2	88.7	83.4	140.8
1984-86	14.5	50.5	109.1	163.6	185.1	157.0	73.6	87.8	154.5
1987-90	15.5	52.9	113.3	170.8	193.6	164.0	77.0	92.6	161.3
% Increase									
87-90/60-61	31.2	20.2	39.7	53.5	54.4	38.8	-16.1	30.8	36.7
TERM VALUE OF LIFE INSURANCE									
1960-61	18.0	26.4	24.9	18.6	10.7	4.6	1.6	19.4	5.8
1972-73	21.9	39.7	39.0	28.6	15.4	5.7	1.9	27.3	7.5
1984-86	21.3	46.7	48.1	33.9	16.8	5.1	1.6	31.2	7.3
1987-90	25.4	54.3	56.1	39.6	19.4	5.9	1.9	37.2	8.5
% Increase									
87-90/60-61	41.4	105.7	124.7	113.1	81.7	29.0	16.4	91.3	45.8
BEQUEATHABLE WEALTH (Non-Human Wealth plus Term Value of Life Insurance)									
1960-61	29.8	70.5	106.1	129.8	136.1	122.8	93.5	90.2	123.8
1972-73	35.0	88.6	138.8	169.7	175.1	147.8	90.6	110.7	148.3
1984-86	35.8	97.2	157.1	197.5	201.9	162.1	75.2	119.0	161.9
1987-90	40.9	107.3	169.4	210.4	213.0	169.9	78.9	129.8	169.8
% Increase									
87-90/60-61	37.4	52.2	59.7	62.1	56.5	38.4	-15.5	43.9	37.1
ANNUITIZED WEALTH (Total Wealth minus Bequeathable Wealth)									
1960-61	239.8	203.0	153.8	94.2	42.5	19.2	9.9	149.4	23.0
1972-73	281.5	250.3	196.5	138.2	80.7	53.2	39.3	194.1	57.0
1984-86	313.7	282.0	237.7	181.8	138.0	97.6	66.1	237.4	103.7
1987-90	323.6	286.4	240.6	188.9	149.3	111.4	75.7	243.9	116.2
% Increase									
87-90/60-61	35.0	41.1	56.4	100.4	251.0	479.9	660.7	63.2	406.1

Source: Authors' calculations

Table 10: The Components of Bequeathable Resources -- Female Cohorts

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
TOTAL RESOURCES									
1960-61	247.7	255.1	255.4	222.3	166.4	119.3	92.4	223.1	127.0
1972-73	296.3	319.0	323.2	297.3	246.2	181.8	106.3	282.8	183.7
1984-86	346.1	380.7	378.1	357.8	325.4	234.0	105.2	337.8	229.7
1987-90	365.8	399.6	397.5	378.3	346.7	253.2	116.8	357.3	247.3
% Increase									
87-90/60-61	47.7	56.6	55.7	70.2	108.3	112.3	26.4	60.2	94.8
NON-HUMAN WEALTH									
1960-61	7.1	42.6	91.1	117.1	112.8	99.1	87.7	71.6	101.0
1972-73	12.3	54.7	105.6	138.9	144.4	114.7	65.7	83.9	114.0
1984-86	19.7	65.6	109.1	151.2	167.8	121.7	29.6	88.2	115.3
1987-90	21.4	68.7	113.6	157.9	175.5	126.8	31.0	93.0	119.8
% Increase									
87-90/60-61	202.3	61.4	24.7	34.8	55.5	28.0	-64.7	29.9	18.6
TERM VALUE OF LIFE INSURANCE									
1960-61	18.9	24.9	21.6	14.8	7.5	2.8	1.3	17.0	3.7
1972-73	22.9	36.7	33.1	22.0	10.0	2.9	1.1	22.9	4.0
1984-86	21.9	42.2	40.1	25.2	10.0	1.8	0.4	25.4	3.0
1987-90	26.1	49.1	46.8	29.5	11.5	2.1	0.4	30.1	3.4
% Increase									
87-90/60-61	38.2	97.4	116.2	99.8	53.0	-25.5	-68.5	77.5	-7.3
BEQUEATHABLE WEALTH (Non-Human Wealth plus Term Value of Life Insurance)									
1960-61	25.9	67.4	112.8	131.9	120.3	101.9	89.1	88.6	104.7
1972-73	35.2	91.5	138.7	160.9	154.4	117.6	66.8	106.8	118.0
1984-86	41.6	107.8	149.2	176.4	177.8	123.5	30.0	113.6	118.3
1987-90	47.4	117.8	160.4	187.4	187.0	128.9	31.4	123.1	123.2
% Increase									
87-90/60-61	82.9	74.7	42.2	42.1	55.4	26.6	-64.8	39.0	17.7
ANNUITIZED WEALTH (Total Wealth minus Bequeathable Wealth)									
1960-61	221.8	187.7	142.6	90.4	46.1	17.4	3.3	134.5	22.3
1972-73	261.1	227.5	184.5	136.4	91.8	64.2	39.5	175.9	65.7
1984-86	304.5	272.9	228.9	181.5	147.6	110.5	75.2	224.2	111.5
1987-90	318.4	281.8	237.1	191.0	159.7	124.3	85.4	234.2	124.2
% Increase									
87-90/60-61	43.6	50.2	66.3	111.2	246.4	613.0	2449.0	74.1	456.9

Source: Authors' calculations.

Table 11: The Components of Bequeathable Resources As Fractions of Total Resources -- Male Cohorts

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
TOTAL RESOURCES									
1960-61	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1972-73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1984-86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1987-90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NON-HUMAN WEALTH									
1960-61	0.04	0.16	0.31	0.50	0.70	0.83	0.89	0.30	0.80
1972-73	0.04	0.14	0.30	0.46	0.62	0.71	0.68	0.27	0.69
1984-86	0.04	0.13	0.28	0.43	0.54	0.60	0.52	0.25	0.58
1987-90	0.04	0.13	0.28	0.43	0.53	0.58	0.50	0.25	0.56
TERM VALUE OF LIFE INSURANCE									
1960-61	0.07	0.10	0.10	0.08	0.06	0.03	0.02	0.08	0.04
1972-73	0.07	0.12	0.12	0.09	0.06	0.03	0.01	0.09	0.04
1984-86	0.06	0.12	0.12	0.09	0.05	0.02	0.01	0.09	0.03
1987-90	0.07	0.14	0.14	0.10	0.05	0.02	0.01	0.10	0.03
BEQUEATHABLE WEALTH (Non-Human Wealth plus Term Value of Life Insurance)									
1960-61	0.11	0.26	0.41	0.58	0.76	0.86	0.90	0.38	0.84
1972-73	0.11	0.26	0.41	0.55	0.68	0.74	0.70	0.36	0.72
1984-86	0.10	0.26	0.40	0.52	0.59	0.62	0.53	0.33	0.61
1987-90	0.11	0.27	0.41	0.53	0.59	0.60	0.51	0.35	0.59
ANNUITIZED WEALTH (Total Wealth minus Bequeathable Wealth)									
1960-61	0.89	0.74	0.59	0.42	0.24	0.14	0.10	0.62	0.16
1972-73	0.89	0.74	0.59	0.45	0.32	0.26	0.30	0.64	0.28
1984-86	0.90	0.74	0.60	0.48	0.41	0.38	0.47	0.67	0.39
1987-90	0.89	0.73	0.59	0.47	0.41	0.40	0.49	0.65	0.41

Source: Authors' calculations.

Table 12: The Components of Bequeathable Resources As a Fraction of Total Resources -- Female Cohorts

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
TOTAL RESOURCES									
1960-61	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1972-73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1984-86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1987-90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NON-HUMAN WEALTH									
1960-61	0.03	0.17	0.36	0.53	0.68	0.83	0.95	0.32	0.80
1972-73	0.04	0.17	0.33	0.47	0.59	0.63	0.62	0.30	0.62
1984-86	0.06	0.17	0.29	0.42	0.52	0.52	0.28	0.26	0.50
1987-90	0.06	0.17	0.29	0.42	0.51	0.50	0.27	0.26	0.48
TERM VALUE OF LIFE INSURANCE									
1960-61	0.08	0.10	0.08	0.07	0.05	0.02	0.01	0.08	0.03
1972-73	0.08	0.12	0.10	0.07	0.04	0.02	0.01	0.08	0.02
1984-86	0.06	0.11	0.11	0.07	0.03	0.01	0.00	0.08	0.01
1987-90	0.07	0.12	0.12	0.08	0.03	0.01	0.00	0.08	0.01
BEQUEATHABLE WEALTH (Non-Human Wealth plus Term Value of Life Insurance)									
1960-61	0.10	0.26	0.44	0.59	0.72	0.85	0.96	0.40	0.82
1972-73	0.12	0.29	0.43	0.54	0.63	0.65	0.63	0.38	0.64
1984-86	0.12	0.28	0.39	0.49	0.55	0.53	0.29	0.34	0.51
1987-90	0.13	0.29	0.40	0.50	0.54	0.51	0.27	0.34	0.50
ANNUITIZED WEALTH (Total Wealth minus Bequeathable Wealth)									
1960-61	0.90	0.74	0.56	0.41	0.28	0.15	0.04	0.60	0.18
1972-73	0.88	0.71	0.57	0.46	0.37	0.35	0.37	0.62	0.36
1984-86	0.88	0.72	0.61	0.51	0.45	0.47	0.71	0.66	0.49
1987-90	0.87	0.71	0.60	0.50	0.46	0.49	0.73	0.66	0.50

Source: Authors' calculations.

Table 13: Changes in the Net National Saving Rate

Allocating Income To Nominal Recipients

Impact of Changing Age-Resource Distributions (r_i/r)

	age-resource distribution in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	6.19	5.52	5.55
1972-73	11.16	9.87	9.39	9.36
1984-86	6.00	4.75	4.51	4.40
1987-90	5.07	3.75	3.49	3.38

Impact of Changing Consumption Propensities (α_i)

	propensities to consume in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	4.88	8.39	6.78
1972-73	12.59	9.87	12.94	11.32
1984-86	4.10	0.92	4.51	2.81
1987-90	4.93	1.68	5.05	3.38

Impact of Changing Resources to Output Ratio (R/Y)

	R/Y in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	11.98	4.46	5.51
1972-73	5.59	9.87	2.07	3.16
1984-86	7.91	12.05	4.51	5.57
1987-90	5.81	10.08	2.29	3.38
NOTE:				
R/Y^*	12.68	11.94	13.29	13.10
HW/Y	11.56	10.45	11.66	11.39
NHW/Y	3.69	3.20	3.21	3.18
PW/Y	0.96	1.11	1.37	1.36
GA/Y	3.53	2.82	2.95	2.82

* See footnotes to table 7 for definitions.

Source: Authors' calculations.

Table 14: Total Resources: Case of No Annuity Markets

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
Males									
1960-61	290.6	314.0	317.6	291.4	245.0	199.8	143.0	288.0	205.2
1972-73	336.7	379.3	400.6	395.5	355.3	294.7	205.2	363.0	298.5
1984-86	365.0	422.0	461.6	476.3	464.0	393.4	254.5	419.4	394.8
1987-90	378.4	435.6	478.4	496.9	490.5	423.0	279.5	438.2	422.6
% Increase									
87-90/60-61	30.2	38.7	50.6	70.5	100.2	111.7	95.4	52.1	105.9
Females									
1960-61	256.7	278.7	289.8	264.9	212.2	159.1	117.1	253.1	166.6
1972-73	304.4	342.3	362.7	351.7	312.8	249.8	162.9	320.6	249.6
1984-86	348.3	405.1	419.3	419.0	407.7	328.9	190.6	379.9	320.2
1987-90	364.9	422.0	440.1	439.8	431.6	353.2	211.0	400.2	343.1
% Increase									
87-90/60-61	42.2	51.4	51.9	66.1	103.4	122.0	80.2	58.1	106.0

Source: Authors' calculations.

Table 15: Changes in the Net National Saving Rate

The Case of No Annuity Insurance

Impact of Changing Age-Resource Distributions (r_i/r)

	resource distribution in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	6.41	5.78	5.97
1972-73	11.06	9.87	9.43	9.57
1984-86	6.29	5.01	4.51	4.61
1987-90	5.23	3.86	3.29	3.38

Impact of Changing Consumption Propensities (α_i)

	propensities to consume in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	4.40	7.36	5.30
1972-73	12.88	9.87	12.36	10.29
1984-86	5.07	1.57	4.51	2.33
1987-90	6.23	2.71	5.50	3.38

Impact of Changing Resources to Output Ratio (R/Y)

	R/Y in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	12.19	5.41	6.70
1972-73	5.36	9.87	2.82	4.16
1984-86	6.99	11.39	4.51	5.82
1987-90	4.60	9.16	2.03	3.38
NOTE:				
R/Y^*	14.56	13.66	15.06	14.80
HW/Y	11.91	10.64	11.70	11.38
NHW/Y	3.69	3.20	3.21	3.18
PW/Y	1.45	1.54	1.82	1.78
GA/Y	2.49	1.73	1.67	1.54

Impact of Changing Population Shares (P_i/P)

	population share in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	9.60	9.01	8.57
1972-73	7.97	9.87	9.23	8.69
1984-86	2.93	4.89	4.51	3.85
1987-90	2.44	4.24	4.01	3.38

* See footnotes to table 7 for definitions.

Source: Authors' calculations.

Table 16: Total Resources: Balanced Federal Budget By the Year 2002

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
Males									
1960-61	268.6	272.7	259.6	224.0	178.6	142.0	103.4	239.2	146.8
1972-73	314.9	337.0	333.4	307.1	255.7	201.1	130.0	303.5	205.2
1984-86	347.0	376.2	390.9	374.9	337.2	258.8	141.2	353.5	264.4
1987-90	361.6	390.2	405.6	393.6	357.8	279.3	154.0	369.9	283.5
% Increase									
87-90/60-61	34.6	43.1	56.2	75.7	100.3	96.7	49.0	54.7	93.1
Females									
1960-61	246.6	254.2	254.9	222.2	166.4	119.3	92.4	222.5	127.0
1972-73	294.6	316.8	321.1	296.1	245.9	181.8	106.3	281.3	183.6
1984-86	342.8	377.4	373.9	352.9	322.0	232.6	104.9	334.4	228.2
1987-90	361.8	395.7	392.8	372.2	341.5	250.5	115.9	353.0	244.4
% Increase									
87-90/60-61	46.7	55.7	54.1	67.5	105.1	110.0	25.4	58.6	92.5

Source: Authors' calculations.

Table 17: Changes in the Net National Saving Rate

Balanced Federal Budget By the Year 2002

Impact of Changing Age-Resource Distributions (r_i/r)

	resource distribution in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	6.23	5.59	5.59
1972-73	11.10	9.87	9.45	9.41
1984-86	5.89	4.72	4.51	4.40
1987-90	4.98	3.73	3.50	3.38

Impact of Changing Consumption Propensities (α_i)

	propensities to consume in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	4.82	7.94	6.19
1972-73	12.65	9.87	12.54	10.75
1984-86	4.56	1.33	4.51	2.64
1987-90	5.52	2.24	5.21	3.38

Impact of Changing Resources to Output Ratio (R/Y)

	R/Y in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	12.00	4.85	6.06
1972-73	5.58	9.87	2.46	3.72
1984-86	7.54	11.71	4.51	5.73
1987-90	5.25	9.57	2.12	3.38
NOTE:				
R/Y^*	12.50	11.77	13.03	12.82
HW/Y	11.45	10.38	11.59	11.31
NHW/Y	3.69	3.20	3.21	3.18
PW/Y	0.95	1.10	1.37	1.36
GA/Y	3.59	2.92	3.14	3.02

* See footnotes to Table 7 for definitions.
Source: Authors' calculations.

Table 18: Total Resources Under Myopic Expectations

(Population Weighted Averages in Thousands of 1993 Dollars)

Age Group:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	20-89	65-89
Males									
1960-61	280.1	267.6	245.2	208.5	165.4	135.0	101.1	232.9	138.4
1972-73	398.3	384.0	348.7	301.8	247.1	196.4	125.8	335.1	199.5
1984-86	354.7	375.9	381.6	361.6	324.6	251.9	138.9	350.3	256.4
1987-90	367.7	391.0	397.8	379.7	341.3	268.1	148.6	365.9	271.7
% Increase									
87-90/60-61	31.3	46.1	62.2	82.1	106.4	98.6	46.9	57.1	96.3
Females									
1960-61	250.6	239.2	230.1	194.7	142.5	106.9	89.1	206.6	112.5
1972-73	360.4	352.0	325.6	281.3	227.7	166.6	96.8	297.9	168.7
1984-86	326.0	358.7	354.5	336.7	306.8	224.1	99.6	318.3	218.8
1987-90	353.9	384.1	375.8	354.6	324.9	239.7	109.1	340.3	233.1
% Increase									
87-90/60-61	41.2	60.5	63.3	82.2	128.0	124.3	22.5	64.7	107.2

Source: Authors' calculations.

Table 19: Changes in the Net National Saving Rate -- Myopic Expectations

Impact of Changing Age-Resource Distributions (r_i/r)

	age-resource distribution in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	7.45	4.68	4.75
1972-73	10.01	9.87	7.22	7.25
1984-86	5.89	6.07	4.51	4.48
1987-90	5.05	5.26	3.41	3.38

Impact of Changing Consumption Propensities (α_i)

	propensities to consume in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	13.03	9.44	8.10
1972-73	4.30	9.87	5.78	4.19
1984-86	2.90	8.19	4.51	2.97
1987-90	3.44	8.58	4.89	3.38

Impact of Changing Resources to Income Ratio (R/Y)

	R/Y in period			
Period	1960-61	1972-73	1984-86	1987-90
1960-61	7.85	2.40	3.71	4.54
1972-73	14.81	9.87	11.06	11.81
1984-86	8.62	3.21	4.51	5.33
1987-90	6.77	1.20	2.54	3.38
NOTE:				
R/Y*	11.97	12.89	12.67	12.53
HW/Y	12.27	13.04	11.28	11.24
NHW/Y	3.69	3.20	3.21	3.18
PW/Y	0.55	0.91	1.23	1.29
GA/Y	4.54	4.26	3.05	3.17

* See footnotes to table 7 for definitions.
Source: Authors' calculations.

Table 20: Marginal Propensities to Consume Out of Specified Resource Components at Selected Ages

Eqn	Age	r	nw	hw	pen	ga	chw	cpen	cga	fhw	fpen	fga	css	chlt	cwel	ctax	fss	fhlt	fwel	ftax
Males																				
1	20	0.06																		
1	40	0.06																		
1	60	0.06																		
1	80	0.10																		
2	20		0.23	0.09	0.14	-0.18														
2	40		0.22	0.07	0.02	-0.15														
2	60		0.12	0.00	-0.01	-0.07														
2	80		0.05	-0.02	0.40	-0.10														
3	20		0.07				-0.50	-2.19	1.12	0.18	0.14	-0.43								
3	40		0.05				0.10	-0.59	0.70	0.09	0.10	-0.31								
3	60		-0.02				0.38	1.87	0.25	-0.05	-0.08	-0.17								
3	80		-0.11				-1.12	2.29	1.29	-0.05	-0.39	-0.53								
4	20		-0.03				-0.60	-0.25		0.05	0.25		-10.48	-1.12	-2.43	0.73	-0.80	0.29	0.79	-0.03
4	40		-0.21				-0.02	1.21		0.02	0.14		-3.00	2.26	4.77	2.01	-0.60	0.16	-0.52	-0.10
4	60		-0.44				0.17	2.37		0.24	0.11		8.80	8.72	9.42	4.22	-1.02	-1.28	-4.15	-0.71
4	80		-0.62				-1.65	1.25		1.02	0.57		11.29	16.83	-0.66	7.72	-3.69	-4.94	-10.31	-2.37
Females																				
1	20	0.06																		
1	40	0.06																		
1	60	0.05																		
1	80	0.08																		
2	20		0.04	-0.01	0.49	0.07														
2	40		0.05	0.02	0.27	-0.02														
2	60		0.02	0.07	0.00	-0.12														
2	80		-0.04	0.10	0.35	-0.07														
3	20		0.00				-0.04	4.20	-0.09	-0.01	0.45	0.06								
3	40		0.00				0.51	4.42	-0.32	0.00	0.15	0.01								
3	60		0.00				1.00	3.03	-0.36	-0.01	-0.20	-0.07								
3	80		-0.02				0.74	2.40	0.14	-0.10	0.10	-0.10								
4	20		-0.09				-1.55	-1.58		0.08	-0.33		19.17	0.06	13.72	5.08	-0.37	0.01	-0.58	-0.27
4	40		-0.13				-0.97	-1.39		-0.06	-0.22		14.49	3.01	7.57	4.27	0.10	0.47	-0.49	0.01
4	60		-0.13				-0.86	0.42		-0.37	-0.03		6.11	7.01	2.30	2.82	0.80	1.01	2.14	0.45
4	80		-0.11				-3.84	3.69		-0.78	-0.11		14.17	10.23	18.71	5.99	1.10	1.30	9.18	0.63

Definitions for Table 20

R: Total Resources
NW: Net Worth
HW: Human Wealth
PEN: Pension Wealth
GA: Generational Account
CHW: Current Human Wealth
CPEN: Current Pension Wealth
CGA: Current Net Taxes
CSS: Current Social Security Benefits
CHLT: Current Medicare Plus Medicaid Benefits
CWEL: Current Welfare Benefits
CTAX: Current Tax Payments
FHW: Future Human Wealth
FPEN: Future Pension Wealth
FGA: Future Net Taxes
FSS: Future Social Security Benefits
FHLT: Future Medicare Plus Medicaid Benefits
FWEL: Future Welfare Benefits
FTAX: Current Tax Payments

Table 21: Impact of Changing Population Structure on the Net National Saving Rate

Year	Saving Rate (%)
1995	2.1
2000	1.7
2005	1.7
2010	1.9
2015	1.9
2020	1.7
2025	1.4
2030	1.3
2035	1.3
2040	1.3
2045	1.3
2050	1.3

Source: Authors' calculations.

Appendix

Data Construction

In allocating income, taxes, and benefits to household members we distribute various income, tax, and transfer aggregates according to age-sex relative profiles obtained from various micro-economic surveys. Two methods are followed in constructing the relative profiles for the various types of payments and receipts. In both methods, children's amounts are attributed equally to the head and spouse (if present). In the first (primary) method, nominal receipts/payments by married individuals are divided equally between the head and spouse before averaging within each age-sex category. This is done for labor income, for all tax payments and all benefit receipts except for Medicare and Medicaid -- which are in-kind benefits and cannot be shared with the spouse. The secondary method involves allocating the amounts to the nominal recipient before averaging within each age-sex category. The detailed description of data sources and construction that follows should be read keeping in mind these two alternative methods of allocating payments and receipts within the household.

Labor Income

Aggregate labor income between 1960 and 1993 is calculated as labor's share of NIPA-reported national income. For each of these years, labor's share of national income is calculated under the assumption that its share of proprietorship income is the same as its share of national income.[23] Relative profiles of labor income by age and sex are calculated for each year between 1963 and 1993 using that year's CPS data. The 1963 profile is used to distribute aggregate labor income for years prior to 1963. Per capita labor income for years beyond 1993 is projected under the assumption that, except for an adjustment for growth, cohorts of a given age and sex earn the same average labor income in future years as cohorts of that age and sex earned in 1993. For example, males who are age 50 in 1993 are assumed to earn the same amount on average, apart from an adjustment for growth, as males who were age 50 in 1993. The growth adjustment is 1.2 percent per year. Thus, the projected average earnings of males age-50 in, say, 1996 equals the corresponding male age-50 1993 average multiplied by 1.012 cubed.

Pension Benefits

Pension benefits include private pension benefits, workers compensation, veterans benefits, and government employee pension benefits. Aggregate pension benefits for the years 1960-1988 are taken from Park (1992). Here, the NIPA estimates are used primarily because estimates based upon administrative reports are generally deemed more reliable than those based upon household surveys. The estimates for the years through

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[23] The share of labor income in national income is ϕ, where ϕ satisfies $C + \phi PI = \phi NI$. In this equation, C is compensation paid to employees less employer contributions to employee pension plans, PI is proprietorship income, and NI is national income. The calculated values of à are quite stable over the period 1960-1992, ranging between 0.76 and 0.82.

2030 were derived by assuming that the share of pension benefits to GDP would remain at its 1988 level. Actual GDP through 1993 and GDP projections made by the Office of Management and Budget through the year 2030 were used to extrapolate aggregate pension benefits into the future. The aggregates for the other three types of benefits through 1993 are taken from SCB. The same procedure is used to extrapolate the aggregates through the year 2030.

The relative profiles for all four types of pensions are computed from the March CPS between the years 1972 and 1993. This survey contains information on pension income from a variety of sources including company or union pensions, workers compensation, veterans benefits, and government employee pensions, and receipts from annuities and other regular contributions. For all categories retirement, disability and survivor benefits are included. The 1972 profile was used to distribute the aggregates in years prior to 1972, and the 1993 profile was used to distribute the projected aggregates through 2030. For years after 2030, it is assumed that real average pension benefits at a given age and sex will equal their 2030 values adjusted for growth at the base case assumed rate of 1.2 percent per year.

Social Security Benefits

Aggregate Social Security benefits between 1960 and 1993 are those reported in the NIPA. Between 1993 and 2030 we use the Office of Management and Budget's (OMB) projections (on a NIPA basis) of Social Security benefits.

Relative Social Security benefit profiles by age and sex obtained from the CPS for the years 1968-1993 are used to distribute aggregate benefits in those years. Aggregate benefits in prior years are distributed according to the 1968 relative profiles and OMB's projected benefits for the years 1994 through 2030 are distributed according to the 1993 relative profiles. Per capita benefits by age and sex beyond the year 2030 equal those in the year 2030 except for an adjustment for productivity growth at a 1.2 percent annual rate.

Medicare and Medicaid Benefits

Aggregate Medicare and Medicaid payments from the inception of these programs through 1993 are reported by NIPA. OMB provided us with unpublished projections (on a NIPA basis) of aggregate Medicare payments for the years 1994 through 2030. In the case of Medicaid, we applied OMB's projected annual growth rates for grants in aid to state and local governments between 1994 and 2030 to the 1993 aggregate NIPA value of Medicaid. Beyond 2030, both Medicare and Medicaid payments are assumed to grow in accordance with demographic change and our assumed productivity growth rate. Relative profiles of Medicare and Medicaid benefits are based on HCFA data on average benefits by age and sex. In the case of Medicare, we use data from Skinner and McClellan (1995).

Unemployment Insurance, Aid to Families With Dependent Children, Food Stamps and General Welfare Benefits

Aggregate values of these federal, state, and local transfers are reported by NIPA. General welfare benefits include federal black lung benefits, state general assistance, state energy assistance, education benefits, and other federal, state, and local transfers. The age-sex relative profiles used for distributing these benefits were obtained from March CPS data on public assistance for the years 1972 and 1993. These relative profiles were used to distribute their respective aggregate expenditures for all of the years between 1960 and 1993, and the 1972 profiles were used for distributing benefits in years prior to 1972. For future years, we assume that the age- and sex-specific values of each of these different types of transfer payments keep pace with productivity growth.

Labor Income Taxes

Aggregate federal, state, and local income taxes for 1960 through 1993 are reported by the NIPA. For 1993 through 2030 we use OMB's projections of federal income tax revenues. State and local income taxes for 1993 through 2030 are projected using OMB's GDP forecast and assuming that the same ratio of state and local income taxes to GDP prevails between 1993 and 2030 that prevailed in 1993.

Aggregate labor income taxes in each year are calculated as the product of total federal, state, and local income taxes and labor's share of national income. We distribute aggregate labor income taxes based on the CPS profiles of labor income described above. After 2030 we assume that age- and sex-specific values of labor income taxes keep pace with productivity growth.

Payroll Taxes

The NIPA reports aggregate values of payroll taxes from 1960 through 1993. OMB provided us with projections of aggregate federal payroll taxes from 1994 through 2030. Aggregate state and local payroll taxes for 1994 through 2030 were calculated based on OMB's projection of GDP between 1994 and 2030 and the assumption that the 1993 ratio of state and local payroll taxes to GDP prevails through 2030. Aggregate payroll taxes in the years 1960-2030 are distributed by age and sex according to 1963 through 1993 CPS profiles of covered earnings, where covered earnings refers to labor earnings subject to Social Security payroll taxes.[24] Age- and sex-specific values of payroll taxes beyond 2030 are assumed to equal their 2030 values adjusted for growth.

Excise and Sales Taxes

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24 Unfortunately, the data do not permit the calculation of separate profiles for state and local payroll taxes, which aren't necessarily subject to earnings ceilings. However, non social security payroll taxes are a small fraction of the total (less than 30 percent), so the biased associated with using social security covered earnings profiles is likely to be quite small.

The NIPA is our source for aggregate excise tax (including property tax) and sales tax revenue from 1960 through 1993. For the period 1994-2030 we use OMB projections of federal excise and sales tax revenues. State and local excise and sales tax revenues between 1994 and 2030 are calculated using the 1993 ratio of these revenues t GDP and applying OMB's GDP forecasts through 2030.

Relative age-sex profiles of excise and sales taxes were calculated from the 1960-61, 1972-73, 1984-86, and 1987-90 CEX surveys. Separate profiles were constructed for tobacco, alcohol, property taxes, and all other sales and excise taxes. The 1960-61 profiles were used for years prior to 1966. The 1972-73 profiles were used for the years 1967 through 1978. The 1984-86 profiles were used for the years 1979 through 1986, and the 1987-90 profiles were used for 1987 and beyond. Age- and sex-specific values of sales and excise taxes beyond 2030 are assumed to equal the 2030 values adjusted for growth.

Capital Income Taxes

Aggregate capital income taxes between 1960 and 2030 are calculated as capital's share of national income multiplied by actual or projected values of aggregate federal, state, and local income tax revenues. Relative profiles for capital income taxes come from the 1962 and 1983 SCFs. These profiles are based upon weighted average net worth holdings by age and sex, where the weights applied are SCF person weights. This procedure could be applied only to individuals aged 80 or less because of the paucity of data for older individuals. The profile of average net worth holdings by age and sex were smoothed and extrapolated through age 100 using a 4th order polynomial. Age- and sex-specific values of capital income taxes after 2030 are assumed to equal the 2030 values adjusted for growth.

Nonhuman Wealth

Age- and sex-specific values of nonhuman wealth (NHW) in each year between 1960 and 1993 are constructed by distributing by age and sex each of these year's levels of total private net wealth. Aggregate private net wealth for these years is reported in the FOF.[25] The relative profiles of wealth holding by age and sex are calculated by using data from the 1963 and 1983 SCF. The 1963 profiles are used for years prior to 1963 and the 1983 profile for years after 1983. The profiles for intermediate years are constructed by linearly interpolating between the 1963 and 1983 profiles.

Determining Average Consumption by Age and Sex

The data used for determining average consumption by age and sex for the years 1960-61, 1972-73, 1984-86, and 1987-90 are the National Income and Product Accounts (NIPA),

[25] Our aggregates are net of the FOF's estimate of the value of residential structures, plant, and equipment owned by non-profit institutions.

the 1960-61, 1972-73, and 1984-90 Consumer Expenditure Surveys (CEX), and the 1977 and 1987 National Medical Expenditure Surveys (NMES). Aggregate NIPA household consumption expenditure was allocated to adults based on four relative profiles of consumption by age and sex -- one for the years 1960-61, one for the years 1972-73, one for the years 1984-86, and one for the years 1987-90.

To use the 1960-61 CEX we first needed to impute particular demographic information to households. The reason is that the 1960-61 CEX provides only general information about the ages and sexes of household members other than the head and spouse. Our imputation used a statistical match with the 1960 Decennial Census. Specifically, we sorted the Census data by a set of variables that are also available in the CEX. These matching variables include demographic variables, such as the numbers of children under age 18 and the ages and sexes of the household head and spouse, household income, the sex and marital status of the head, a urban versus rural indicator, region, and housing tenure. For each 1960-61 CEX household with members other than the head and spouse, we then randomly selected a Census household from the set of Census households with the same matching data. The ages and sexes of the Census household members other than the head and spouse were then attributed to the CEX household.

Each of the four relative age-sex consumption profiles was formed in a similar manner. First, we divided the NIPA consumption aggregates into thirty-five separate components. For most of these components, such as clothing, there are corresponding data in the CEX that can be used to distribute the aggregate values of these components. For three other components, imputed rent, financial services, and expenditures by charitable institutions, there is no corresponding direct measure in the CEX, but there are other CEX variables (e.g., house value in the case of imputed rent) that can be used for purposes of distribution. This is not the case for the health care component of aggregate NIPA consumption, so we use the NMES to distribute health care.

The second step in forming age-sex consumption profiles involved benchmarking the distribution data to the relevant component of the NIPA consumption aggregateTake NIPA clothing, for example. For this component, we divided NIPA clothing by the total CEX clothing expenditure, where the total was computed using the CEX household weights. The resulting ratio was used to rescale the clothing expenditure of each household in the CEX. Separate rescaling of clothing was done for each of CEX surveys used in the study based on the contemporaneous NIPA value of clothing. This procedure was used to rescale the CEX data for each of the NIPA components for which there are also direct CEX measures. The rescaling factors for easily verified or remembered spending categories, like automobiles and rent, are generally very close to one. CEX aggregates for spending on other goods and services, such as food and alcohol, are generally under-reported by roughly 20 percent.[26]

26 See Bosworth, Burtless, and Sabelhaus (1992) for a general comparison of CEX and NIPA aggregates.

In the case of the NIPA aggregate for imputed rent, we calculated the ratio of NIPA aggregate imputed rent to total CEX reported house values, where, again, the total was computed using the CEX household weights. We then multiplied each household's reported house value by this ratio to produce a NIPA-benchmarked estimate of the household's imputed rent. The same procedure was used in the case of financial services, expenditures by charitable institutions, clothing provided by the military, food produced and consumed on farms, and net foreign remittances except that, instead of house value, we used, respectively, checking plus saving accounts, charitable contributions, number of members in the military, a dummy variable equal to 1 if the household owned a farm and 0 otherwise, and total other consumption.

In the case of health care expenditures, we benchmarked the NMES data using NIPA's five broad components: physician's services, hospital services, private health insurance, prescriptions, and other medical. Specifically, we formed the ratio of each of these components to the corresponding NMES totals (based on the NMES population weights) and then rescaled the NMES data based on these ratios. We used the 1977 NMES for the years 1960 and 1961 as well as 1972 and 1973. We used the 1987 NMES for the years 1984 through 1990.

In the third step, we allocated our rescaled (NIPA-benchmarked) actual or imputed CEX data to individuals within the CEX household. (This was not necessary for the NMES which takes the individual as the unit of observation.) For certain types of expenditures, the method of allocation was fairly clear. For example, boy's clothing expenditures was divided evenly among the household's male children, and pipe tobacco was divided evenly among the household's adult males. For other types of expenditures, we developed particular rules. Housing expenditures, including imputed rent, was allocated evenly to the head and spouse. And food, vacations, and other not readily allocable expenditure items, were divided evenly among the household's adult equivalents, where each adult was given an equivalency factor of 1 and each child under 18 was given a factor that increased linearly from .3 for newborns to 1 for 18-year-olds.

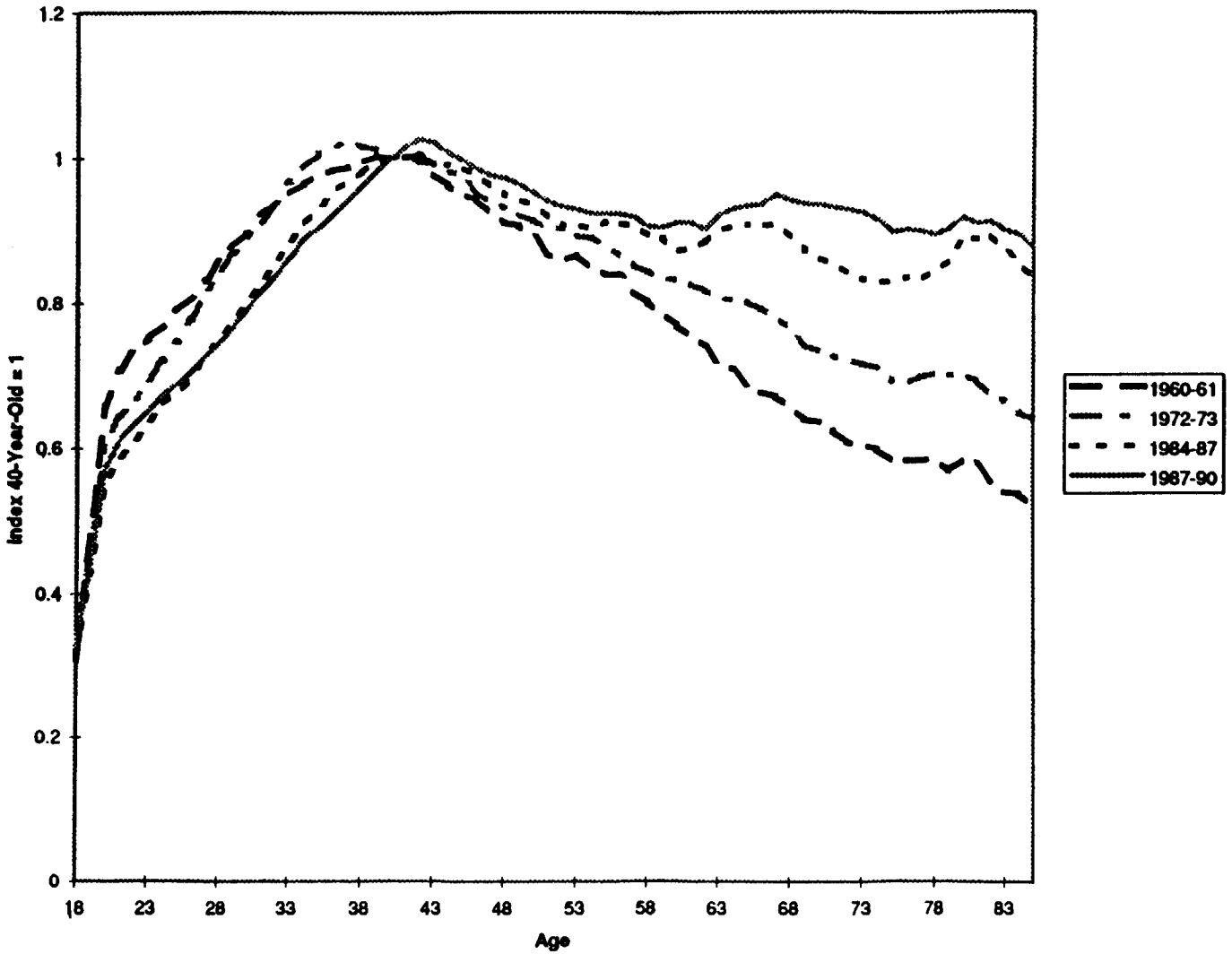
The fourth step entailed using the NIPA-benchmarked NMES data to calculate age- and sex-specific weighted average values of each of the five different types of health expenditures. These values were then attributed to individual members of the CEX households based on their ages and sexes. In this step we also allocated to individual members of the CEX households, based on their ages and sexes, average values of privately paid educational expenditures. These average values were determined by calculating average elementary and secondary school expenditures per child age 5 through 18 and average college expenditures per person age 18 through 24.

In the fifth step, we reallocated all of the CEX children's expenditures, including their imputed health expenditures, evenly to the head and spouse. We then combined these NIPA-benchmarked, CEX actual or imputed data for particular years (1960 and 1961, 1972 and 1973, 1984-1986, and 1987-1990) to form the ratios of the average value over these years of total expenditures of adults (those age 18 and older) of a particular age and

sex to that of 40 year-old males. This provided our four age-sex relative consumption profiles.

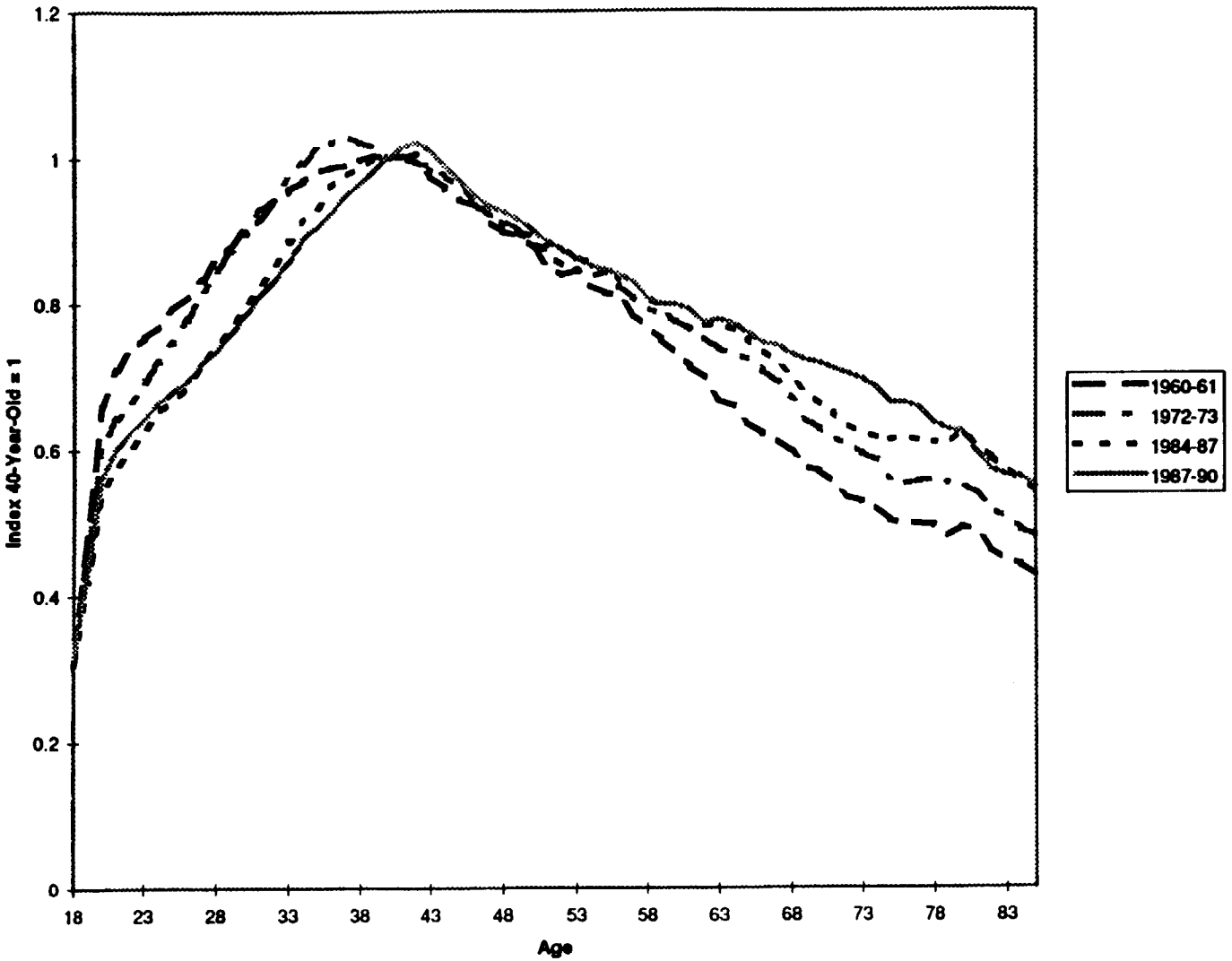
We used our four age-sex relative consumption profiles and our age- and sex-specific population data to allocate total NIPA consumption over the four periods by age and sex. This procedure may appear to represent an unnecessary second round of benchmarking of aggregate NIPA consumption, but in so doing we insure ourselves that our final calculated values of average consumption by age and sex are consistent with the Census population data used to calculate age- and sex-specific values of average remaining lifetime resources. In particular, they avoid under- or over-estimates of average age- and sex-specific consumption that would arise if the CEX household weights were systematically too high or too low.

Figure 1: Relative Consumption Profiles



Source: Authors' calculations based on the Consumer Expenditure Survey.

Figure 2: Relative Nonmedical Consumption Profiles



Source: Authors' calculations based on the Consumer Expenditure Survey.

Figure 3a: The Composition of Consumption by Age – 1960-61

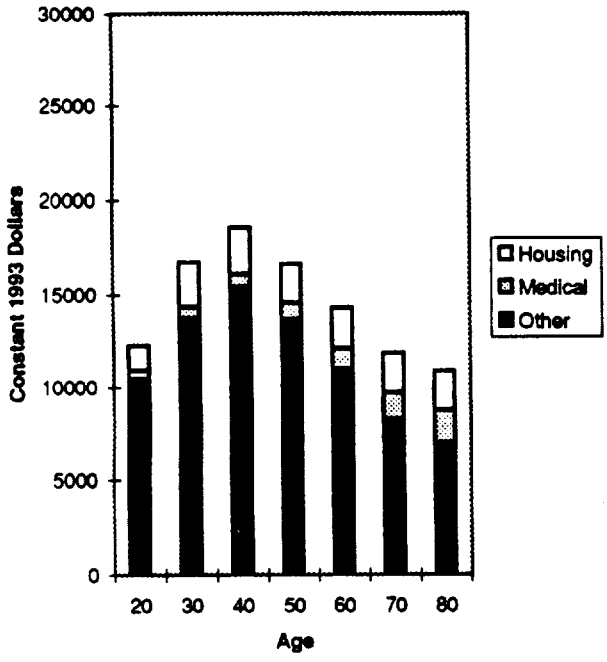


Figure 3b: The Composition of Consumption by Age – 1987-90

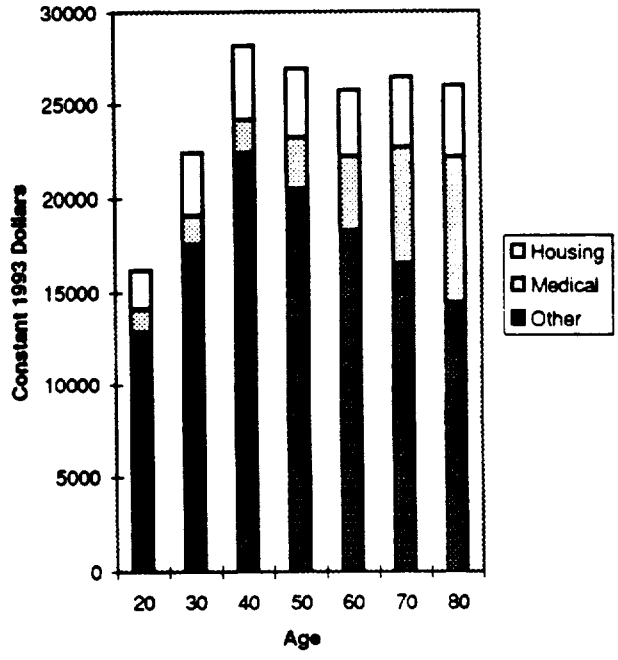


Figure 3c: The Share of Housing, Medical, and Other Consumption by Cohort – 1960-61

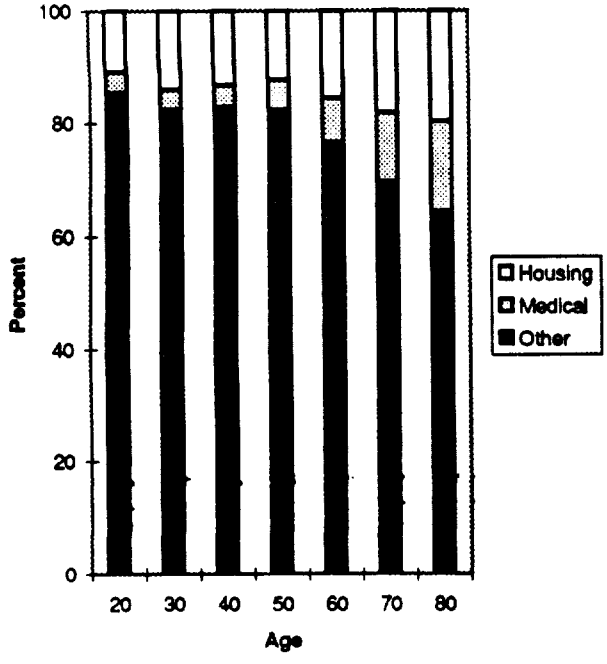
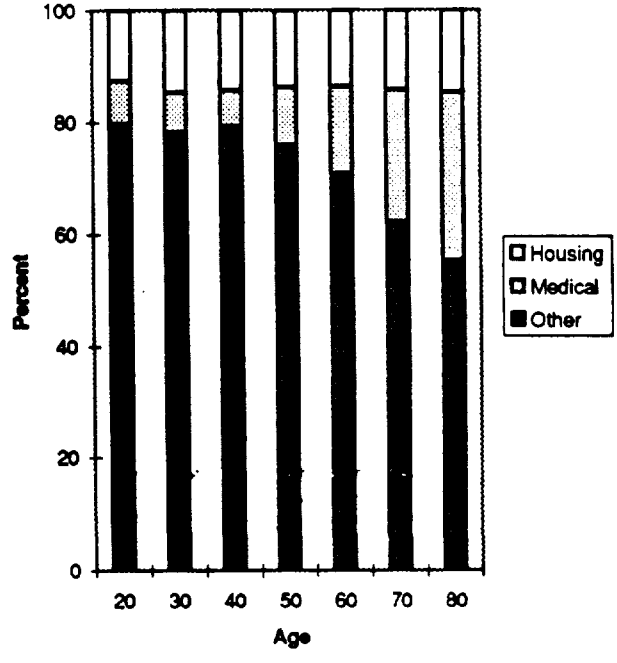
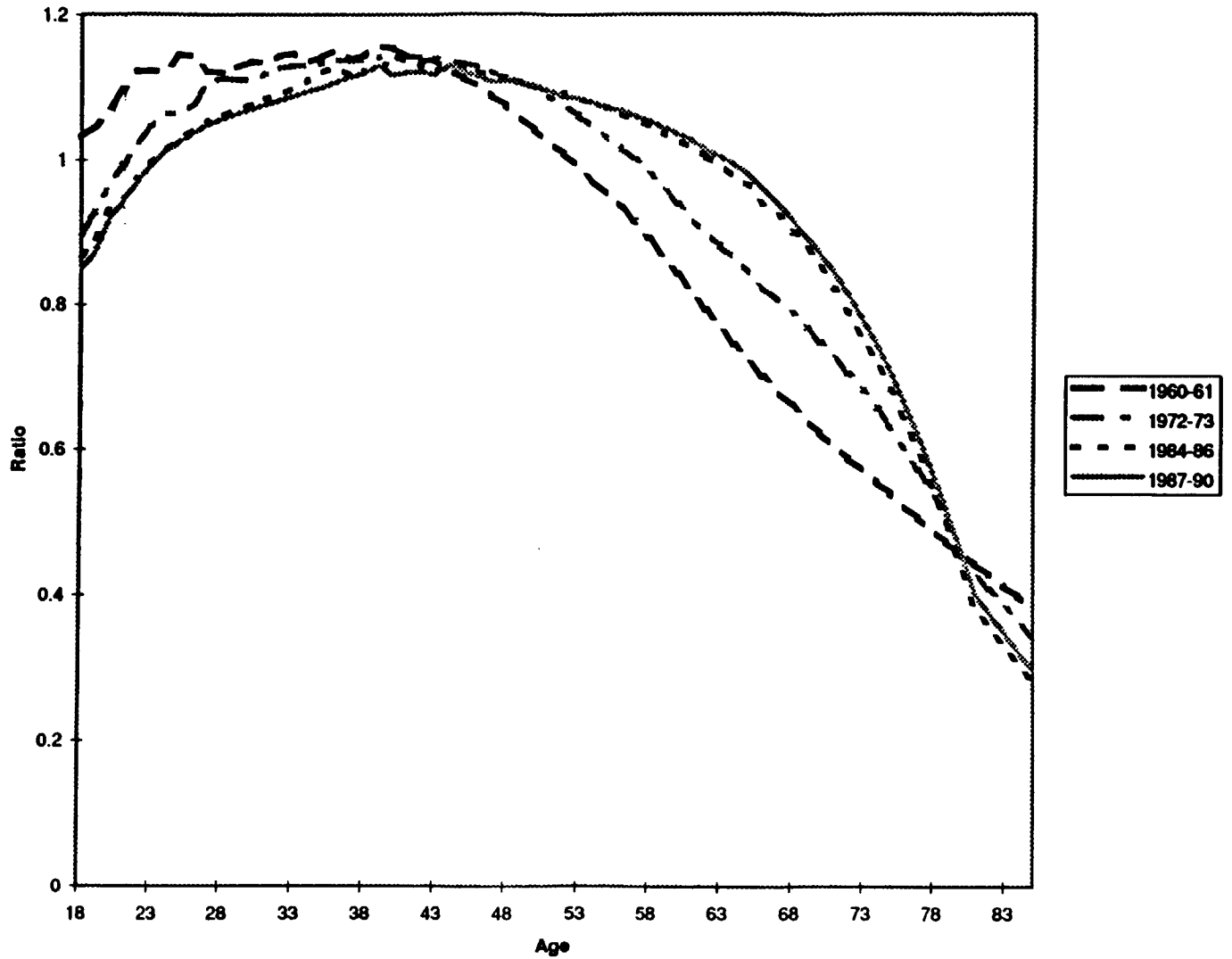


Figure 3d: The Share of Housing, Medical, and Other Consumption by Cohort – 1987-90



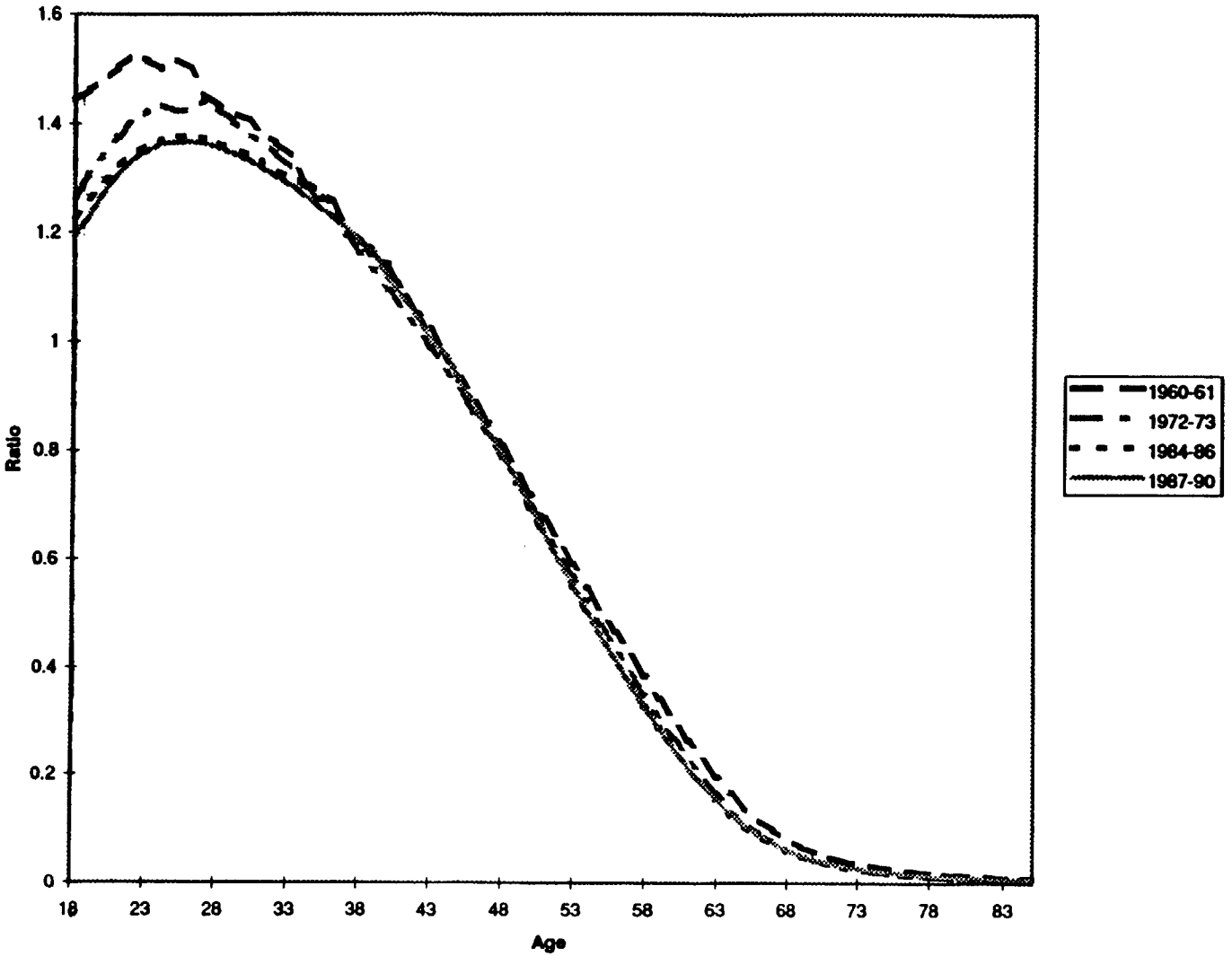
Source: Authors' calculations.

Figure 4: Cohort Resources Per Capita / Per Capita Resources



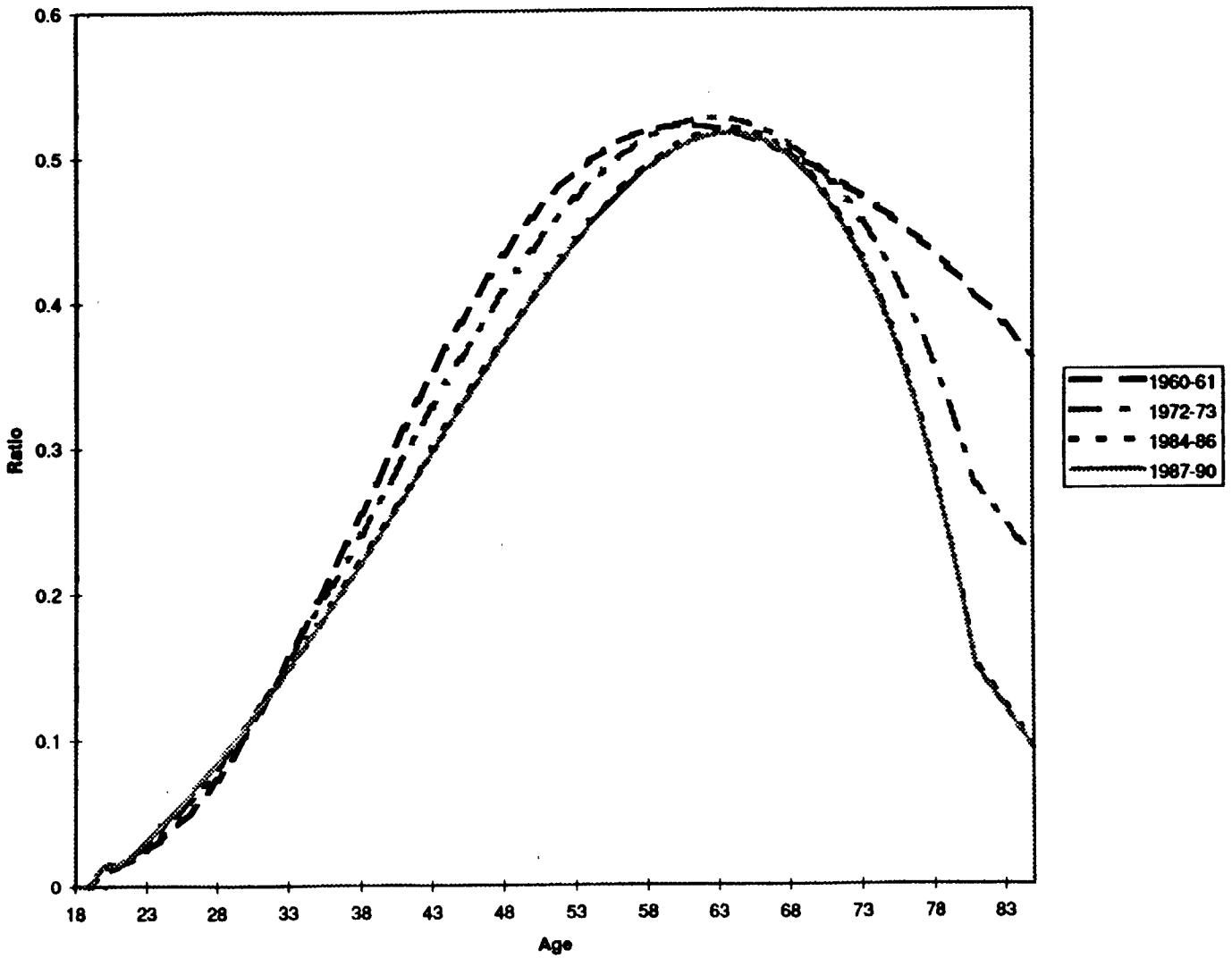
Source: Authors' calculations.

Figure 5: Cohort Human Wealth Per Capita / Per Capita Resources



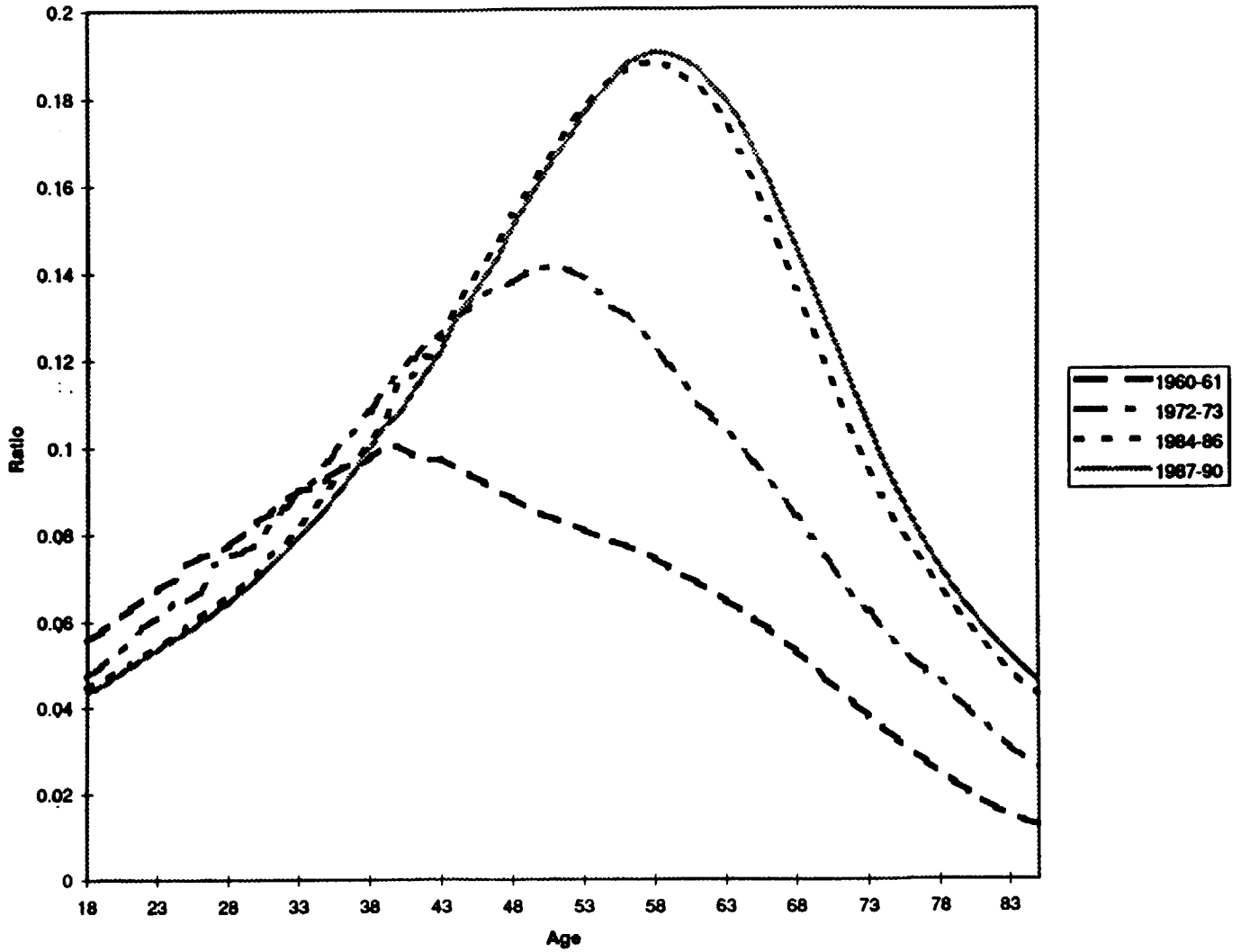
Source: Authors' calculations.

Figure 6: Cohort Nonhuman Wealth Per Capita / Per Capita Resources



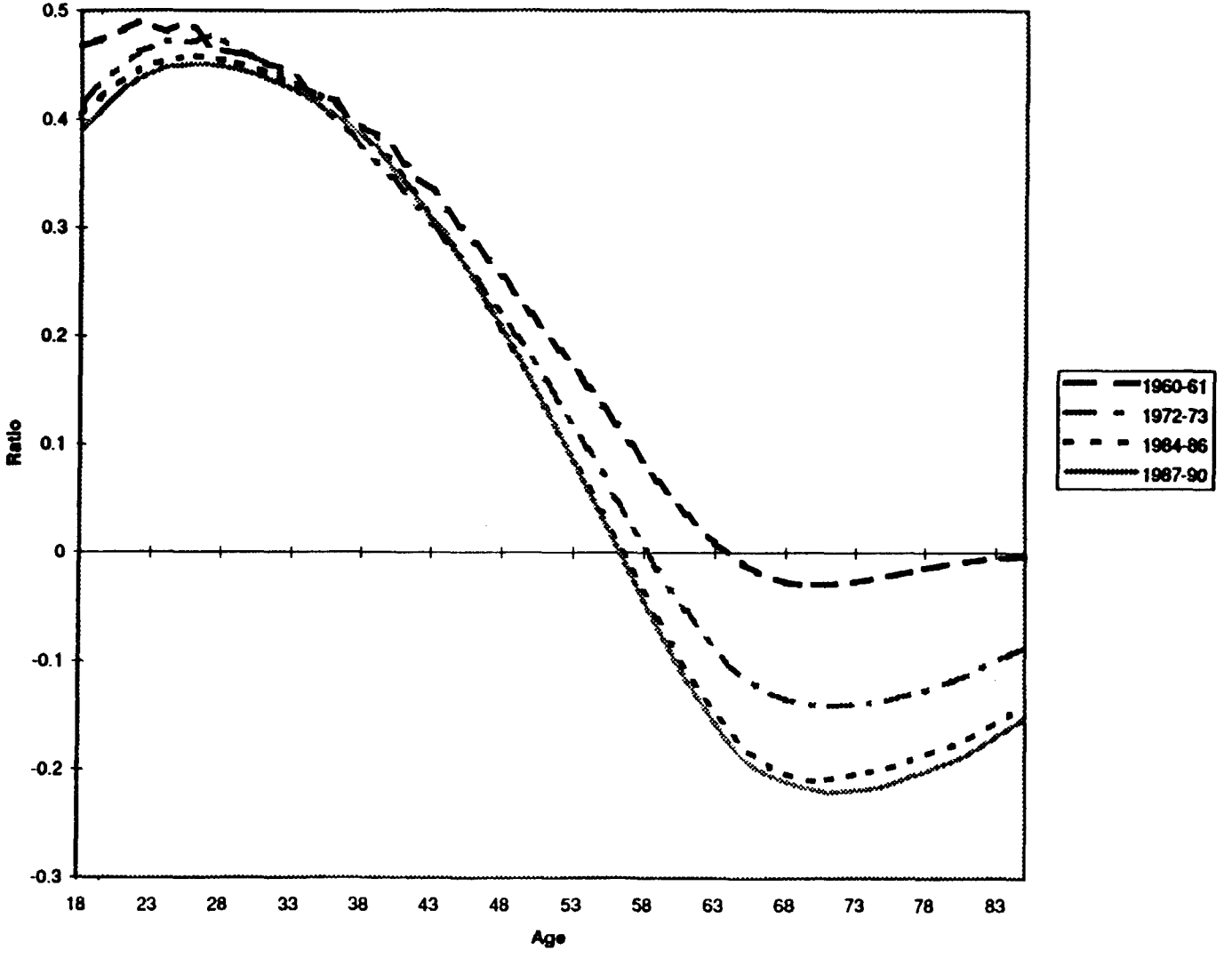
Source: Authors' calculations.

Figure 7: Cohort Pension Wealth Per Capita / Per Capita Resources



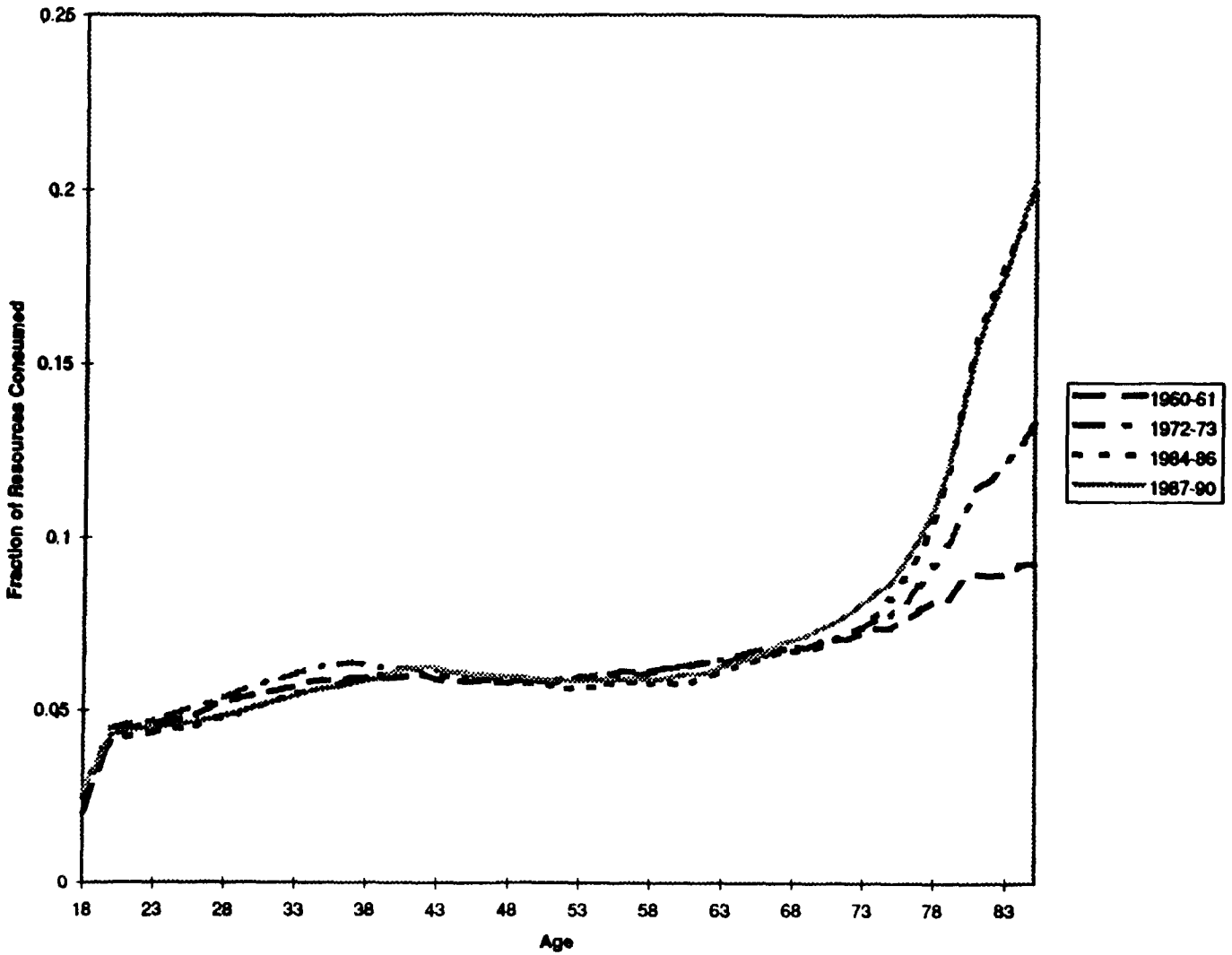
Source: Authors' calculations.

Figure 8: Cohort Generational Accounts Per Capita / Per Capita Resources



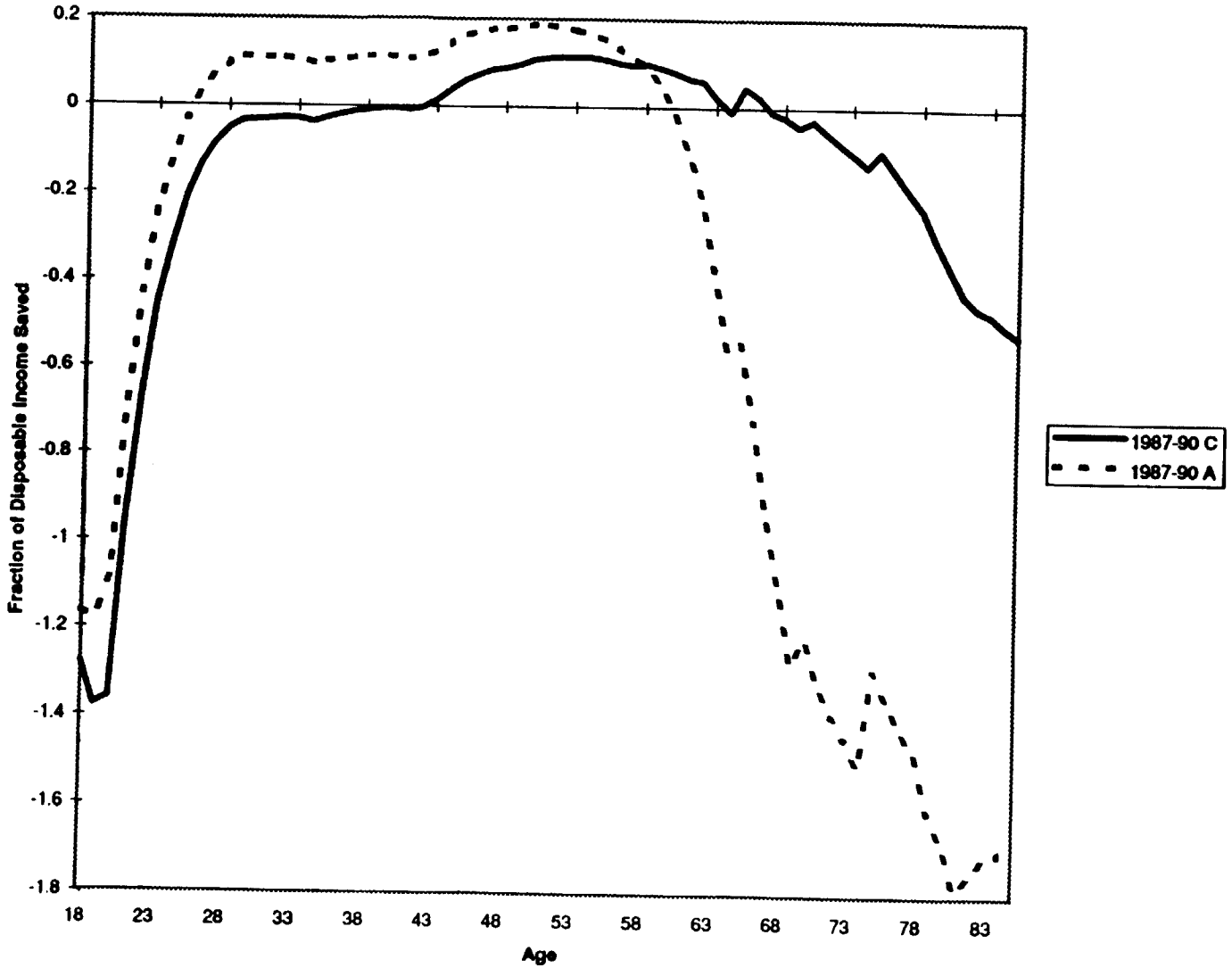
Source: Authors' calculations.

Figure 9: Average Propensities to Consume out of Total Resources (r=6%)



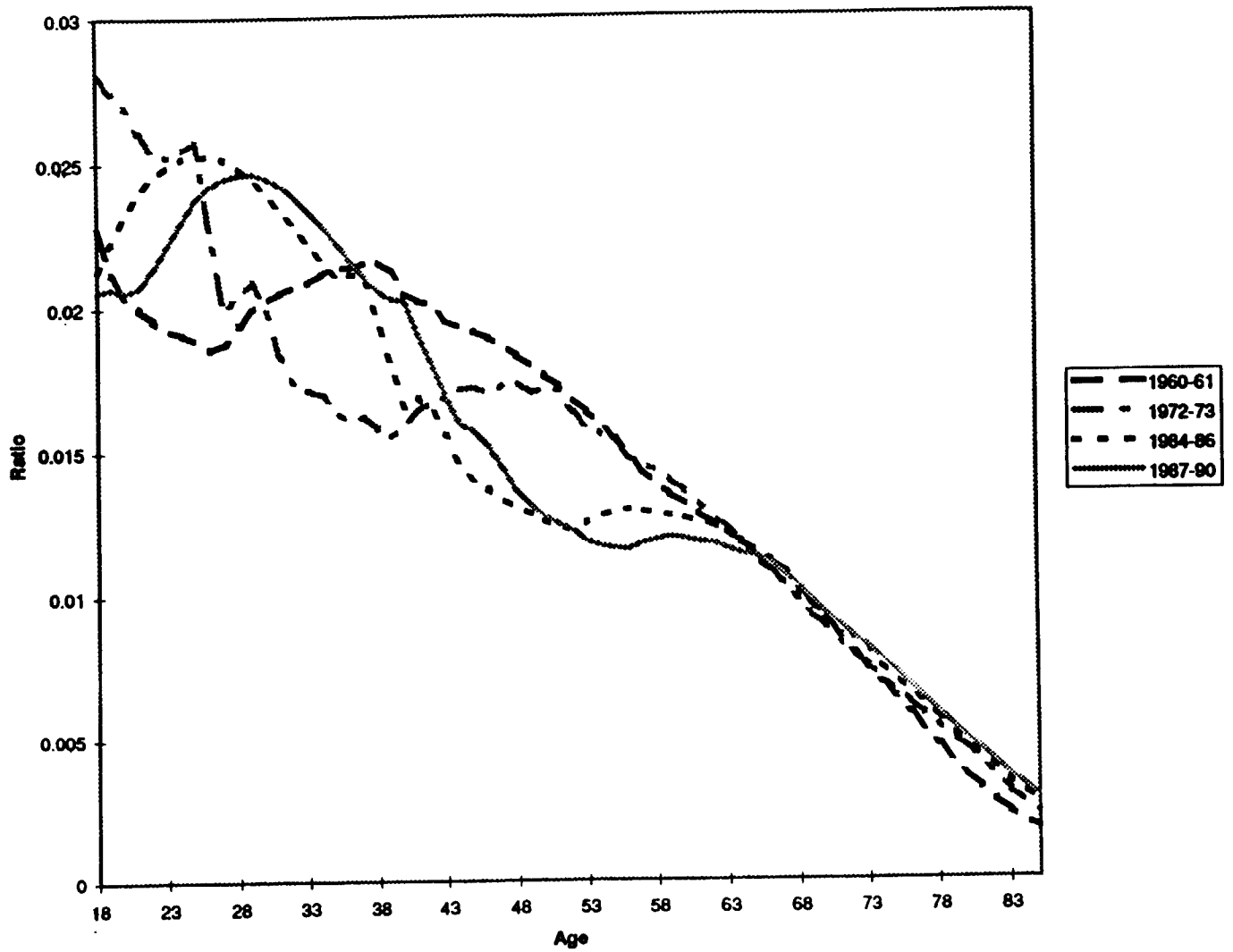
Source: Authors' calculations.

Figure 10: Average Propensities to Save Out of Conventional (C) and Alternative (A) Disposable Income



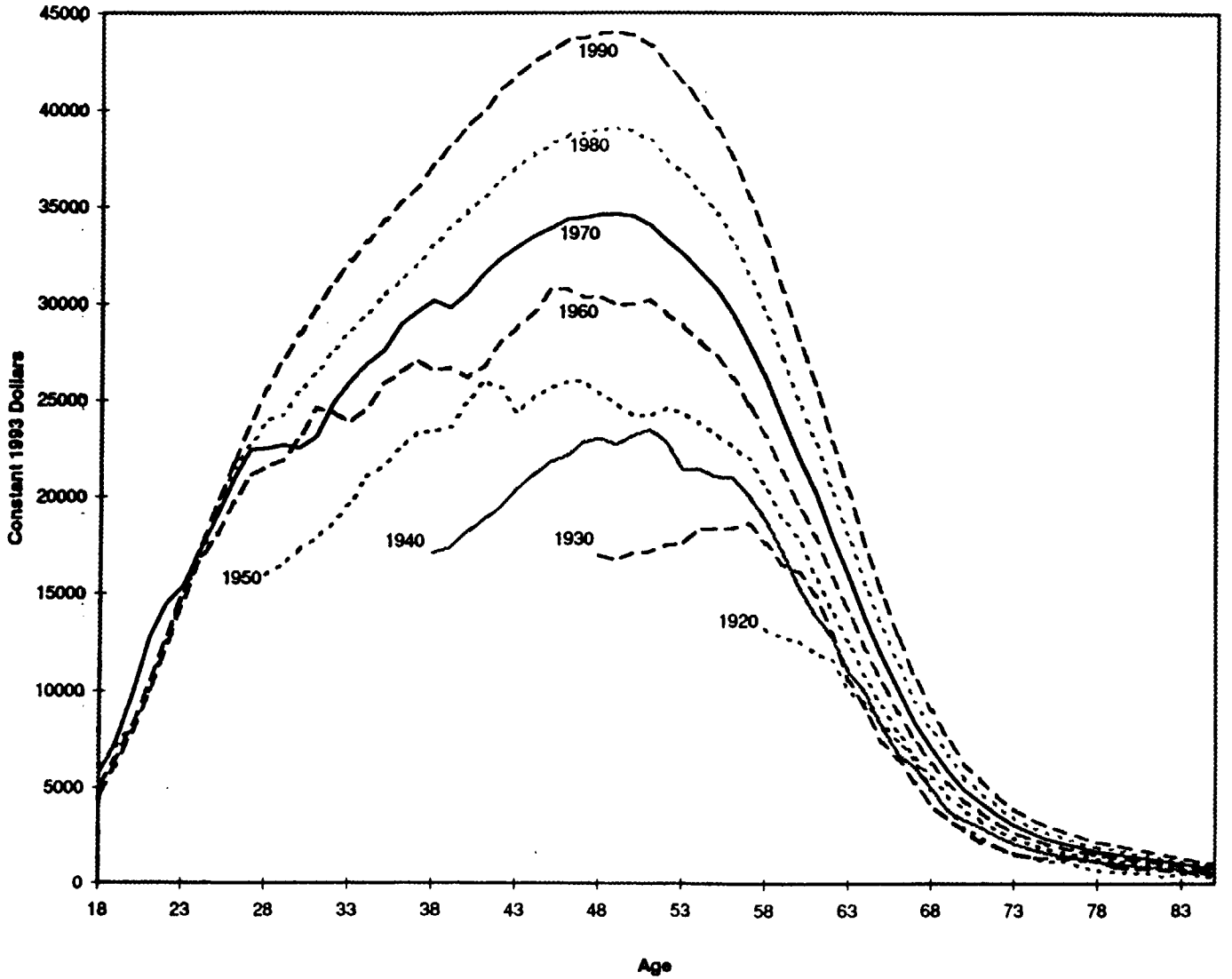
Source: Authors' calculations.

Figure 11: Ratio of Cohort Population to Total Population



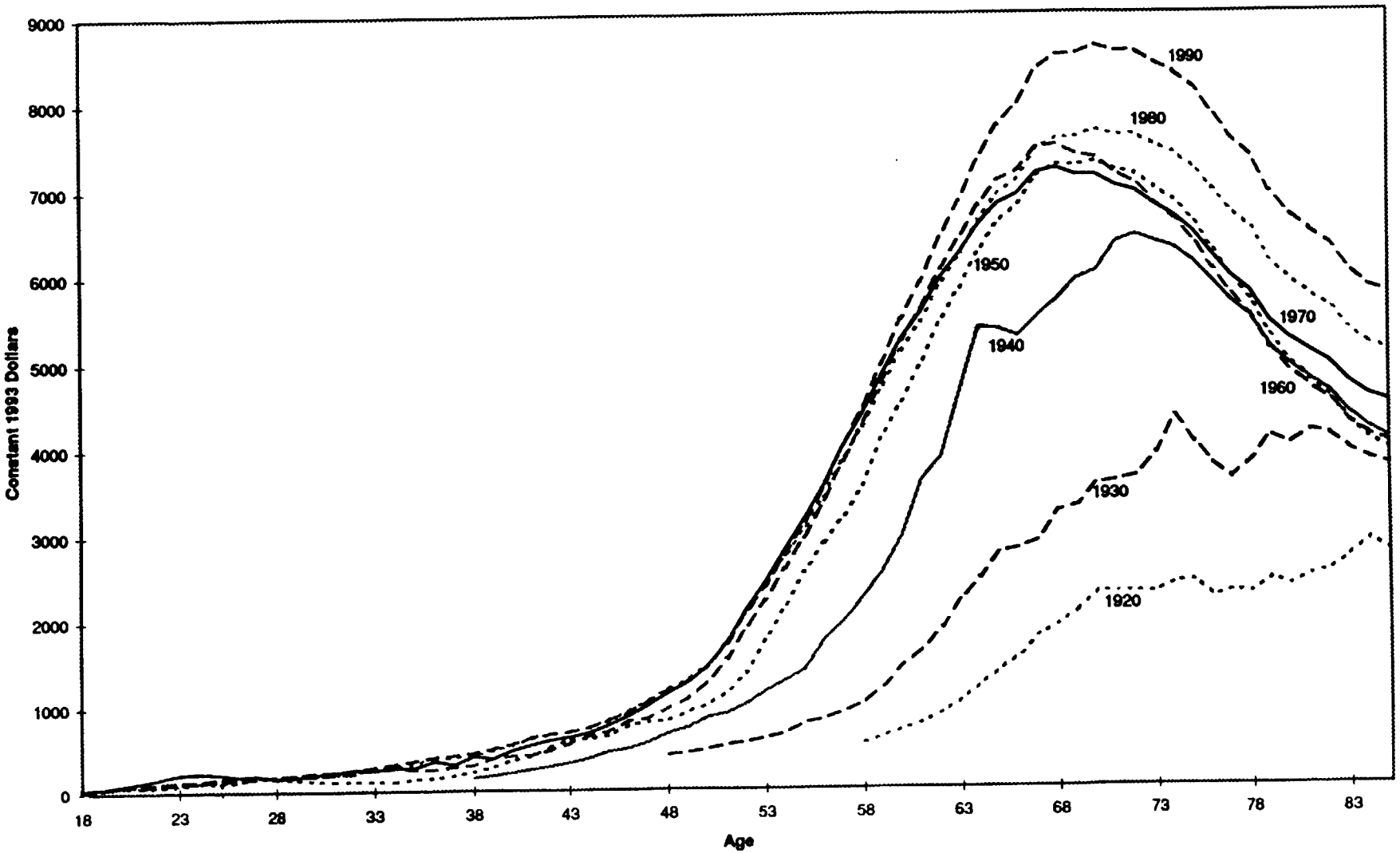
Source: Authors' calculations.

Figure 12: Longitudinal Profiles of Labor Income (Selected Cohorts by Year Age 18)



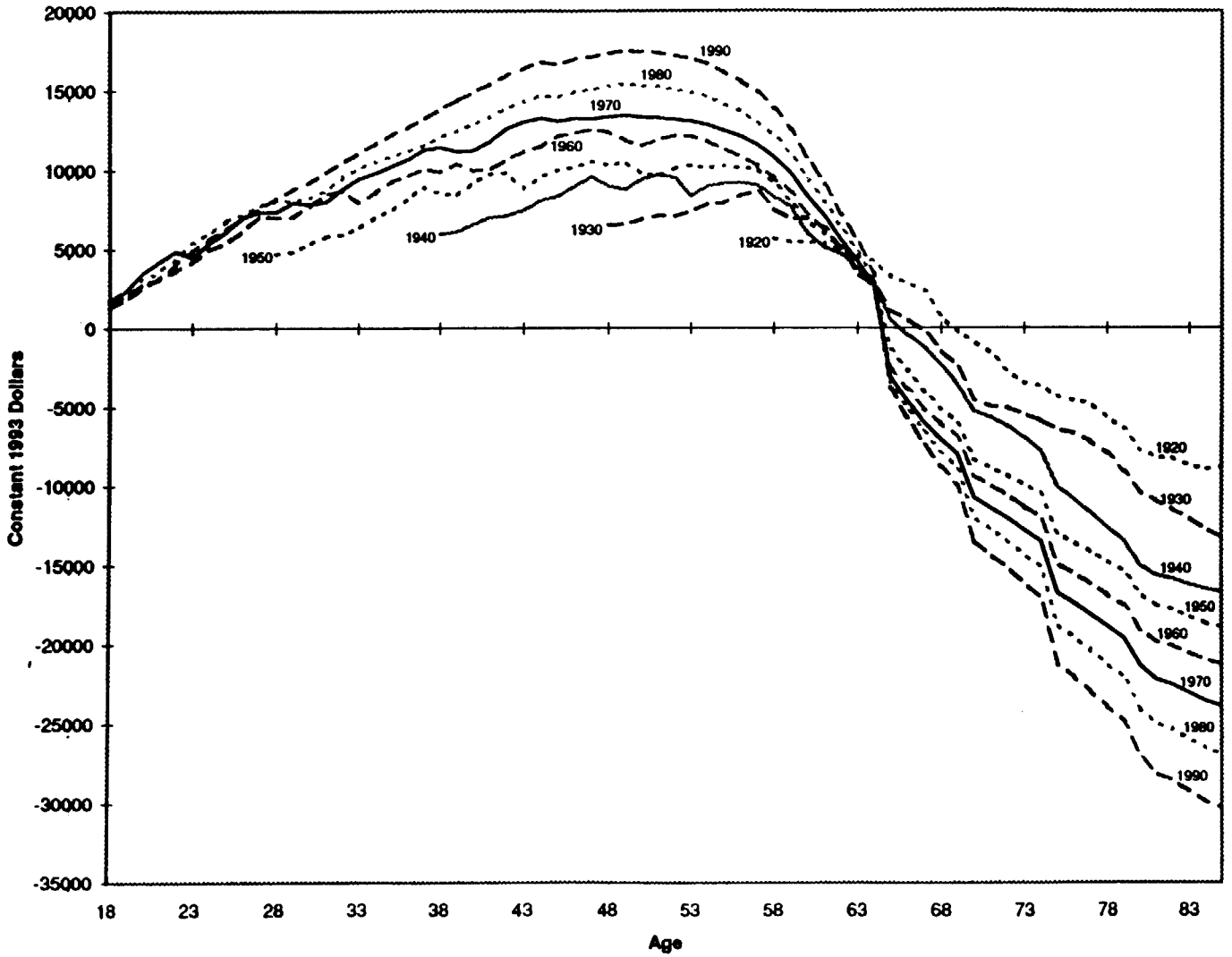
Source: Authors' calculations.

Figure 13: Longitudinal Profiles of Pension Income (Selected Cohorts by Year Age 18)



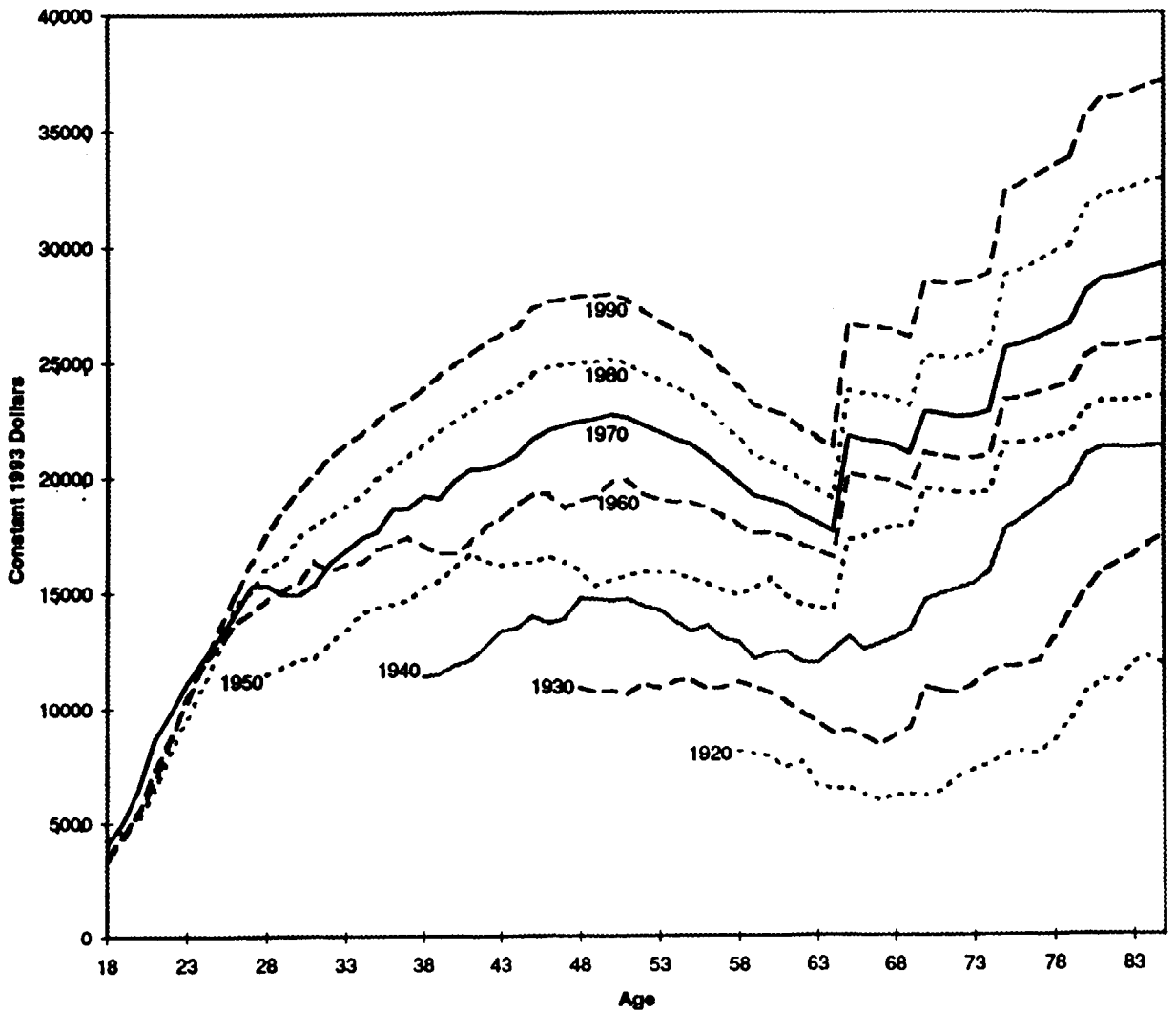
Source: Authors' calculations.

Figure 14: Longitudinal Profiles of Generational Accounts (Selected Cohorts by Year Age 18)



Source: Authors' calculations.

Figure 15: Longitudinal Profiles of Non-Asset Income (Selected Cohorts by Year Age 18)



Source: Authors' calculations.