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SOCIAL SECURITY AND THE EVOLUTION OF ELDERLY POVERTY

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ABSTRACT

We use data from the March 1968-2001 Current Population Surveys to document the evolution of elderly poverty over this time period, and to assess the causal role of the Social Security program in reducing poverty rates. We develop an instrumental variable approach that relies on the large increase in benefits for birth cohorts from 1885 through 1916, and the subsequent decline and flattening of real benefits growth due to the Social Securing "notch", to estimate the causal effect of Social Security on elderly poverty. Our findings suggest that over all elderly families the elasticity of poverty to benefits is roughly unitary. This suggests that reductions in Social Security benefits would significantly alter the poverty of the elderly.

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One of the most striking trends in elderly well-being in the twentieth century was the dramatic decline in income poverty among the elderly. The official poverty rate of those 65 years and older was 35 percent in 1960, more than twice that of the non-elderly (those 18-64), and had fallen to 10 percent by 1995, below that for the non-elderly. Smolensky, Danziger and Gottschalk (1988) found similar steep declines in elderly poverty back to 1939. This poverty reduction exceeded that for any other group in society.

The rapid growth in Social Security benefits in the post-World War II period is often cited as a major factor in elderly poverty reduction. This conclusion is based on evidence such as that shown in Figure 1, which plots both the elderly poverty rate and Social Security program expenditures per capita over time; the figure is rescaled so that both series fit on the same graph. There is a striking negative association between these series, with elderly poverty declining rapidly as the Social Security program grows quickly in the 1960s and 1970s, and then declining more slowly as program growth slows in the 1980s and 1990s. One concern with potential reforms to the Social Security system is that, to the extent they effectively involve benefit reduction, the gains in elderly poverty reduction over the last forty years may be reversed.

Our goal in this paper is to assess the role of Social Security in driving this reduction in elderly poverty. We begin with time series evidence on the growth in Social Security and the decline in elderly poverty. We consider both absolute and relative measures of elderly poverty, as well as the heterogeneity in the evolution of elderly poverty. In particular, we consider first whether these changes in poverty were reflected equally among the oldest old, who start with much higher poverty rates, and the youngest old; as well as whether the trends were comparable

across marital status groups, comparing elders who are married, divorced, widowed, and never married.

We then assess the causal role of Social Security in explaining these trends. We outline the econometric problems in the previous literature on the impact of Social Security on elderly income poverty and propose an instrumental variable procedure to circumvent these difficulties. We then examine the effect on poverty of the large changes in Social Security benefits for cohorts born in the late 19th and early 20th centuries. Of particular interest is the sharp benefits changes for birth cohorts from 1906 through 1926. The early cohorts in this range saw enormous exogenous increases in Social Security benefits, partly due to double indexation of the system in the early 1970s. This double indexing was ended in the 1977 Amendments to the Social Security Act that generated the so-called "benefits notch." The 1977 law grandfathered all individuals born before January 1, 1917, under the old benefit rules, but those born in 1917-1921 received benefit reductions that were as much as 20 percent lower than observationally equivalent individuals in the 1916 birth cohort. After 1921, benefits were roughly constant in real terms. It is this variation that was first identified by Krueger and Pischke (1992) as a fruitful means of identifying the behavioral effects of Social Security, in their case in the context of retirement decisions. We follow their methodology to define an instrumental variable for observed Social Security benefits.[1]

We carry out this analysis using data from 1967 through 2000 from the March Current Population Survey (CPS), to study those elderly born in 1885 through 1930. We use these data to form income measures for elderly *households* and *families*. Elderly households are all living

[1] In related papers, Snyder and Evans (2002) and Engelhardt, Gruber, and Perry (2002) used the notch to examine the effect of income on mortality and living arrangements, respectively.

units in which an elderly person resides; elderly families consist of an elder and his/her spouse. So if an elderly couple co-resides with their children, they are in the same household, but different families.

We have several findings of interest. First, while there has been a major decline in absolute poverty among elderly households, that decline has been much smaller for relative poverty, which did not decrease in the 1980s and 1990s. This raises the important question of whether the elderly should or should not share in the increases in the standard of living realized by the non-elderly. Income inequality has also exploded among the elderly in the 1990s.

Second, these changes in the income position of low income elders are fairly similar across age groups, with all age groups following the same basic patterns outlined above. Third, there are important differences in these patterns by marital status group. In particular, the declines in absolute poverty that we see in the data are much stronger for married than for unmarried elders.

Fourth, we document a major causal role of Social Security in driving these time series patterns. Increases in Social Security generosity over time are strongly negatively associated with changes in poverty. There is, however, a weak association with income inequality, suggesting that Social Security is benefiting higher income elders at the same or higher rate that it benefits low income elders over this period.

Finally, we illustrate the critical role of elderly living arrangements in driving these conclusions. As we document, there were stark changes in the living arrangements of the elderly over the time period we study, with a large shift in living with others to living independently. Our regression results show that the effect of Social Security on poverty is much stronger for

families than for households, in particular for widows/widowers and divorcees. This is consistent with the findings of Engelhardt, Gruber and Perry (2002) that higher Social Security benefits cause more independent living among widowed and divorced elders. When those elders move out on their own, they are in the same family, but they become relatively poor households, raising the poverty rate among households. This offsets to some extent the measured poverty reduction among the elderly from higher benefits.

The paper is organized as follows. The next section describes the CPS data. Section III charts the time-series evolution of elderly income and poverty from 1967-2000. Section IV outlines the primary method used to determine the impact of Social Security in the previous literature and describes the construction of the instrumental variable. Section V discusses the empirical results. There is a brief conclusion.

II. Data Construction

This study uses data from the Current Population Surveys (CPS) of March, 1968 through 2001. Each file is a cross sectional nationally representative sample of households. We restrict our analysis to cohorts born starting in 1880 (because our sample is very small before that cohort), and ending in 1935, the youngest cohort that turns 65 in our data.

To construct our main sample, we first assign families within the CPS. For our purposes, a "family" is defined as the household head, his or her spouse, and any children of the household head that are living in the household and are under the age of 18. This differs from the CPS family definition in that we assume any other member of the household is his/her own family, whereas all individuals related by birth, marriage, and adoption are considered members of the CPS family. Note that there may be more than one "family" in a given CPS "household" (e.g. if

there are multiple non-married elderly living together). Our family definition requires consistency in relational measures in the CPS household in the annual surveys. Because of changes in these measures, we were not able to construct our measure of the family prior to the March, 1968 CPS. We use both families and households as our observational unit.

In order to measure outcomes for any age range, for either households or families, we weight the full sample of households/families by the number of persons sharing that household/family in the relevant age range. That is, our estimated poverty rate for 65-69 year old "households" is the poverty rate over all households containing a 65-69 year old, weighted by the number of persons age 65-69 in that household. So these are essentially person-weighted poverty rates.

The questions in the March CPS are about income earned in the previous calendar year, so that even though we use data from the 1968-2001 surveys, the income data refer to 1967-2000. Over time, the CPS has provided more disaggregated questions on income sources, and, for some types of income, has changed the wording of questions. For each year, we used the most disaggregated income measures to make our poverty measures, which, following official poverty rates, are based on gross income.[2] All income measures were deflated into real 2001 dollars using the all-items Consumer Price Index (CPI).

We begin our analysis with the classic absolute poverty measure, whether a family is below the federal poverty line. Specifically, for the household-level analysis, we assigned to each household the poverty threshold for the appropriate household size. Similarly, for the family-level analysis, we assigned to each family the threshold for the appropriate size, treating

[2] In addition, we constructed poverty measures using a set of more aggregated income measures consistently measured across surveys, and the results of our statistical analysis below did not change. We made no attempt to quantify in-kind transfers received (Smeeding, 1986) into our gross income measures.

the family as the "household" in the federal threshold definition. We did not incorporate the age 65 and older adjustments for one- and two-person households built into the federal thresholds, so that we could compare elderly and non-elderly on an equal basis. This absolute measure of poverty has a number of limitations, however. First, it holds standards of living constant, and does not allow for productivity growth. Specifically, in a mechanical sense, if there is any real productivity growth over time, so that real wage growth is positive, then poverty based on the federal threshold likely will fall over time, because this measure only adjusts for inflation, not real earnings growth. Second, it is a knife-edge measure that does not capture the depth of absolute deprivation.

As an alternative, we define a relative measure of the poverty line: 40 percent of the median income per OECD equivalent of the non-elderly in each calendar year. Non-elderly are defined as individuals 25-54 years old. We adjust both elderly and non-elderly income by the OECD equivalence scale. The relative measure has an important feature. It does not hold living standards constant. Holding real elderly income per equivalent constant, elderly poverty will rise as median non-elderly income rises. This relative measure will yield poverty rates that are more likely to be pro-cyclical, as median income rises and falls over the business cycle.

The potential importance of using this relative measure in addition to the absolute measure is shown in Figure 2. This figure graphs real Social Security expenditures per capita as well as the ratio of Social Security expenditures per capita to mean nonelderly income per capita. The series move in tandem until the mid-1980s, but after that point there is a decline in relative Social Security generosity even as benefits continued to slowly rise in real terms.

In addition, we consider income inequality among the elderly, which we measure as the 90-10 coefficient of variation (i.e., in each calendar year, the difference in the 90^{th} and 10^{th}

elderly OECD equivalent income percentiles normalized by mean elderly income). We also considered other variants of poverty measures. Specifically, we created alternative measures of the absolute poverty line based on 133, 150, and 200 percent, respectively, of the relative poverty line based on 25 and 50 percent of the non-elderly median income, respectively, and measures based on gross and net income. The results did not differ from those presented below. For the remainder of the analysis, all income measures were based on gross income to be comparable with the federal poverty thresholds.

III. Time-Series Evidence

Trends Among All Elderly Households

We begin our time series analysis by considering trends for all elderly households, before turning to subsets of the elderly. Figure 3 shows the absolute poverty rate for elderly households, replicating the result from Figure 1, but adding as well the trends in poverty for nonelderly households. This figure is rescaled so that elderly and nonelderly poverty can be shown in comparable terms. Recall that this graph includes only those born between 1885 and 1930, so it will not match published statistics for all elderly in each year; but the pattern is very similar to published statistics over this time period.

During the period of most rapid Social Security growth, during the late 1960s and early 1970s, both elderly and nonelderly poverty are declining. The difference between the elderly and nonelderly emerges in the recession of the elderly 1980s, when nonelderly poverty rose dramatically while elderly poverty rose only slightly, and the recession of the early 1990s, where elderly and nonelderly poverty followed a similar pattern. In the 1990s, the decline in

nonelderly poverty was much steeper than the decline in elderly poverty. These findings on the relative cyclicality of poverty highlight the protective role of Social Security for the elderly.

Figure 4 shows the relative poverty rate for the elderly and nonelderly. During the late 1960s and early 1970s, the relative poverty rate of the elderly was falling, just as was the case with absolute poverty, although in this case the declines came against a backdrop of rising non-elderly relative poverty. During the 1980s and 1990s, the decline stagnated, so that there was on net little change in relative poverty from 1980 through 2000. The fact that relative poverty did not fall, while absolute poverty did, is consistent with the pattern of benefits during the 1980s and 1990s shown in Figure 2.

Figure 5 shows the evolution of inequality within the elderly over time. Relative to the nonelderly, inequality among the elderly declined significantly from the late 1960s through the early 1990s. But inequality exploded in the late 1990s among the elderly, rising at an even faster rate than inequality among the non-elderly.

Families vs. Households

The analysis thus far has focused on elderly households, which includes both elders and others that share their residence. An alternative means of measuring poverty is just to focus on the elders themselves (and their own spouses and children under 18) in a family-level analysis. These analyses can potentially yield very different measures of poverty because changes in Social Security benefits can change the living arrangements of the elderly. A number of studies, most recent Engelhardt, Gruber and Perry (2002) find that unmarried elders are more likely to live on their own as their Social Security benefits rise. Engelhardt, Gruber, and Perry (2002) found that widows were quite sensitive to benefits in their living arrangements, with each 1%

rise in benefits found to lead to a 1.3% reduction in the share of widows living with others. In addition, elderly divorcees were even more income elastic in their living arrangements. But those who are never married are less elastic, and those are married are not at all elastic. Overall, averaging across all of these groups, there is a sizeable elasticity of –0.4.

This time series change in living arrangements is illustrated in Figure 6, which shows the share of elderly in shared living arrangements over time. This share dropped precipitously from 34% in 1967 to 24% by 1982, and then was relatively constant thereafter. This is very consistent with the rapid run-up in benefits in the late 1960s and 1970s, and the flattening of benefits in the 1980s and 1990s, supporting the notion that Social Security benefits are a major determinant of living arrangements.

These findings can have important implications for the measurement of poverty. In particular, if higher Social Security benefits make the widowed and divorced more likely to live independently, then this will create more elderly households but keep the number of elderly families the same (because in our definition of family, elderly living alone or in shared arrangements are their own family). In addition, the "new" elderly households will be comparatively poor because they only have elderly in them. Therefore, the endogenous response of living arrangements to benefits will bias downward any estimated poverty improvement among elderly households. This suggests that using a family-level analysis may be more appropriate for reflecting Social Security-induced poverty reductions.

Figures 7 shows the results for elderly families, rather than elderly households. For absolute poverty, in Figure 7, the pattern for the elderly is similar, but it is not mirrored by the non-elderly in this case; the poverty rate of non-elderly families actually rises slightly. Poverty rates are much higher, consistent with the notion that there are economies of scale in shared

living conditions). Nevertheless, in these time series data, there is no evidence of a major effect of using families rather than households for the analysis.

Trends by Age Group

There are dramatic differences in the poverty rates of the "young" and "old" elderly. In 2000, households in which 65-69 year olds resided had a poverty rate of 7.5 percent; households in which elders ages 80 and above resided had a poverty rate that was almost twice as high, at 13%. This raises the question of whether all age groups of elderly have shared equally in these dramatic changes in the income distribution.

Figure 8 shows the poverty rates by age group, at the household level (parallel to Figures 3 and 4). In fact, the patterns are remarkably similar across these age groups. In every case we see the steep decline in poverty in the late 1960s and early 1970s, and the much slower decline in the 1980s and 1990s. So there is no evidence here of a relatively large effect on one particular age group.

Trends by Marital Status

Another important source of dispersion in poverty rates among the elderly is marital status. At the household level, the poverty rate of married elders in 2000 was only 5%; for never married elders, it was almost 22%. For divorced and widowed elders, it was 16-17%.

Figure 9 investigate differences in the evolution of income by marital status, for elderly households. In interpreting these figures, it is important to recognize that the composition of each group is changing over time. While the number of married or widowed elders rises by 50% from 1967 to 2000, the number of divorced elders rises by almost 500%, and the number of

never married elders rises by over 300%. Thus, patterns in poverty over time could reflect group composition changes.

Given this caveat, the results for changes in poverty by marital status are quite interesting. It appears that the changes over time for all elderly are driven by the married elderly. The patterns are much stronger for married elderly than for other groups. Particularly striking is the lack of poverty decline for never married elderly, who start out with the second highest poverty rate in 1967 and have the highest rate of these groups by 2000.

IV. Identifying the Impact of Social Security

The previous literature on poverty is voluminous, and we do not attempt to review it here.[3] Instead, we focus on the primary method used to measure the impact of public policies on poverty and how that relates to our instrumental variable identification strategy. Following Jantti and Danziger (2000), let i and t index elderly sub-group and calendar year, respectively, F be a function of resources, then $P_{it}[F(y);z]$ is a poverty measure for some income y and poverty line z. In addition, let b denote Social Security income, so that

$$y = y' + b\,, \tag{1}$$

where y' is market capital and labor income. In principle, the impact of Social Security on poverty is

$$\widetilde{\Delta} = P_{it}[\widetilde{F}(y');z] - P_{it}[F(y);z], \tag{2}$$

where $\widetilde{F}$ is the counterfactual distribution of market labor and capital income in the absence of Social Security. In practice, the primary method for analyzing the impact of Social Security on

[3] See Jantti and Danziger (2001), Cowell (2001), and Gottschalk and Smeeding (2001) for comprehensive recent reviews of various aspects of this literature.

poverty has been to calculate the *actual* difference in poverty using market income and income net of taxes and transfers,

$$\Delta = P_{it}[F(y');z] - P_{it}[F(y);z]. \tag{3}$$

There are three problems with Δ as a measure of the impact of Social Security on poverty. First, it misses is any "crowd out" of real behavior. In particular, observed capital and labor income, y', itself may be a function of benefits, b, if, for example, when faced with an unanticipated and permanent increase in benefits, the elderly leave the labor force earlier, reduce post-retirement hours of labor supplied, increase consumption and reduce saving, or substitute independent for shared living arrangements.[4] Second, survey-based measures of income might be subject to reporting error. Third, to the extent that most of the variation in Social Security benefits that identifies Δ is time-series in nature, there may omitted variables that are correlated with changes in poverty rates and Social Security. For example, lifetime earnings, which enter into Social Security benefit calculations, are affected by aggregate productivity and human capital accumulation that have been changing across time. However, because the federal poverty thresholds are inflation-adjusted, but not average earnings adjusted, in a mechanical sense, poverty rates for successive birth cohorts should be predicted to fall as productivity, human capital accumulation, and real lifetime earnings have risen. Thus, what might appear as an inverse correlation between elderly poverty based on absolute measures and Social Security, as in our figures, may simply be due to rising aggregate productivity. That is, even in the absence of Social Security having had a causal impact, elderly poverty would appear to have fallen as

[4] See Feldstein and Liebman (2001) for a comprehensive recent review of studies on labor supply and saving behavior, Sawhill (1988), Hurd (1990), and Danziger, Haveman, and Plotnick (1981) for earlier reviews. Engelhardt, Gruber, and Perry (2002) review the literature on elderly living arrangements.

benefits rose. This would bias estimates toward finding that Social Security lowered elderly poverty.

Construction of the Instrument

To circumvent these problems we place (3) in a regression framework and construct an instrumental variable for Social Security benefits independent of omitted time-varying factors and based on an exogenous measure of lifetime labor income. The variation in this instrument derives solely from legislative changes in benefits.

To construct our instrument, we note that all of the identifying variation from the Social Security notch is based on year of birth, and divide the underyling CPS micro data into age-by-calendar year cells, which, of course, are also year-of-birth cells. The year of birth refers to the "Social Security beneficiary," defined as the male person in the family 65 and older. If there is no male 65 and older, the beneficiary is the oldest never-married female in the family. These two groups consist of people most likely to have had Social Security benefits based on their own earnings history, rather than that of their spouse. If there is neither a male nor a never-married female 65 and older, we assign the Social Security beneficiary to be the divorced or widowed female that is 65 and older. We assume that her Social Security benefits are based on the earnings of her former or deceased spouse, assumed to be three years older than her, so that the "age" of beneficiary is the woman's age plus three for the purposes of calculating our instrument.[5]

[5] Three years was the median difference in age between male and female spouses in the 1981 New Beneficiary Survey. An additional factor that influences actual Social Security benefit levels for widows is the age at which the spouse dies (for widows). A widow whose husband dies at a relatively young age will receive less than a widow whose spouse dies at an older age, due to a longer earnings history for the deceased spouse. For a divorcee, the age at which the marriage ends and the duration of the marriage (for divorcees) are also important factors, as divorcees

The instrument is based on the notion that Social Security benefits should be constructed to be identical for each year of birth *except for changes in the benefits law*. To do so, we first assigned an earnings history to the 1916 birth cohort. The *Annual Statistical Supplement* produced by the Social Security Administration each year contains the median Social Security earnings by gender for five-year age groups on a yearly basis for the current year as well as years past. We use median male earnings from these tables. We assigned median earnings at age 22 (from the median earnings for ages 20-24 in 1938), age 27 (from median earnings for ages 25-29 in 1943), etc., in five-year intervals. We then assume a linear trend in earnings in between these five-year intervals. This method is used through age 60, and earnings are assumed to grow with inflation for ages beyond 60. We do not use median earnings for workers over 60 because many of these workers have entered "bridge" jobs, so that the median worker's earnings at these ages may not be representative of workers who have remained in their lifetime jobs through age 65. This generates an earnings history for a median male earner in the cohort born in 1916. We use the *same* earnings profile even when assigning benefits to never married females, because we assume that their earnings profile would more closely resemble that of a male worker than that of the median female worker.[6]

Importantly, we want our instrument to vary only with changes in Social Security benefit rules and do not want to capture changes in earnings profiles due to human capital and productivity changes in cohorts over time. Therefore, we use the earnings history that we constructed for the 1916 cohort for *all* birth cohorts, and simply use the CPI to adjust this

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may only claim on their former spouses' earnings histories if the marriage lasted at least 10 years. Because the March survey did not ask the duration of previous marriages for divorcees or the age at death of the spouse for widows, we could not incorporate these factors into the construction of our instrument.

[6] In separate tabulations in the CPS, the median earnings of never married females are significantly more highly correlated with male earnings than with the earnings of all females.

earnings profile for inflation for earlier and later cohorts. Thus, all birth cohorts have the same real earnings trajectory over time. By holding lifetime earnings constant by construction, this insures that all of the variation in the instrument comes from variation in the benefit formula due to the law change. We also assume that this prototypical earnings history ends at age 65, so that we do not incorporate any variation across cohorts in average retirement ages. So we assume all workers retire at age 65; our results are very similar using an instrument that uses a fixed distribution of retirement ages from the 1916 cohort.

Our next step is to input the constructed earnings histories into the Social Security Administration's ANYPIA program. This program calculates the monthly benefit at retirement given a date of birth, date of retirement, and earnings history. ANYPIA gives the monthly benefit at the date of retirement, which is the primary insurance amount (PIA). We assign birthdays of June 2 in the particular year of birth and assume that people retire and claim benefits in June of their retirement year to yield a PIAfor that year of birth..[7] Married couples are assigned 150% of this PIA.

The Social Security Administration periodically increases nominal benefits to adjust for inflation. To obtain a value for the predicted benefit for a given age and year-of-birth cohort, we need to account for all "cost of living adjustments" (COLA) until the date of interview. We calculate the median month in which a given age and year-of-birth cell was interviewed, and administer all COLA adjustments from the time that the person would have retired through this date. This produces a predicted (COLA-adjusted) Social Security monthly benefit for each age and year-of-birth cell. We then multiply by 12 to get the predicted annual benefit.

[7] We assume that they claim in June because some cost-of-living (COLA) adjustments were administered in June of a given year, rather than December of a given year. We assume that the beneficiary claims in June so that he will receive any COLA in that year. This prevents variation across years of birth based simply on the timing of the COLA.

Figure 10 shows the plot of cell mean annual household Social Security income versus the instrument by year of birth. The variation in benefits, even conditional on constant earnings histories, is readily apparent in the graph of the instrument. Benefits are rising steadily until 1910, and then ramp up quickly from 1910 through 1916, before falling precipitously in the 1917-1921 period, and then rising more slowly thereafter. The graph of actual Social Security incomes by cohort tracks this pattern well, with the benefits notch apparent in the data. So there is a good first stage relationship here: our legislative variation instrument clearly predicts actual Social Security incomes.

Regression Specification

To examine the effect of Social Security on elderly poverty, we estimate the following basic specification,

$$P_{it} = \delta' \mathbf{X}_{it} + \theta SSIncome_{it} + u_{it} \tag{4}$$

where i and t index single year of age and calendar year, respectively. P is poverty (or one of the other outcome measures used here), *SSIncome* is the cell mean reported annual Social Security income, and u is a disturbance term. The parameter θ indicates the change in the proportion of elderly in poverty for a change in Social Security income. $\mathbf{X}$ is a vector of all other explanatory variables. We specify $\delta' \mathbf{X}$ as

$$\delta' \mathbf{X}_{it} = \beta' x_{it} + \sum_{i=65}^{90} \gamma_i D_{it}^{Age\ i} + \sum_{t=1967}^{1999} \alpha_t D_{it}^{Year\ t}, \tag{5}$$

where x is a vector of demographic variables that includes controls for cell means of educational attainment of the head (high school diploma, some college, and college or advanced degree), marital status (married, widowed, and divorced in the pooled sample) white, and female. By

controlling for these cell characteristics, we control for any other trends in cohort characteristics that might be correlated with both the legislative changes in benefits determination and with poverty. Following Krueger and Pischke (1992), we also include in (5) a full set of dummies for the age of the head, $D^{Age\,i}$, and calendar year dummies, $D^{Year\,t}$.[8] The age dummies control for differences across age groups in the outcome measure; the year dummies control for any general time trends in the outcome measure.

Thus, after controlling for age and calendar year, the variation in *SSIncome* is based only upon year of birth. When we then instrument with the variable described above, which we denote as Z, our model is identified solely by legislative variation in benefits generosity across birth cohorts, and not any differences in their earnings history. The regression analysis is based on 950 elderly age-by-year cells. The means of the dependent variable and primary explanatory variable are shown in Table 1 for each sample.[9]

Visual Inspection

To illustrate the nature of the regression results that follow, we begin with a visual inspection of the data. Figure 11 shows the average poverty rate at ages 65 and older for each birth cohort, graphed against our instrument for that birth cohort. There is a rapid decline in poverty for early cohorts, where benefits are rising, and this rate of decline slows substantially after the notch in 1916, although the decline does continue. This is suggestive of a role for benefits, but the correspondence is not particularly striking.

[8] The excluded group consists of families with heads' age over 90, observed in calendar year 2000.
[9] Descriptive statistics for all variables and samples are available in an appendix from the authors.

Figure 12 shows a parallel graph for shared living arrangements. Once again, there is a steep decline in the early years of the sample, when benefits are rising most rapidly, then a turnaround and rise in shared living arrangements when Social Security benefits fall and flatten. This evidence is very consistent with a benefits effect on shared living arrangements.

V. Estimation Results

Basic Results

Table 2 shows the grouped OLS and IV estimation results for the full sample that includes all elderly, where the weights were based on the cell sizes. Standard errors are shown in parentheses. Each row shows the estimate of θ for the associated outcome measure. Columns 1 and 2 give the grouped OLS and IV estimates of θ with no other controls, respectively. Column 3 gives the IV estimates with other controls. In columns 1-3, in which, the outcome and Social Security measures are in levels, all coefficients are multiplied by 1000 for ease of interpretation; so, the coefficient shows the impact of a real $1000 rise in annual Social Security benefits on the outcome. In column 4, the outcome and the Social Security measures are in logs, so that the coefficients are interpreted as elasticities, and column 5 shows the results in logs with the $\mathbf{X}$ controls. Panel A gives estimates for elderly households and Panel B for families.

Using the fraction of elderly households below federal poverty threshold (the head-count ratio) as the dependent variable (row 1, Panel A), a $1000 increase in annual benefits reduces the poverty rate by 2.8 percentage points (column 1). The IV estimates in columns 2 and 3 imply decreases in the poverty rate of 3.5 and 3.1 percentage points without and with controls, respectively. The IV estimates from the log specification with controls in column 5 imply an

elasticity of the poverty rate to Social Security benefits of -0.72, so that if benefits were cut by 10 percent, the poverty rate would be expected to rise by 7.2 *percent* (not percentage points).

Over the 1967-2000 period, the poverty rate for this sample fell from 28.3 percent to 11.6 percent, or by 16.7 percentage points, while the simulated Social Security benefit, Z, rose by $5760, or 91%. Hence, the IV linear estimate in column 3 implies that the increase in Social Security benefits of $5760 would lead to a 17.8% decline in poverty rates. The IV log estimate in column 5 implies that the 91% rise in benefits should have led to a 66% decline in poverty rates. Both of these estimates are almost exactly the same as the poverty decline experienced by these elderly, suggesting that Social Security can explain all of the decline.

The first row of panel B shows the estimates of θ for the family-level dataset. The results for elderly families are much stronger. In column 5, the estimated elasticity of the poverty rate to Social Security benefits is -1.38, which suggests that a cut in benefits of 10 percent would increase the proportion of elderly families in poverty by 13.8 percent. The IV linear estimate in column 3 implies that each $1000 increase in Social Security benefit would cause a 5.7 percent decline in elderly poverty.

At the family level, the poverty rate fell from 39.4 to 16.9%, a decline of 22.5 percentage points (57% of base value). Applied to the $5760 (91%) rise in benefits over this period, both of these estimates suggest that, at the family level, poverty actually fell *less than it should have* given the rise in benefits. The log estimate suggests that family level poverty should have fallen by 126% (twice the actual fall), and the level estimate suggests that family level poverty should have fallen by 33% (50% larger than the actual fall).

The second row of Table 2 gives the estimates of θ for the relative poverty rate. Increases in Social Security benefits appear to play a strong causal role in reducing poverty for

both the levels and log specifications. Once again, there is a much stronger effect for elderly families than households, a consistent finding throughout the empirical analysis, and one to which we return below.

The third row of each panel shows the estimated impact of Social Security on our measure of inequality (the 90-10 difference divided by mean income). For elderly households, there is a significant reduction in inequality, but for elderly families, this finding is very sensitive to the inclusion of controls in the model. Overall, the results in Table 2 indicate that Social Security has played a very significant role in reducing elderly poverty, measured as (absolute and relative) rates and gaps. However, it may be a fairly blunt instrument at the family level, where there are only insignificant declines in inequality.

The final row of the table shows the impact of Social Security benefits on shared living arrangements. There is a sizeable negative effect, with the log estimate suggesting an elasticity of shared living arrangements of 1.8 with respect to the benefit level. This is an enormous effect, much larger than is found in Engelhardt, Gruber and Perry (2003) for their full sample.

Restricting the Time Period

One disadvantage of the estimation strategy thus far is that it does not focus explicitly on the "notch" variation in benefits. Much of the identification of the results in Table 2 comes from the run-up in benefits from 1885 onwards. If there is a simple birth-cohort trend in poverty, this could be driving much of the results.

To address this issue, in Table 3 we reduce the sample of years of birth used to the ten years before and after the benefits peak in 1916. We show the results only for the two IV specifications including controls, in levels and in logs.

Overall, using these notch years for identification confirms our main finding from Table 2: there is a sizeable and significant effect of Social Security benefits in terms of reducing elderly poverty. The log results are very similar to Table 2. The effect on poverty for households rises and for families falls, with both converging in an elasticity of -0.8 to -1, which is still large enough to more than explain the time series trends in poverty rates. For the level specification, the convergence between household and family results also occurs, but to a much lower level.

The inequality results also weaken when the sample is restricted, confirming the insignificant effect on inequality of these policy changes. There is also a dramatic reduction in the elasticity of shared living arrangements, which falls to -0.34 and is marginally significant. This is much closer to the full sample -0.4 estimate in Engelhardt, Gruber and Perry (2002), which was estimated on a more restricted set of birth cohorts.

Results by Marital Status

The pooled sample used in Table 2 combines households of different marital types, some of which might be expected to display quite different responsiveness of Social Security to poverty. For example, because most married couples live independently (of other adults) and have many potential sources of income with which to support themselves, they may be expected to have relatively low sensitivity of poverty to Social Security *a priori.* Married couples have a much lower baseline rate of poverty than the other groups in our sample: over our sample period, the rate of absolute poverty for married couples is 9.5%, while it is 26.5% for divorcees, 24.2% for widows, and 21.3% for those never married.

Tables 4 show estimation results for four different sub-samples, split out by marital status. Once again, we show only the level and log IV specifications, including control

variables. Surprisingly, married couples appear to have the most elastic poverty response to Social Security, with very large estimated elasticities in Table 4 across the various outcome measures. The responses for other groups are much smaller, and are only significant at the household level for widows. At the family level, the effects are much larger for widows, although they remain smaller in elasticity form than for married households. The results are also significant in levels, although much smaller, for widows and the never married at the family level.

One finding that is consistent across all specifications in our analysis is that the impact of Social Security on poverty is stronger for elderly families than households. Indeed, the final row of the table shows that for all marital status groups, there is a strong effect of Social Security benefits on living in shared arrangements. The findings here are different than those of Engelhardt, Gruber, and Perry (2002), who found a strong effect on living arrangements for widows and divorcees, but not for married couples. These differences are due to differences in birth cohorts used; when the sample is restricted to the narrower set of birth cohorts from 1900-1930, the effects on shared living arrangements are much stronger for the widows and divorcees relative to married couples.

As noted earlier, the fact that Social Security impacts living arrangements can explain the much stronger response of family-level poverty measures. If higher Social Security benefits make the widowed and divorced more likely to live independently, they will cause the creation of many elderly households that are comparatively poor because they only have elderly in them. Therefore, the endogenous response of living arrangements to benefits will bias downward any estimated poverty improvement among elderly households.

VI. Conclusion

The most frequently cited "victory" in the war on poverty of the 1960s is the dramatic decline in elderly poverty. This poverty decline is typically attributed to the growth in Social Security over this period, but to date there has been little direct assessment of the causal role of the Social Security program in determining elderly poverty. We provide such a direct assessment by using the variation in the generosity of the Social Security program across birth cohorts over the 1885-1930 period. Our analysis suggests that the growth in Social Security can indeed explain all of the decline in poverty among the elderly over this period.

We also highlight the important sensitivity of poverty measurement to living arrangements. Poverty measured at the family level is much more sensitive to increases in program generosity than is poverty measured at the household level. This is consistent with the notion that part of the response to rising Social Security benefits is to encourage increased independent living among lower-income elders.

While our results are striking, they are not the final word on this important topic. A particularly important question remains the implications of this increase in elderly income for broader measures of well-being, such as consumption. For example, was this rise in income associated one-for-one with increased consumption, or did it serve to crowd out other sources of consumption smoothing, such as transfers from family members? Analysis of these types of questions is important for a richer understanding of the welfare implications of Social Security program growth.

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Table 1: Sample Means

Variable	(1) Mean	(2) Standard Deviation
Simulated Benefit	$10,507	$2,761
Household SS Income Per Equivalent	$6,896	$1,396
Household Absolute Poverty Rate	18.5%	6.9%
Household Relative Poverty Rate	23.7%	6.3%
Household 90-10 Ratio	1.56	0.14
Family SS Income Per Equivalent	$7,288	$1,441
Family Absolute Poverty Rate	27.9%	12.7%
Family Relative Poverty Rate	31.4%	10.9%
Family 90-10 Ratio	1.54	0.19
% in Shared Living Arrangements	0.28	0.09

Notes: Table shows means and standard deviations for selected variables from the CPS data set described in text.

Table 2: Estimation Results for Full Sample

	(1) OLS	(2) IV	(3) IV, with controls	(4) Log IV	(5) Log IV, with controls
			A. Household Level		
Absolute Poverty	-.028 (.002)	-.035 (.003)	-.031 (.003)	-.752 (.146)	-.722 (0.165)
Relative Poverty	-.028 (.002)	-.034 (.003)	-.035 (.004)	-1.025 (.127)	-1.155 (.151)
90-10 Ratio	-.055 (.009)	-.083 (.013)	- 035 (.016)	-.478 (.072)	-.221 (.085)
			B. Family Level		
Absolute Poverty	-.055 (.003)	-.068 (.004)	-.057 (.004)	-1.721 (.174)	-1.383 (.176)
Relative Poverty	-.049 (.003)	-.057 (.004)	-.052 (.004)	-1.693 (.163)	-1.575 (.178)
90-10 Ratio	-.049 (.011)	-.065 (.015)	-.018 (.019)	-.286 (.104)	-.017 (.118)
Shared Living	- .036 (.003)	-.047 (.004)	-.038 (.004)	-2.382 (.221)	-1.787 (0.211)

Notes: N = 950 for all regressions. Table shows coefficients of interest from regressions that also include the full set of age and year dummies. Standard errors are in parentheses. Regressions "with controls" also include controls for the percentage in age/year cell that are: female; white; high school graduate; some college; college graduate; advanced degree; married; divorced/separated; widowed. The IV regressions instrument with the simulated Social Security benefit described in text. First three columns are estimated in levels; remaining columns in logs.

Table 3: Estimation Results Restricting the Time Period to 1906-1926		
	(1) IV, with Controls	(2) Log IV, with Controls
B. Household Level		
Absolute Poverty	-.022 (.004)	- 1.062 (.243)
Relative Poverty	-.032 (.005)	-1.372 (.246)
90-10 Ratio	-.016 (.022)	-.097 (.118)
A. Family Level		
Absolute Poverty	-.025 (.004)	-.989 (.206)
Relative Poverty	-.030 (.005)	-1.117 (.189)
90-10 Ratio	-.027 (.024)	-.158 (.137)
Shared Living	-.009 (.004)	-.341 (.174)

Notes: N = 419 for all regressions. Table shows coefficients of interest from regressions that also include the full set of age and year dummies and controls for the percentage in age/year cell that are: female; white; high school graduate; some college; college graduate; advanced degree; married; divorced/separated; widowed. Standard errors are in parentheses. The regressions instrument with the simulated Social Security benefit described in text. First column estimated in levels, second in logs.

Table 4: Results by Marital Status

	Married		Widowed		Divorced		Never Married	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV, with Controls	Log IV, with Controls	IV, with Controls	Log IV, with Controls	IV, with Controls	Log IV, with Controls	IV, with Controls	Log IV, with Controls
				A. Household Level				
Absolute Poverty	- .033 (.004)	-2.810 (.518)	- .032 (.006)	-.574 (.168)	-.020 (.014)	-.183 (.446)	-.012 (.016)	-.598 (.496)
Relative Poverty	-.044 (.004)	-2.620 (.385)	-.039 (.006)	-1.012 (.156)	-.023 (.015)	-.427 (.430)	-.029 (.016)	-1.122 (.431)
90-10 Ratio	-.038 (.021)	-.240 (.173)	-.075 (.023)	-.370 (.096)	-.024 (.065)	.090 (.307)	.060 (.078)	.117 (.277)
				B. Family Level				
Absolute Poverty	-.040 (.004)	-3.506 (.599)	-.093 (.007)	-1.644 (.163)	-.041 (.014)	-.545 (.405)	-.034 (.015)	-.731 (.264)
Relative Poverty	-.049 (.005)	-2.827 (.451)	-.085 (.007)	-1.803 (.170)	-.036 (.014)	-.557 (.362)	-.032 (.015)	-.785 (.273)
90-10 Ratio	-.026 (.023)	-.055 (.209)	-.008 (.031)	.220 (.160)	-.001 (.074)	.252 (.439)	.014 (.075)	.170 (.250)
Shared Living	-.017 (.004)	-2.131 (.496)	-.093 (.009)	-2.509 (.229)	-.050 (.016)	-1.692 (.655)	-.061 (.019)	-1.036 (.305)

Notes: N = cells for married regressions (first set of two columns), 950 for widowed regressions (second set of two columns), 815 cells for widowed regressions (third set of two columns), 808 for never married regressions (last set of two columns). Table shows coefficients of interest from regressions that also include the full set of age and year dummies and controls for the percentage in age/year cell that are: female; white; high school graduate; some college; college graduate; advanced degree. Standard errors are in parentheses. The regressions instrument with the simulated Social Security benefit described in text. First column in each panel estimated in levels, second in logs.

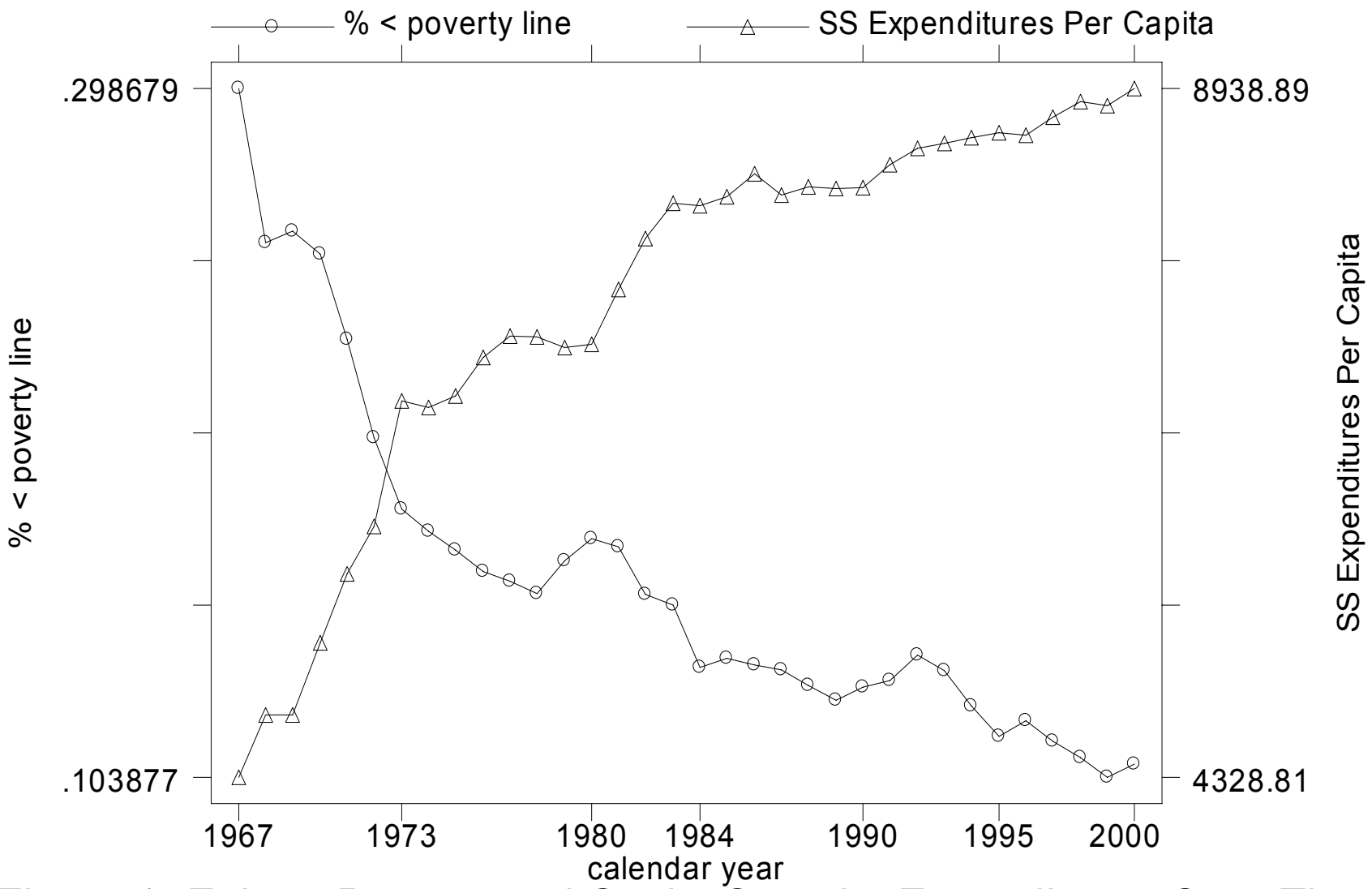

Figure 1: Elderly Poverty and Social Security Expenditures Over Time

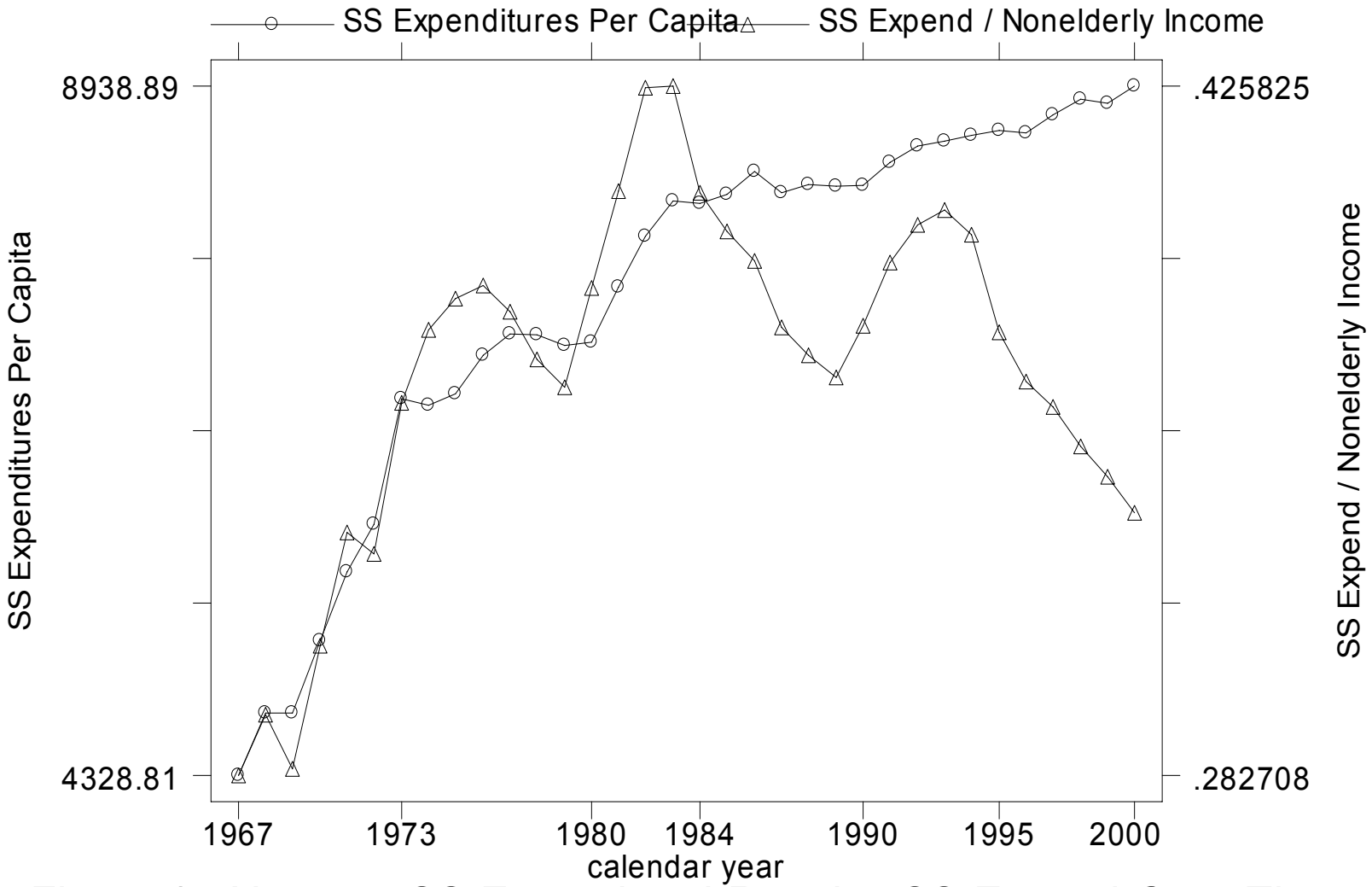

Figure 2: Absolute SS Expend and Relative SS Expend Over Time

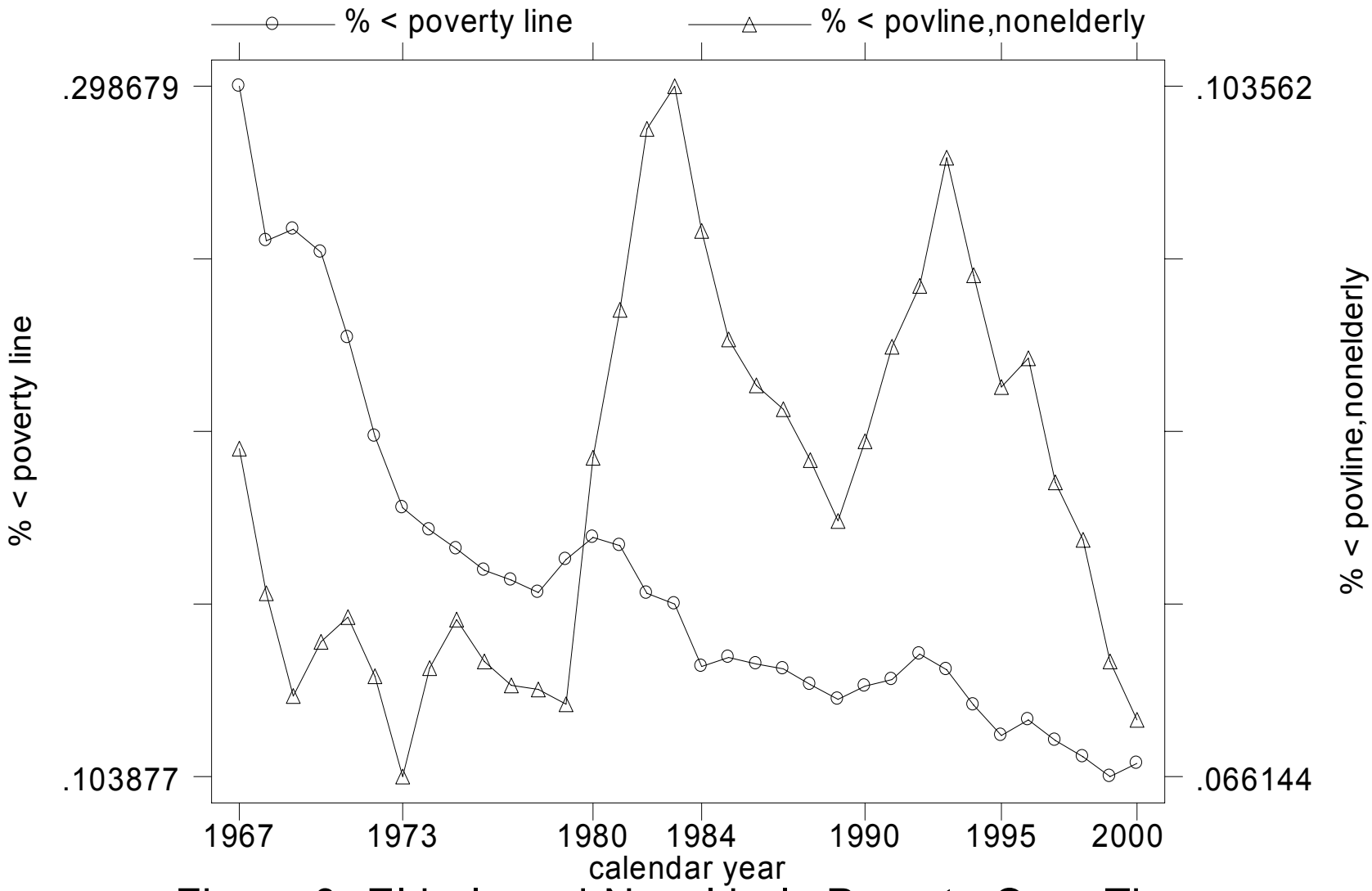

Figure 3: Elderly and Nonelderly Poverty Over Time

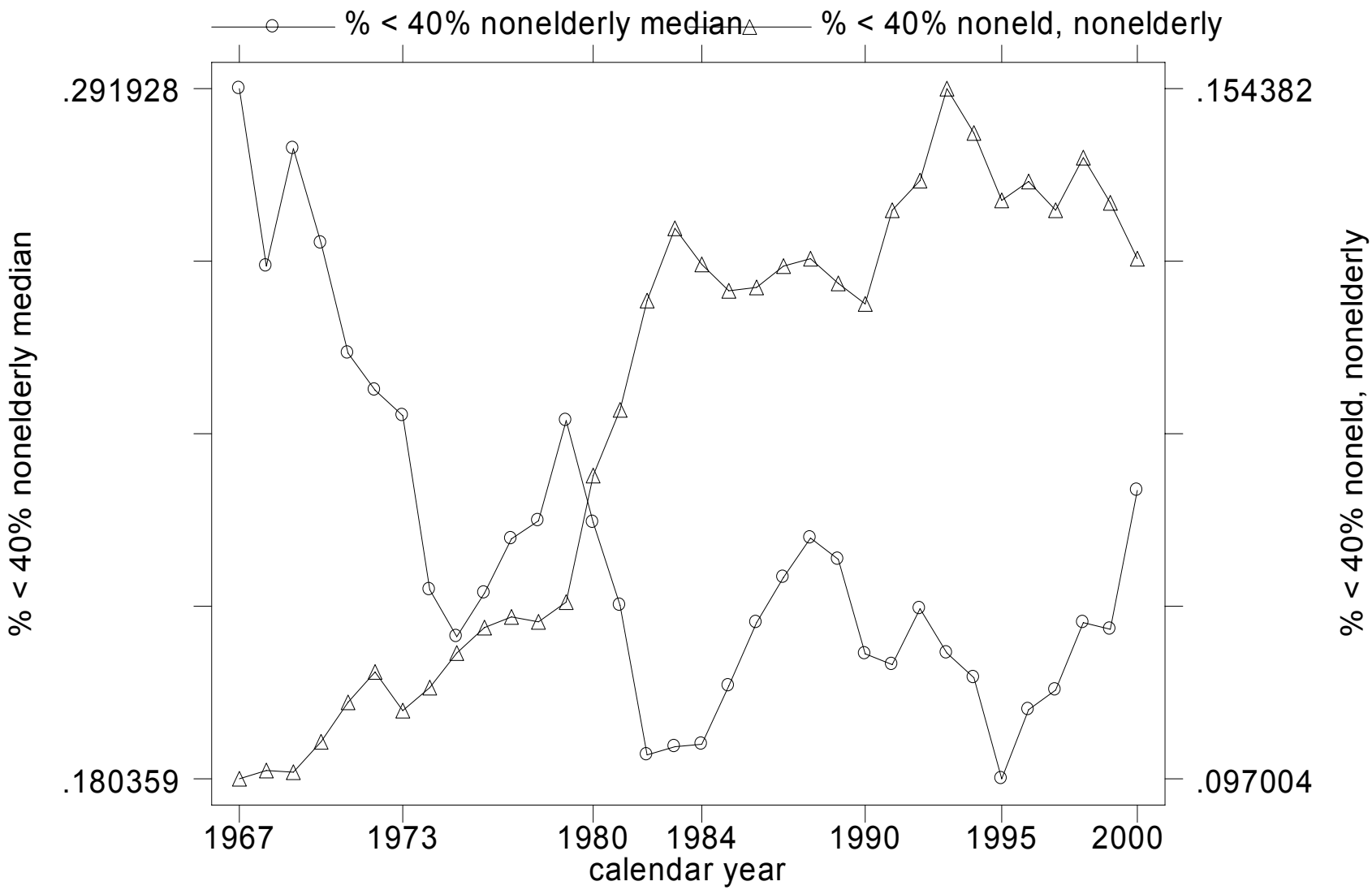

Figure 4: Relative Poverty

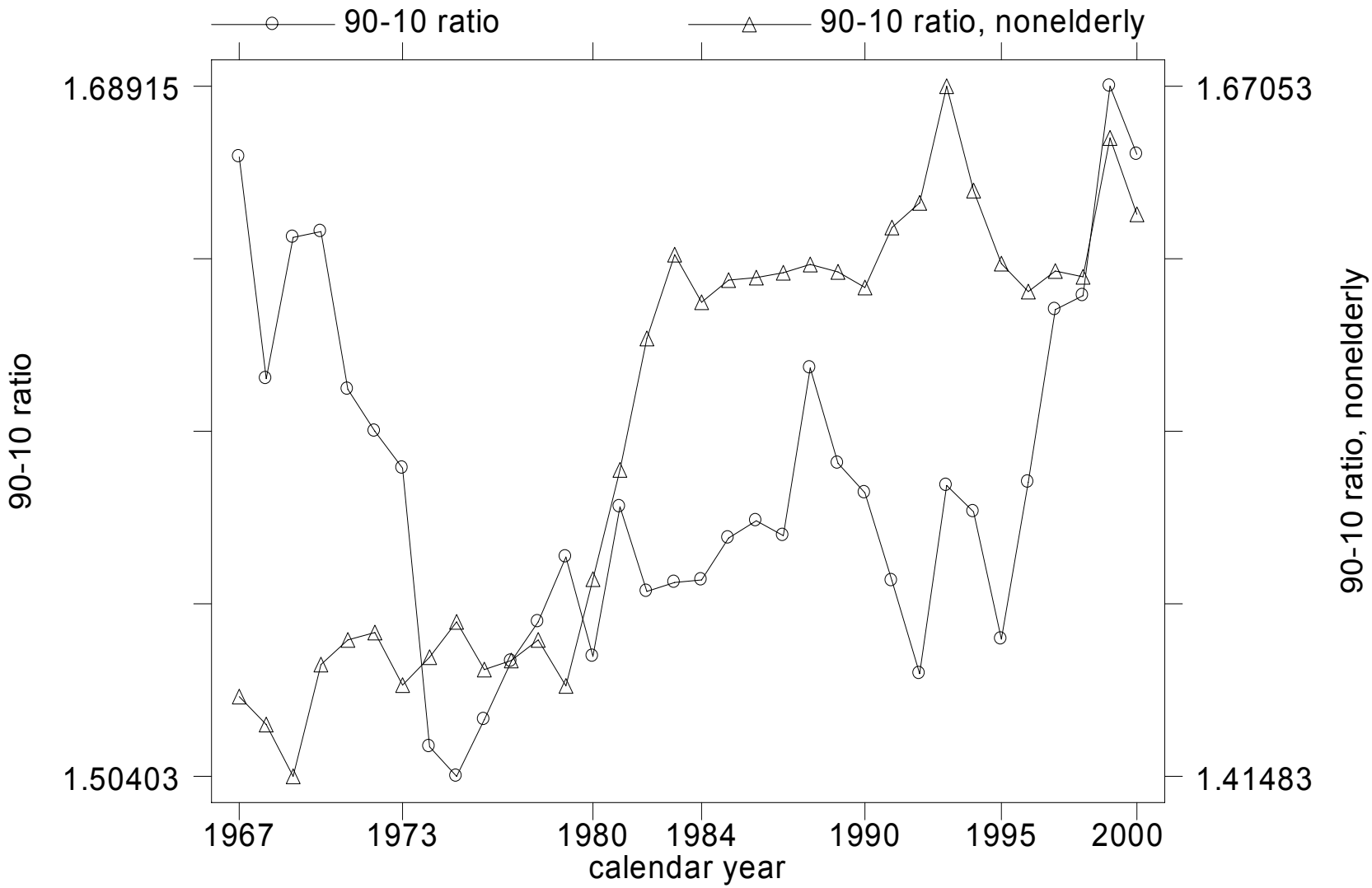

Figure 5: Income Inequality

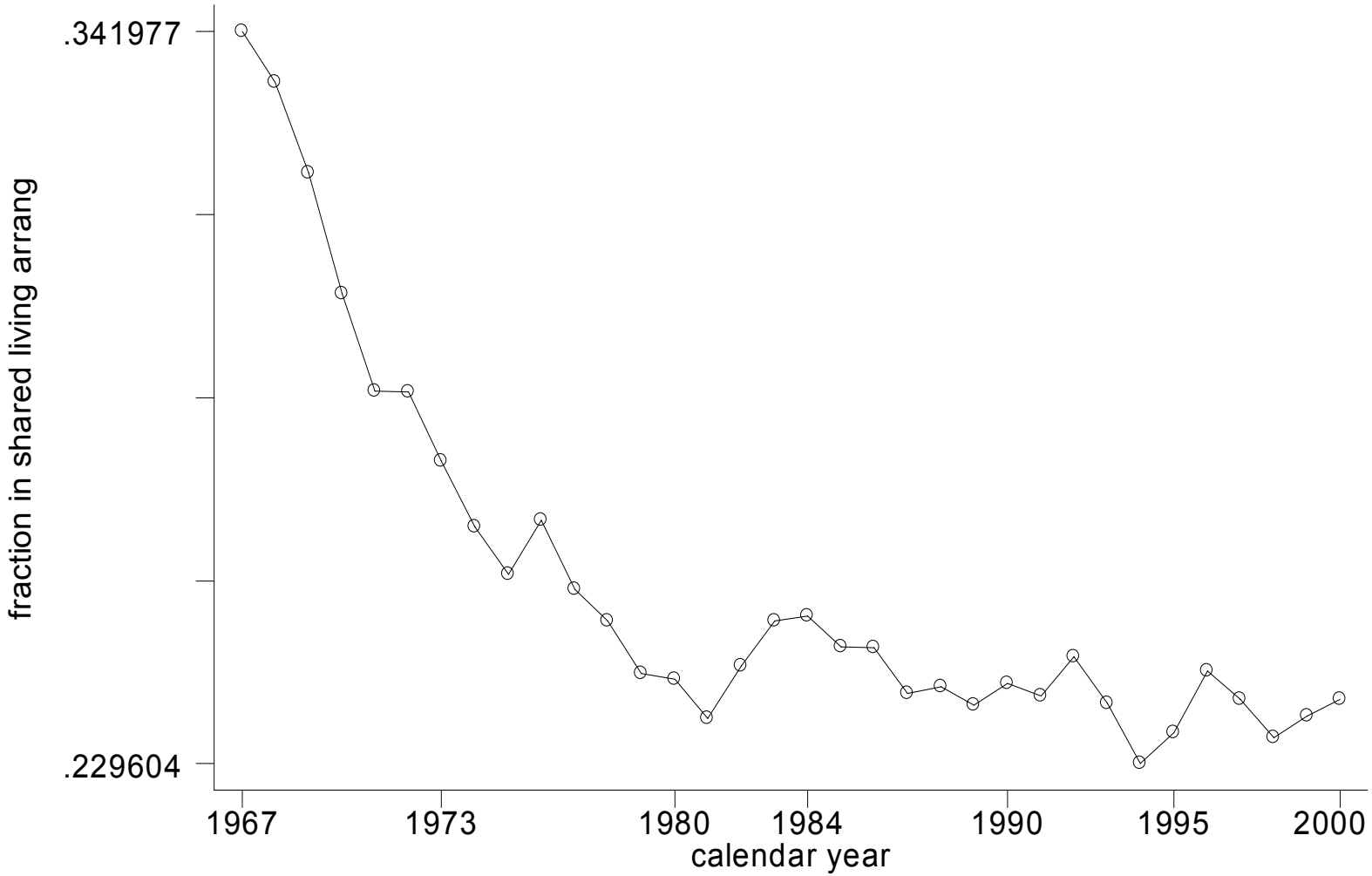

Figure 6: Shared Living Arrangements

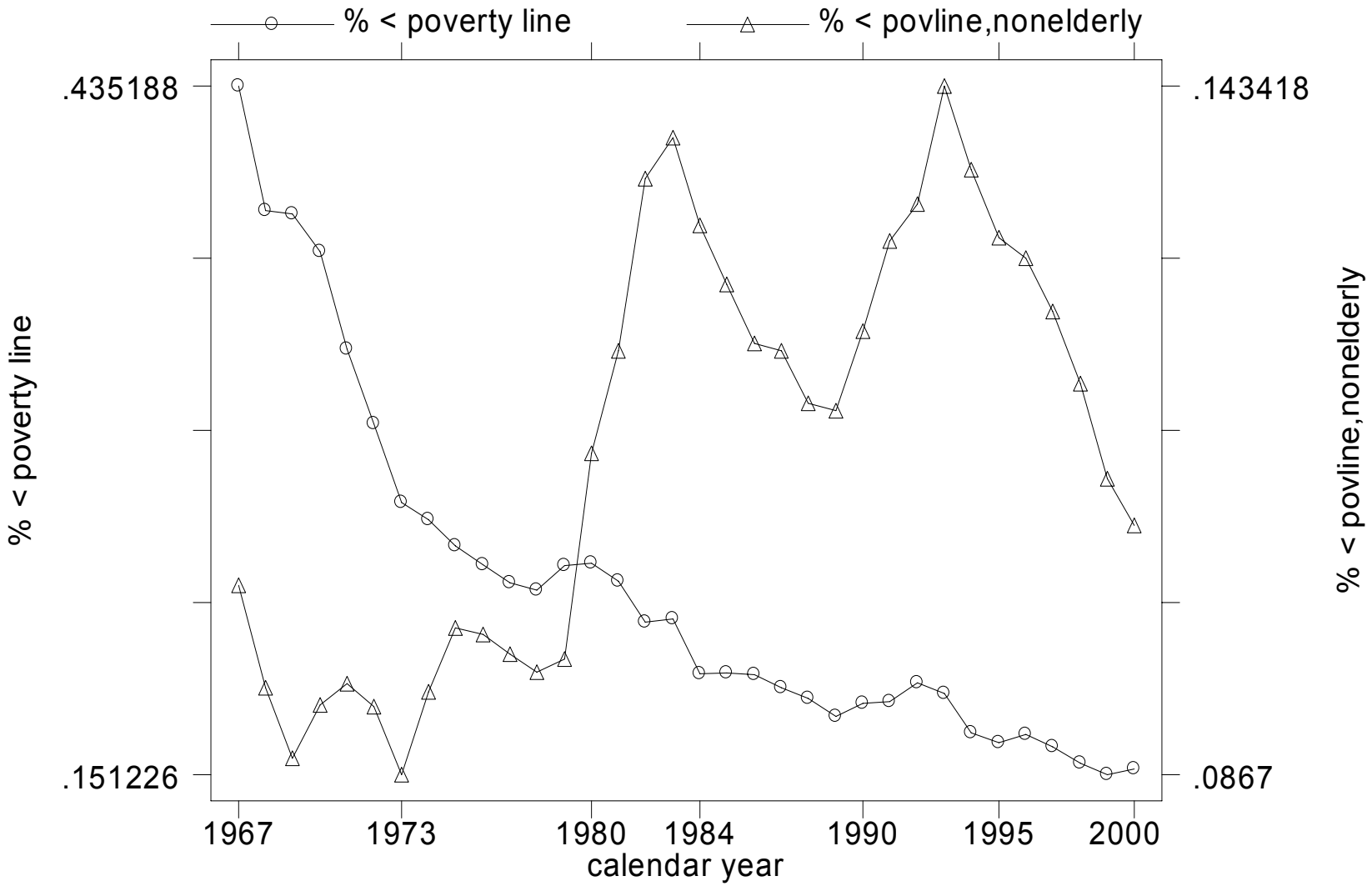

Figure 7: Absolute Poverty,Families

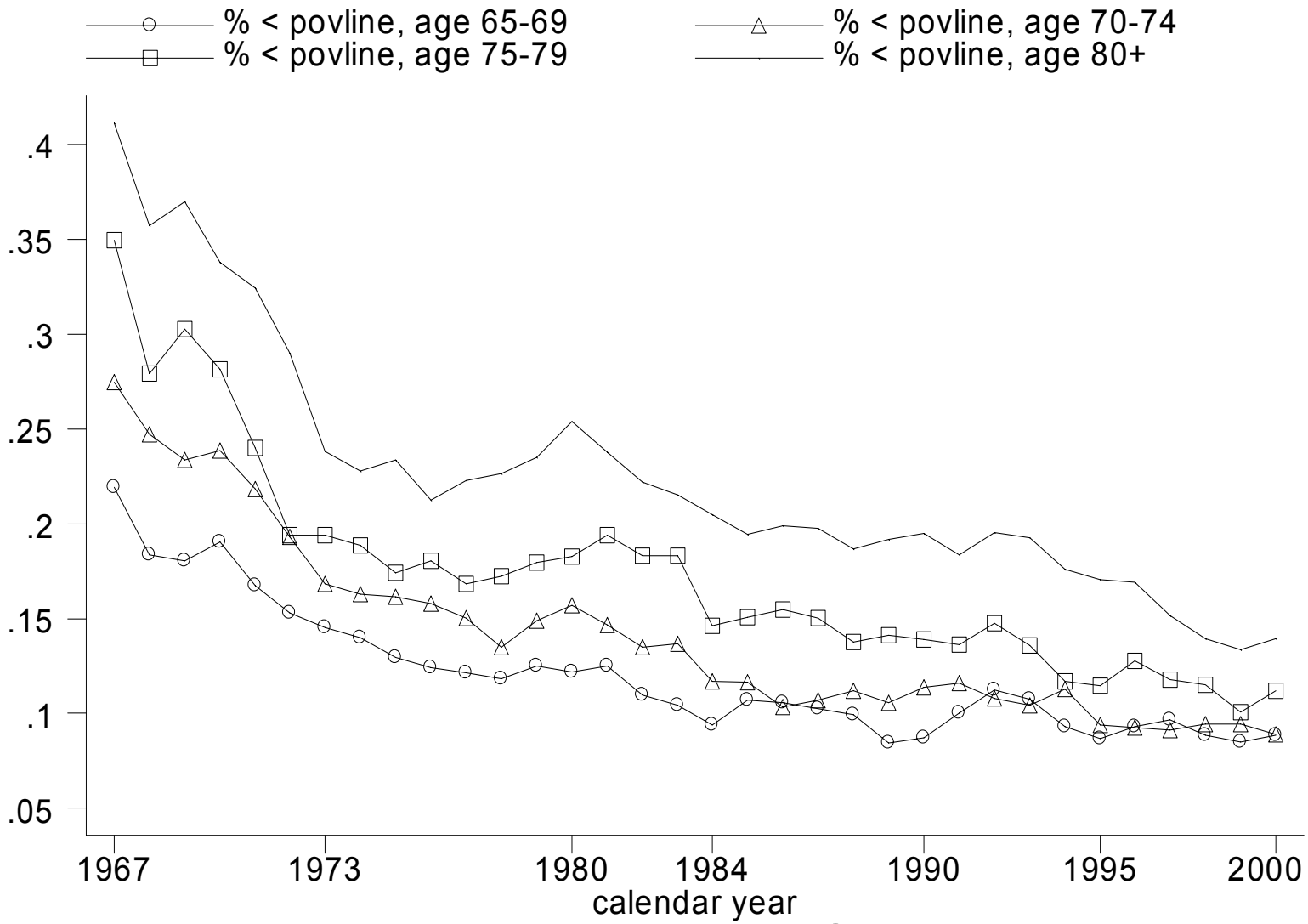

Figure 8: Poverty by Age Group

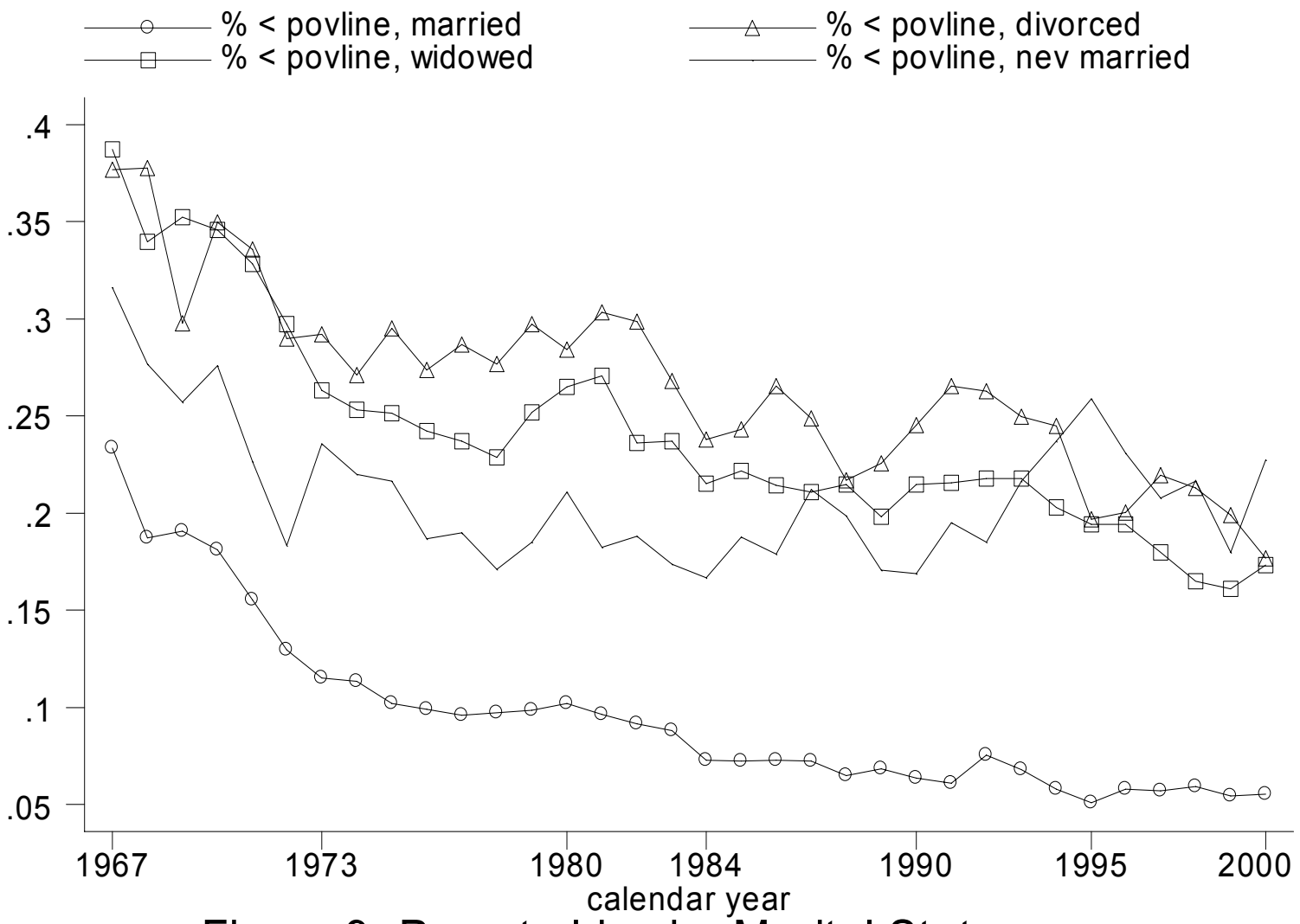

Figure 9: Poverty Line by Marital Status

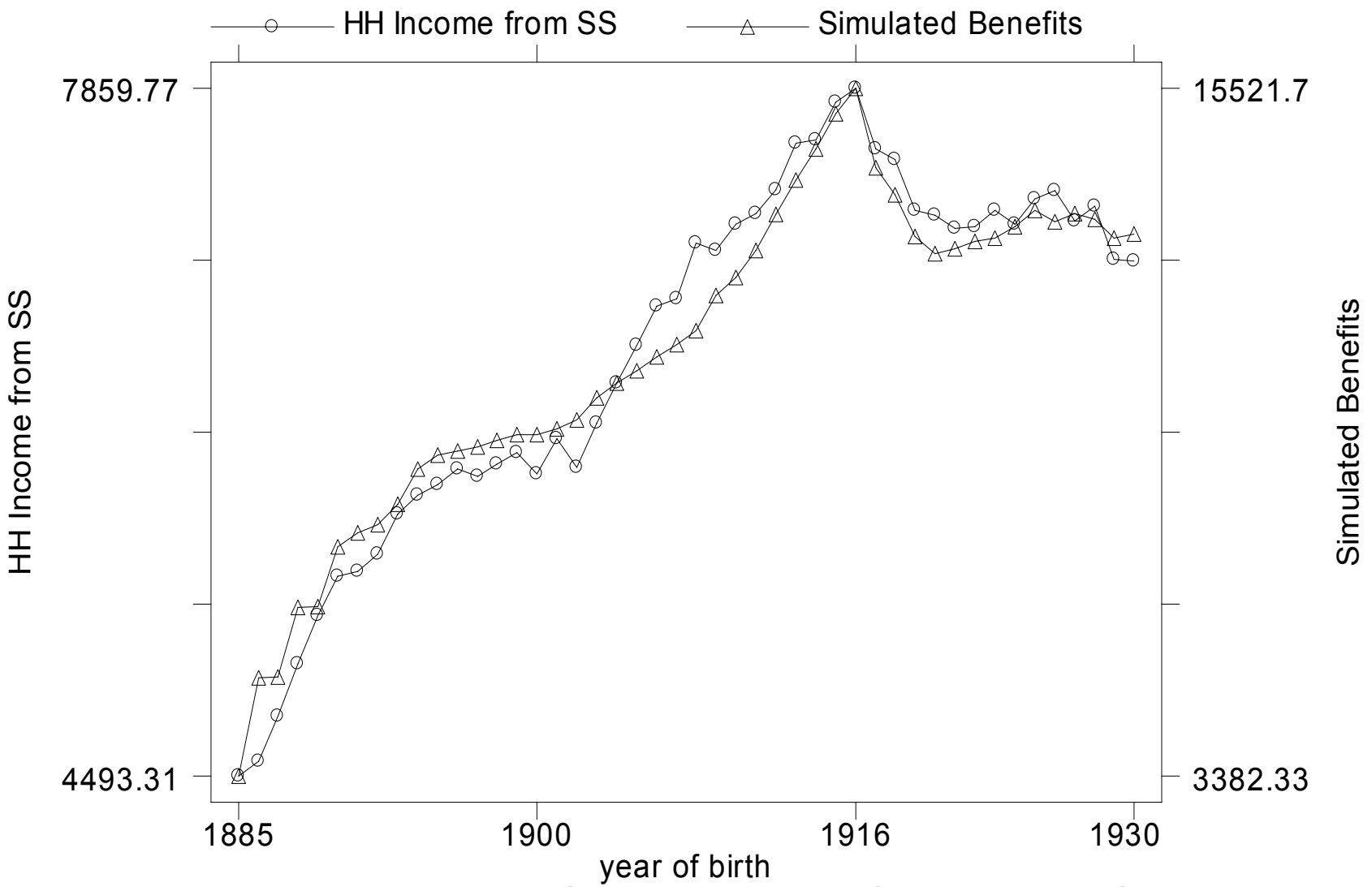

Figure 10: Actual vs. Simulated Benefits by Birth Cohort

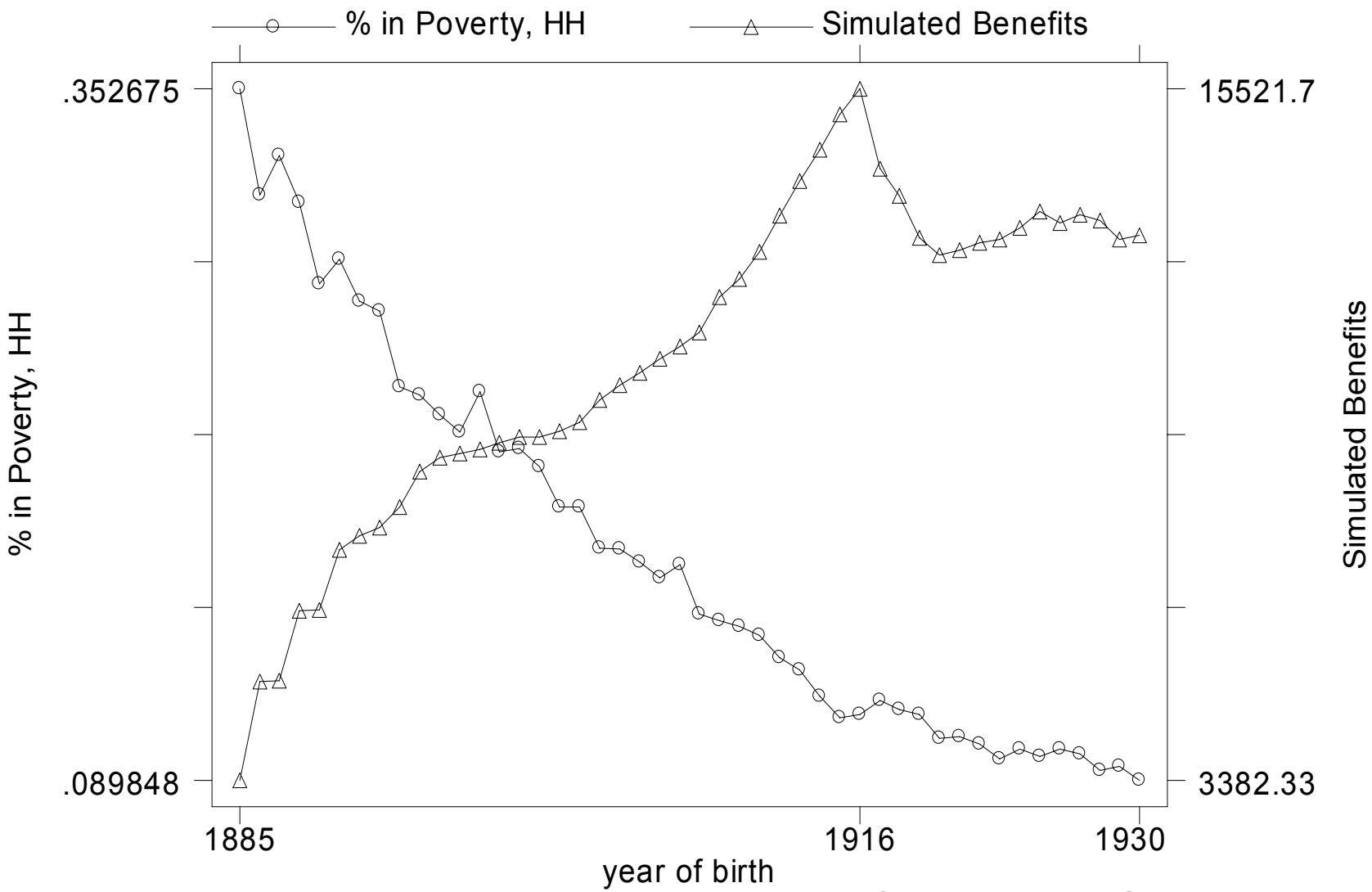

Figure 11: HH Poverty Rate vs. Benefits by Birth Cohort

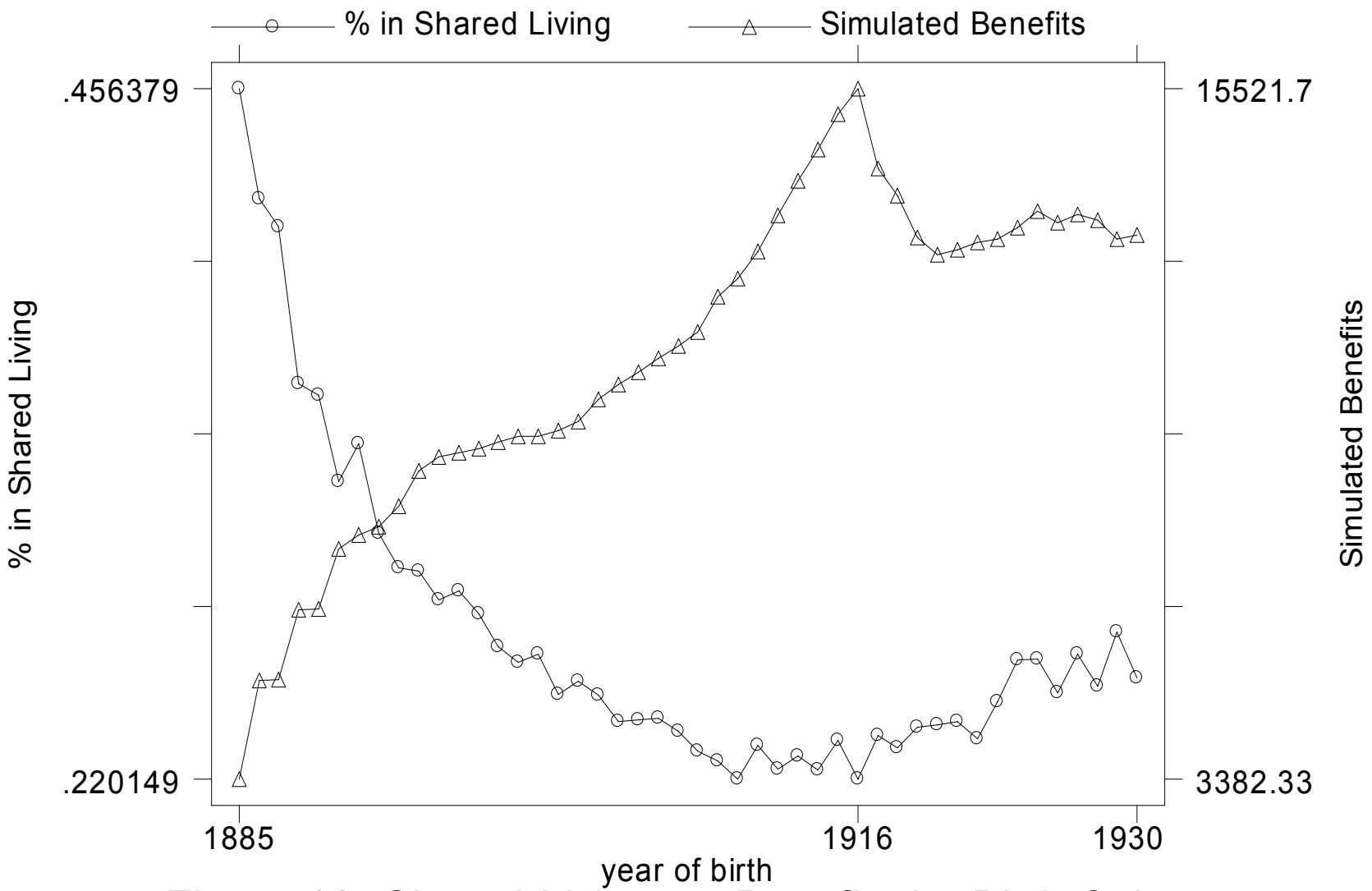

Figure 12: Shared Living vs. Benefits by Birth Cohort