HOUSEHOLD SAVING IN THE ‘90s:

EVIDENCE FROM CROSS-SECTION

WEALTH SURVEYS

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Abstract

This paper uses a series of cross-section wealth surveys to measure how wealth accumulation and active saving rates varied across cohort-groups during the early and mid 1990s. Our estimated rates of saving and wealth change across cohorts show a somewhat more dramatic life cycle pattern than found in previous studies, in part because we use a new technique, and in part because the cross-section wealth surveys we use oversample the wealthiest families whose behavior dominates aggregate changes. Adjusting the wealth-change rates for bequests and subtracting out the capital gains component of wealth change move the estimates in the direction of results from previous studies, but the biggest changes in that direction result from excluding the top of the wealth distribution in each year.

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1. Introduction

The economics profession has a long-standing interest in how saving and wealth accumulation vary over the life cycle, because observations about actual saving behavior are useful for validating or refuting various theories of intertemporal resource-allocation. The general interest in life cycle saving behavior has been heightened of late because of the secular decline in U.S. household-level saving.[1] This paper uses a series of cross-section wealth surveys from the early and mid 1990s to measure cohort-level wealth accumulation and active saving. Our estimated rates of saving and wealth change across cohorts differ somewhat from previous studies, in part because we use a new technique, and in part because the cross-section wealth surveys we use oversample the wealthiest families whose behavior dominates aggregate changes.

The approach we take of creating a pseudo-panel from multiple cross-section wealth surveys is an alternative to measuring saving or wealth change directly with household survey data.[2,3] We apply the pseudo-panel technique to the 1989, 1992, and 1995 Survey of Consumer Finance (SCF)

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[1] See, for example, Gale and Sabelhaus (1999).

[2] The pseudo-panel or "synthetic cohort" approach is described by Deaton (1985). For an application to life cycle consumption patterns, see Banks, Blundell, and Tanner (1998). Another good example, which significantly influenced this paper, is Robb, Magee, and Burbidge (1992).

[3] For a review of studies which directly measure household-level saving using various methods, see Browning and Lusardi (1996). For example, Bosworth, Burtless, and Sabelhaus (1991) and Sabelhaus (1993) present direct saving estimates computed by subtracting survey-reported expenditures from survey-reported income, and by measuring the change in wealth over short periods for families in panel surveys. More recently, Dynan, Skinner, and Zeldes (1998), Kennickell and Starr-McCluer (1997), and Hurst, Luoh, and Stafford (1998) have measured saving across groups using wealth change over several-year periods in SCF and PSID longitudinal data sets. Though the SCF panel is not expected to be repeated, the PSID wealth supplements will be included in the survey every five years.

cross-section wealth surveys, which oversample the wealthy and are thus more representative of the entire wealth distribution. By choosing to apply the pseudo-panel approach to the SCF cross-sections, we are trading off making direct estimates of saving with limited data in favor of making indirect estimates using the highest quality data available.[4]

The next section describes how we use the wealth cross-sections to measure cohort-level variables. Our measures of wealth change by cohort are computed by differencing wealth levels for various cohort-groups over time. Since the data we use are for 1989, 1992, and 1995, the appropriate strategy is to look at groups where the age brackets are increasing by three years in each cross-section. We also discuss the effect of mortality-associated bequests on cohort-level wealth change, and how we subtract capital gains from total wealth change to generate an "active" saving measure.

In the third and fourth sections we present our various measures of cohort-level wealth holdings, wealth change, and saving. Even after making appropriate adjustments for mortality-related bequests and capital gains, our estimates of how saving and wealth accumulation vary across cohorts are somewhat more dramatic (more saving when young, more dissaving when old) than found in previous studies. That result may simply be attributable to introducing the pseudo-panel technique, but when we recompute our estimates after excluding the top of the wealth distribution, we generate wealth change and saving values which are much closer to the direct-survey findings. That result suggests that the patterns of wealth accumulation in the direct-survey saving studies may only be representative of the limited subset of families in those surveys.

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[4] Other studies have used these and other SCF cross-sections for synthetic cohort analysis of the impact of taxes on portfolio composition (Scholz (1994), Poterba and Samwick (1997)) and the impact of 401(k) eligibility on total household saving (Sabelhaus and Ayotte (1998)).

2. Measuring Cohort-Level Saving Using Wealth Cross-Sections

The pseudo-panel technique used in this paper is a significant departure from the approaches taken in other studies of cohort-level saving and wealth change, so it is important to begin with a description of the method. The primary reason for choosing this approach is that we can work with truly representative measures of cross-section wealth distributions at each point in time. The biggest drawback to the approach is that we cannot measure the change in wealth for particular households; we can only infer how wealth changed across identifiable groups over time.

The pseudo-panel technique allows us to measure wealth change and saving rates without identifying measures for specific families. For example, to measure saving of a given cohort in 1995, we start with their wealth holdings in 1995 and then subtract the wealth holdings of the group j years younger in either previous survey year 1995-j (j=3 or 6). If all of the cross-sections are random and representative, the total change in wealth for that cohort group will be accurately identified, even though we are observing different samples of the population in each of the years.

Though the pseudo-panel technique is easy to describe, the interpretation of results is somewhat complicated because total cohort-level wealth holdings evolve over time for reasons that are not always associated with saving behavior. The first problem with measuring wealth change in a pseudo-panel is associated with family formation and dissolution; in particular, wealth transferred through bequests has to be properly accounted for. The second set of measurement issues has to do with distinguishing capital gains on existing assets from active saving when analyzing total wealth changes over time.

Family formation and dissolution have first-order effects on estimated cohort-level wealth change when using the pseudo-panel approach. Consider, for example, an older cohort–over the course of the pseudo-panel, as families in the cohort disappear through normal mortality, the total wealth holdings of that group will fall even if no individual cohort member ever dissaves. At the same time, some younger cohorts are receiving the wealth that is left behind through inheritance. Those flows must be modeled explicitly when using the pseudo-panel technique to arrive at behavioral-measures of wealth accumulation or saving. If not, the technique will generate large rates of "dissaving" by the older cohorts dying off and large rates of "saving" by the younger cohorts receiving those inheritances.

One approach we use for eliminating the first-order effects of family formation and dissolution is to present measures of average and median wealth changes by cohort. If the families "entering" and "leaving" a cohort in any given period have the same wealth holdings of the families who "stay" in the cohort across periods, the average or median will eliminate the biases in total wealth change measures, at least to a first approximation. There are second-order effects that tend to bias the conclusions when looking at averages or medians, however. In particular, it is well known that mortality rates and wealth are negatively correlated, so the families "leaving" the oldest cohorts will tend to be less wealthy than those who "stay," so average or median wealth change measures will be biased upwards for those groups.

The second issue that arises when using balance-sheet data to measure saving is splitting wealth change between capital gains and active saving. In the period we are studying capital gains dominate active saving as a source of aggregate wealth change; between 1989 and 1995, SCF-comparable net worth in the Federal Reserve Board's Flow of Funds Accounts (FFA) rose twenty percent in nominal terms, but of that, only two percent was from active saving and the rest was nominal capital gains.[5] Although gains dominate in the aggregate, it is certainly the case that the split between gains and active saving as sources of wealth change vary across cohorts because of differential asset holdings.

The issue of how to split wealth change into active saving and gains components arises in any study based on balance-sheet data, even those with true panel observations on a sample of households. The solution we apply to backing out capital gains from the overall wealth change is to apply average rates of capital gains across asset types. We use estimates of gains as a share of beginning-period asset levels from the FFA (described in the Data Appendix) for three broad asset categories: owner-occupied housing, stocks and mutual funds, and noncorporate business equity. This approach affects the split between active saving and gains across cohorts only if different cohorts hold different types of assets within each class. For example, if the young hold risky stocks and the old hold safe stocks, then when stock prices rise, we are overstating the gains component of wealth change for the older cohorts and understating the gains component of wealth change for the younger cohort.

[5] Details on these calculations are in the Data Appendix.

3. Cohort-Level Wealth in the SCF Cross-Sections

In this section we present the basic cohort-level wealth calculations that underlie our estimated wealth accumulation and active saving rates later in the paper. We show various measures of wealth levels and changes using synthetic ten-year cohort groups and kernel-smoothed values around discrete points in the cohort age distribution. The pattern of total wealth change varies with age in a way that is consistent with simple theoretical predictions, but the interpretation of the data is complicated by patterns of family formation and dissolution.

Table 1 shows total (nominal) net worth and cohort size across ten-year cohort groups in the SCF cross-sections for 1989, 1992, and 1995. The measure of net worth in Table 1 is based on standard Federal Reserve Board concepts, as in Kennickell and Starr-McCluer (1994) and Kennickell, Starr-McCluer, and Sunden (1997). This net worth measure differs from available aggregate measures of household sector net worth in, for example, the Flow of Funds Accounts (FFA), but Antoniewicz (1997) shows (and we confirm in the Data Appendix) that the SCF wealth levels generally track the FFA values closely over time, both in aggregate and for important sub-categories of assets and liabilities.

In the top half of Table 1 we sum net worth in the SCF across ten-year-cohort groups in each of the three years; for example, in the second row of the table, cohort age 24 to 33, we include families headed by people age 24 to 33 in 1989, 27 to 36 in 1992, and 30 to 36 in 1995.[6] The change in total net worth across cohort groups is consistent with basic theory about saving and wealth

[6] Aggregate wealth in Table 1 is actually $4 billion less than the SCF total in 1995, because we exclude the families in the cohorts younger than 14 in 1989. This does not affect the aggregate in 1989 or 1992, because no head of household is younger than 17. There are, however, a few families with head aged younger than 20 in 1995.

accumulation: wealth grew over time for the younger cohorts, wealth grew but more slowly for middle-aged cohorts, and wealth fell over time for the oldest cohort.

It is premature to evaluate the wealth change patterns in the top half of Table 1 without considering the complicating effects of family formation and dissolution, however. The bottom half of Table 1 shows changes in the number of families within each cohort over the six-year period. As expected, the number of families in the middle-age groups is fairly constant over the period, because there is little net change in family headship.[7] However, the number of families in the 14 to 23 year-old age group (which is the 20 to 30 year-old age group by 1995) grows dramatically, as this cohort moved out of their parents' homes and established their own families, and the number of families in the 64 and older age group (which is the 70 and older age group by 1995) falls dramatically because of mortality and/or the elderly moving into living arrangements in which they are no longer a head of household in the SCF population.

One approach to removing the complicating effects of family formation and dissolution (to a first approximation) is to focus on average or median wealth, which we do in Table 2. As expected, average and median wealth grows much more slowly for younger cohorts and falls less (or not at all) for the older cohorts. There is also an interesting time-component in both sets of measures which largely reflects the effect of stock-market appreciation; the percentage change in wealth during

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[7] To the extent there is significant growth and/or decline in the number of families within the sub-periods, it is at least partially attributable to the relatively small sample sizes in the SCF. The SCF population weights are adjusted so that the number of SCF families within fixed age groups matches the corresponding group in the Current Population Survey (see, for example, Kennickell and Woodburn (1997)) but there is still variability in cohort-size estimates when one works with subgroups defined by other age-breaks, as in Table 1.

the 1992-95 sub-period exceeded in the 1989-92 sub-period in aggregate and for most cohorts.[8]

Figures 1 through 4 show the same basic data as in Tables 1 and 2, but in a slightly different way. Each of the figures show kernel-smoothed values of the statistic in which we are interested, where the plotted value for any given point in the age distribution is the weighted average of the values within five years on either side of the point. The weights decline in a triangular fashion as we move away from the center, such that the weights placed on observations six years away are exactly zero.

Cohort-level wealth change is measured on Figure 1 by computing the distance between the lines vertically above any cohort age value. For example, the 40 year old cohort had about $312 billion in net worth in 1989; that grew to $358 billion in 1992 (when they were 43) and skyrocketed to $507 billion in 1995 (when they were 46). The fact that the 1992 and 1995 lines are below the 1989 line for cohorts older than 62 in 1989 reflects the decline in wealth for the older cohorts, as in Table 1.

As was the case when looking at ten-year cohort groups, the kernel-smoothing approach can

[8] There is also a certain amount of sampling and imputation variability associated with these estimates at any point in time, and therefore inferences about how given measures are changing over time must be made with that variability in mind. The complex weighting associated with the SCF sampling strategy rules out using simple variance estimates to construct confidence intervals around the various statistics, but the SCF makes it possible to create bootstrap estimates using sets of replicate weights (that are consistent with the sample design) which are provided to users. One previous study (Kennickell and Woodburn (1997)) adds perspective to the estimated levels and changes in Table 2. They find that standard errors are approximately 5 percent to 7 percent of the overall estimated median and average wealth for 1992 and 1995, and even higher for 1989 when the over-sampled high-wealth group was smaller. The Kennickell and Woodburn (1997) estimates are for the entire population, so standard errors for any given subgroups will be (relatively) larger. Thus, many of the wealth-change values in Table 2 will fall within the confidence intervals around the estimated means and medians.

be used to measure wealth change in ways that eliminate, at least to a first approximation, the complicating effects of family formation and dissolution. This is done in Figures 2 and 3, which show smoothed average and median wealth holdings across cohorts for the three years. The pattern of cohort-level average wealth change in Figure 2 is similar to, but not nearly as extreme, as the pattern for total wealth change in Figure 1. It is worth noting that average wealth falls for the oldest cohorts, which signals some drawing down of assets, even though we know the bias from differential mortality (rich people live longer) is working in the other direction. The general growth in wealth across younger cohorts also shows up in the median (Figure 3), although the decline in wealth for the older cohorts is not evident, which suggests that either the median wealth holder does not dissave or that the mortality bias has an even stronger effect on the median than on the mean.

In Figure 4 we show the change in wealth as a share of cohort disposable income.[9] The patterns here are much more stable; most of the difference across the two time periods can be directly attributed to variability in the stock market. Though the pattern seems consistent with priors, the actual values are somewhat larger than we would have expected based on previous studies of saving and wealth change. Wealth grows on the order of 20 to 30 percent of income per year for younger and middle-aged cohorts, and falls 50 to 80 percent of income for the oldest groups. These are much larger than previously measured saving rates across age groups, but it is crucial to bear in mind that

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[9] We estimated disposable income in the survey years (1989, 1992, and 1995) using the reported before-tax income and a simple tax calculator. For families with significant financial wealth and little or no reported income, we imputed income using the product of financial wealth and the after-tax 30 year bond rate in the respective years. For the intervening years (1990, 1991, 1993, 1994) we interpolated both population and per-family income, and used the product of the interpolated value to get total cohort income. The income interpolation was indexed to the actual pattern of changes in per-capita disposable income in the intervening years.

these still have not been adjusted for the effects of market valuation and bequests, which are the focus of the next section.

4. Estimating Wealth Accumulation and Active Saving Rates

In this section we apply two adjustments to our SCF-based cohort-level wealth change estimates. The first adjustment is for predictable bequests; we use published mortality probabilities to estimate bequests made and received across cohorts. The second adjustment is for capital gains; we assign gains across cohorts based on the distribution of gains-producing assets across cohorts, and subtract the estimated gains from total wealth change to generate an estimate of active saving. Although these two adjustments generally move the estimated wealth- accumulation patterns much closer to the patterns observed in direct studies of saving or wealth change, the estimates change more dramatically when we exclude the top of the wealth distribution from each of the cross-section samples.

The mortality rates we apply to the SCF cross-sections are a combination of standard mortality used by the Social Security Administration and a high-wealth adjustment based on life insurance industry data taken from Poterba (1997). Poterba uses the 1995 SCF to build a model of estate and gift taxes, and thus faces the same basic problem we do–predicting how much would be bequeathed in the next year by those alive and in the survey in a given year. Poterba uses the mortality adjustment to correct for the fact that the wealthy, who pay the estate tax, tend to live longer than average. Indeed, the adjustments lower mortality rates by as much as 50 percent in some age ranges.

The results of applying the two sets of mortality rates to the 1989 and 1992 SCFs is shown in Table 3. We arbitrarily choose to use the lower mortality rates for families with wealth exceeding the estate-tax threshold, which was $600,000 during the period we are looking at.[10] When we compute expected mortality, we have to convert mortality-rates for persons to mortality-rates for households. For singles the person and family mortality rates are one and the same. For married couples, we compute the probability that only the head dies and the probability that both the head and spouse die. When only the head dies, we allow for both a family "death" in the head's cohort and a family "birth" in the spouses' cohort. The spouse may or may not be in the same cohort as the head–we use the spouse's age to assign the "birth".

The top half of Table 3 compares the actual change in the number of synthetic-families within cohorts, over time, to the expected change based on the mortality probabilities. The mortality calculation does not mean much for the young, but is significant in explaining changes in the number of families within the oldest cohort. In particular, expected mortality accounts for about two-thirds of the change in the number of families in the oldest cohort in both time periods. The unexplained change in the number of families is probably attributable to some combination of non-mortality transitions out of the sample (nursing homes, moving in with their children) and sampling, although we can't rule out inappropriate mortality probabilities.

Applying the mortality rates to observed wealth levels yields estimates of bequests for each of the three-year periods across cohorts, which are shown in the bottom half of Table 3. In these

[10] An alternative to the Poterba (1997) adjustment is to use the differential-mortality values built into the Statistics of Income wealth estimates, as in Johnson (1998). The results are actually insensitive to the choice of standard versus adjusted mortality. Although mortality rates vary significantly, the fact that the differentiated groups is only about 2 percent of the population implies an overall small effect.

estimates, a bequest is made when the head of the household dies; thus we solve for total bequests made within a cohort by summing the weighted mortality probabilities multiplied by wealth levels across observations in the cohort. If the head is single, the estimated bequest is assumed to be received by the cohort 25 years younger. If there is both a head and spouse, the bequest is further divided based on the probability that the spouse survives; the probability-weighted bequest received by the spouse is assigned to the spouses's cohort directly, and the remainder is assigned to the cohort 25 years younger.[11]

The total estimated bequests in each of the three years are, if anything, higher than would be expected based on actual estate and gift tax returns filed. Eller (1997) shows that, between 1993 and 1995, gross estates filed with the IRS were only about $340 billion, which is less than half the total bequest estimate ($1,008 billion) shown in Table 5. But the actual filings only include the transfers in estates greater than $600,000 in value, so the difference is explained in part by bequests left in estates below $600,000 that do not file returns.

The largest estimated bequests are for the oldest cohorts, who account for roughly three-fourths of bequests made. But, because we assign bequests received by spouses directly, the oldest

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[11] The SCF has data on inheritances received that allow us to evaluate this simple bequest rule of passing wealth back to generations 25 years younger. There are a few drawbacks to using the SCF measures, however–the year of an inheritance received on the public-use data set is reported rounded the nearest five-year point in time (for the 1995 survey, 1995, 1990, 1985, etc) and they are (as expected) highly skewed and thus somewhat variable across groups and time. Since we are only interested in cohort-level flows, we used the direct estimates to evaluate whether the distribution of actual inheritances seemed to match what the simple 25-year rule was generating. Indeed it does. We found that both the data and the simple rule suggest about 10 percent of bequests go to people aged 39 or younger, about 60 to 70 percent to people aged 40 to 59, and 20 to 25 percent to those over the age of 60.

group also accounts for a disproportionate share of bequests received.[12] Still, net bequests for the oldest age group are estimated at 18.5 percent of income for the first sub-period, and almost 30 percent for the second, which goes a long way towards explaining the dramatically negative wealth change estimates for the oldest cohort in the last section. It is also worth noting that our estimates of bequests received (based on our simple 25 year lagged assignment) represent a sizable share of income for the younger cohorts, which works in the direction of bringing down the large positive saving rates observed in the last section.

The estimated bequest flows are used to generate adjusted wealth change and active saving rates in Table 4. The top half of the table shows the effect of estimated bequests on wealth change as a percent of income in the 1989-92 and 1992-95 subperiods along with the overall rate for 1989-95. As indicated, adding net bequests made to the wealth change estimates lowers the estimated rate of accumulation for all but the oldest cohort, and significantly reduces the rate of asset spend-down attributed to the oldest group in the unadjusted numbers. Indeed, spend-down of assets relative to income falls from 58 percent to about 35 percent.

Table 4 also shows the effect of removing capital gains from the wealth change estimates. We are able to directly measure holdings of gains-producing assets, but we have to assume that the composition of those assets (e.g., growth stocks versus blue chips) is the same across cohorts. This may be particularly important for closely-held business assets, where rates of appreciation vary dramatically, and the young are more likely to be the ones building businesses. In any case, backing

[12] Referring to spousal transfers as "bequests" is inappropriate in most cases, because joint ownership of assets existed prior to the death of the other spouse. We are using the term to refer to that situation as well as cases where true transfers of wealth occurred.

out the gains dramatically lowers the overall rate of accumulation; active saving as a share of income between 1989 and 1995 is estimated at 2.7 percent, well below the overall wealth-change rate of 17.8 percent.

The divergence between active saving rates and wealth change rates across cohorts is dominated by differences in holdings of stocks and mutual funds, to which most of the capital gains are assigned. Since middle age and older cohorts hold most of the equities, their estimated rates of active saving are much further below their overall wealth change rates than for younger cohorts. For example, the divergence between wealth accumulation and active saving is only a few percentage points for the youngest groups, but 25 percent and higher for the oldest groups. Again, however, these estimates are somewhat sensitive to how the gains are backed out, and the bias works against our conclusion: if the middle age and older cohorts are holding blue chips, we are assigning them too much capital gains, and thus inferring too little active saving.

The bottom half of Table 4 also applies the bequest adjustment to the estimated active-saving rates. The combination of removing capital gains and backing out bequests lowers the estimated accumulation rate for the young significantly, nearing the low double-digits range that is typically found in survey data. But the two adjustments applied simultaneously to the wealth change for the oldest cohort basically resurrects the original mystery: much of the decline in wealth for the old is attributable to bequests, but much of the underlying change in wealth during this period is attributable to the fact that they held stocks and mutual funds which appreciated dramatically. Thus, the residual draw down of wealth (nearly 64 percent of income for the entire period) is still very much at odds with previous studies.

The unadjusted and bequest-adjusted versions of both wealth change and active-saving rates are also shown in kernel-smoothed form in Figure 5. The total wealth change line shows the dramatic pattern in the raw wealth change data, and the other lines show how the two adjustments help reconcile the observed pattern with prior saving rate estimates. The graph makes it clear that the biggest mystery remains for the oldest age group.

One possible explanation for the divergence between our estimates and those of prior studies is explored in Tables 5 and 6. In these tables, we repeat the analysis of Table 4, but excluding first the top 1 percent of the wealth distribution (Table 5) and then the top 5 percent of the wealth distribution (Table 6). The first justification for excluding top wealth holders is that other surveys used to make direct estimates of saving generally do not measure the top of the wealth distribution as well as the SCF, thus we are putting the SCF on the same footing as those other surveys. A second rationale, which is not mutually exclusive, is that the top of the wealth distribution may not change much over any three year period, and thus we are properly measuring wealth change for the bottom 99 percent or 95 percent of the wealth distribution.[13]

In any event, the differences between the accumulation rates for the total population reported above and restricted populations in Tables 5 and 6 are striking. Both rates of accumulation while young and rates of asset draw-down while old are pushed closer to zero, where previous studies suggest they should be. The largest effect is on the rates of wealth accumulation during working years; the estimates fall from 24 percent to 35 percent for the entire 34 to 43 year old cohort in Table 6 to 8 percent to 16 percent for the bottom 99 percent of the wealth distribution of the same cohort in Table 5, and 4 percent to 9 percent for the bottom 95 percent of the wealth distribution of the same

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[13] We are also assuming that bequests are made and received within each subset of the wealth distribution; all bequests made by families in the top 1 percent of the wealth distribution are made to families also in the top 1 percent.

cohort in Table 6. Therefore, for the younger cohorts, we conclude that there is a big effect on including the top of the wealth distribution on cohort-level saving rates, while the first-order effect of using the synthetic cohort technique rather than measure saving directly is less important.

The effect on estimates of residual wealth draw down for the oldest cohort moves closer to zero as well, but remains significantly negative. The bequest-adjusted wealth change and active saving rates for the oldest cohort move from -34 percent to -64 percent in Table 6 to -26 percent to -42 percent in Table 7 and -1 percent to -10 percent in Table 8. Thus, for the older cohorts, it seems as though most of the differences between our results and those in previous studies arise because of technique: rather than working with a wealth panel or income-expenditure cross section where we only observe survivors, the synthetic cohort technique is forced to reconcile wealth change patterns for everyone in the cohort.

5. Conclusions

We have applied the pseudo-panel technique to a series of wealth cross-sections in order to estimate how wealth accumulation and active saving varied across population subgroups in the early-to-mid 1990s. The results are somewhat different from those in direct studies of saving using other survey data sets, which is due to some combination of applying a new technique and working with data that is generally more representative of the entire wealth distribution. We attempt to adjust the wealth change estimates for mortality and capital gains in order to move our estimates closer to those in previous studies, but the biggest changes come from excluding the top of the wealth distribution. Generally, we conclude this technique is a promising approach to studying wealth accumulation behavior, and could be applied to other wealth surveys spaced over longer time-periods to study changes in saving over time.

It is important to provide some interpretation to these estimates before drawing strong conclusions about patterns of saving, particularly when evaluating the validity of various intertemporal planning models or questioning the efficacy of various policies. For example, the estimated wealth declines for the oldest cohort do not necessarily represent an estimate of how much consumption exceeded income; it is difficult to believe, for example, that the elderly were spending out of assets at the rate suggested by the data. But the estimates can be characterized as measuring everything a cohort did with their wealth except hold onto it–that, of course, includes inter vivos transfers to both children and charities. Indeed, these estimates may simply indicate that older cohorts are more generous to their children than direct wealth transfer data suggest.

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7. Data Appendix

This appendix describes how we used Survey of Consumer Finances (SCF) household-level data and Federal Reserve Board Flow of Funds Accounts (FFA) institutional data and to implement the analysis in the paper. Although the estimates in the paper are generally straight from the SCF, we used the FFA data as a check on how well the survey was tracking aggregate wealth change over time, relying heavily on the work of Antoniewicz (1997). We also used the FFA estimates of asset revaluations by type of asset to divide SCF wealth change between active saving and capital gains.

In order to benchmark the wealth-change measures we derived from the SCF micro data, we compared SCF balance-sheet totals with comparable FFA measures in the Federal Reserve Board's Z1 release from March, 1998. Comparing wealth across the two data sets requires adjusting both the FFA and SCF wealth measures; interested readers should turn to Antoniewicz (1997) for more details, including reconciliations of asset and liability categories at higher levels of disaggregation, and analysis of how the underlying sampling and imputation variability in the SCF affects the relationship between survey-level and institutional aggregates. In the FFA, we subtract consumer durables, life insurance reserves, pension fund reserves, and personal trusts, because those categories are not available in the SCF or are inconsistent with SCF measures. We use the non-profit institution balance sheets to back out non-profit asset and liability holdings and put the FFA on a household-only basis.

There are also wealth categories in the SCF which do not match those in the FFA. Our starting point for measuring asset and liabilities using the SCF is the level of aggregation used in several published Federal Reserve Board studies; see, for example, Kennickell, Starr-McCluer, and Sunden (1997), Kennickell and Starr-McCluer (1997), and Kennickell and Starr-McCluer (1994).

From that starting point a few adjustments are needed to make the SCF measure conceptually consistent with the FFA. The SAS code used to make the SCF adjustments is available from the authors; here are some of the highlights. First, the SCF identifies IRAs and Keoghs as types of assets, and we need to allocate those between checking/saving and stocks/mutual funds using data on actual IRA allocations. We use the face value of the bonds, rather than the market value, to be consistent with the FFA. Also, consistent with the FFA definitions, bond mutual funds are added to the "stocks and mutual funds" category rather than credit market instruments. Finally, we exclude pension balances, trusts, annuities, managed investment accounts, vehicles, the cash value of whole life insurance and miscellaneous assets such as future proceeds, royalties, futures, non-public stock, deferred compensation, precious metals and antiques. Overall, the subset of SCF wealth that is comparable to the FFA is a little over 80 percent of total SCF wealth in each of the three years 1989, 1992, and 1995.

After adjusting the SCF and FFA measures for conceptual differences, we confirm the Antoniewicz (1997) finding that the SCF does a good job tracking aggregate wealth change. Using the comparable subset of assets and liabilities, nominal wealth change in the FFA was $2.5 trillion between 1989 and 1995, which is about 20 percent growth. Net worth in the comparable SCF subset grew $2.1 trillion, which is about 14 percent growth. Thus the ratio of SCF to FFA net worth fell slightly over the period, from 115 percent in 1989 to 110 percent in 1995. The ratio of comparable measures for the largest asset and liability categories like housing and home mortgages were even more stable over time, and the most volatile ratio is for stocks and mutual funds, which is probably being pushed around by movements in stock prices during this period. Families may fail to report market values well on the survey because they lack up-to-the-minute market information when the survey is being conducted; small differences in timing between the SCF and FFA can cause big differences in reported aggregates when markets move as dramatically as they did in the early 1990s

In addition to using the FFA for benchmarking the aggregate wealth change in the SCF, we also used those data to allocate changes in certain asset categories between capital gains and active saving ("net acquisitions" in FFA terminology). The FFA provides values for asset revaluations in several categories; for our purposes, we use the capital gains rates for stocks and mutual funds, noncorporate business equity, and owner-occupied housing. The lion's share of total wealth change in this period is attributable to capital gains, as only 2 percent out of the 20 percent growth in SCF-comparable net worth is from net acquisitions.

Rather than apply the FFA gains rate directly to the three categories (stocks, noncorporate business, and housing) which have the associated revaluations, we use the share of gains in the overall change as observed in the FFA. This approach lessens any bias to the net acquisitions measure caused because families in the survey are not keeping up with market prices; note that if we had applied SCF gains rates directly to the SCF, the overall net acquisitions estimate would have been even more negative. As it is, the SCF confirms the FFA finding that little, if any, of the increase in net wealth over the period is attributable to net acquisitions (in this subset of overall household wealth) during this period.

Table 1
Total Wealth and Number of Families
By Cohort in the Survey of Consumer Finances

Total Net Worth

	Levels, in Billions of Dollars			Annual Percent Change		
Cohort Age in 1989	**1989**	**1992**	**1995**	**1989 - 1992**	**1992 - 1995**	**1989 - 1995**
14 to 23	$45	$173	$394	57.2%	31.7%	43.9%
24 to 33	997	1,333	1,686	10.2	8.1	9.2
34 to 43	2,922	3,250	4,776	3.6	13.7	8.5
44 to 53	3,636	4,168	4,923	4.7	5.7	5.2
54 to 63	3,906	4,289	4,474	3.2	1.4	2.3
64 and Older	5,893	4,595	4,418	-8.0	-1.3	-4.7
All	17,400	17,808	20,672	0.8	5.1	2.9

Number of Families

	Number, in Thousands			Annual Percent Change		
Cohort Age in 1989	**1989**	**1992**	**1995**	**1989 - 1992**	**1992 - 1995**	**1989 - 1995**
14 to 23	3,720	8,033	13,547	29.3%	19.0%	24.0%
24 to 33	19,754	21,345	21,870	2.6	0.8	1.7
34 to 43	21,347	20,506	21,722	-1.3	1.9	0.3
44 to 53	13,959	15,014	13,226	2.5	-4.1	-0.9
54 to 63	13,016	12,641	12,688	-1.0	0.1	-0.4
64 and Older	21,224	18,379	15,424	-4.7	-5.7	-5.2
All	93,020	95,918	98,477	1.0	0.9	1.0

Source: Author tabulations of the 1989, 1992, and 1995 Surveys of Consumer Finances.
All dollar values are nominal. See the data appendix for details.

Table 2
Average and Median Wealth
By Cohort in the Survey of Consumer Finances

Average Wealth

Cohort Age in 1989	Levels, in Dollars 1989	1992	1995	Annual Percent Change 1989 - 1992	1992 - 1995	1989 - 1995
14 to 23	$11,959	$21,514	$29,117	21.6%	10.6%	16.0%
24 to 33	50,459	62,471	77,092	7.4	7.3	7.3
34 to 43	136,898	158,486	219,889	5.0	11.5	8.2
44 to 53	260,515	277,618	372,249	2.1	10.3	6.1
54 to 63	300,097	339,248	352,582	4.2	1.3	2.7
64 and Older	277,676	250,031	286,473	-3.4	4.6	0.5
All	187,052	185,658	209,922	-0.2	4.2	1.9

Median Wealth

Cohort Age in 1989	Levels, in Dollars 1989	1992	1995	Annual Percent Change 1989 - 1992	1992 - 1995	1989 - 1995
14 to 23	$2,500	$3,200	$7,700	8.6%	34.0%	20.6%
24 to 33	8,800	16,800	28,000	24.1	18.6	21.3
34 to 43	50,100	49,700	67,800	-0.3	10.9	5.2
44 to 53	89,200	86,100	106,900	-1.2	7.5	3.1
54 to 63	97,100	114,300	106,900	5.6	-2.2	1.6
64 and Older	80,900	87,100	100,000	2.5	4.7	3.6
All	46,900	48,700	56,200	1.3	4.9	3.1

Source: Author tabulations of the 1989, 1992, and 1995 Surveys of Consumer Finances.
All dollar values are nominal. See the data appendix for details.

Figure 1

Total Wealth by Cohort in the Surveys of Consumer

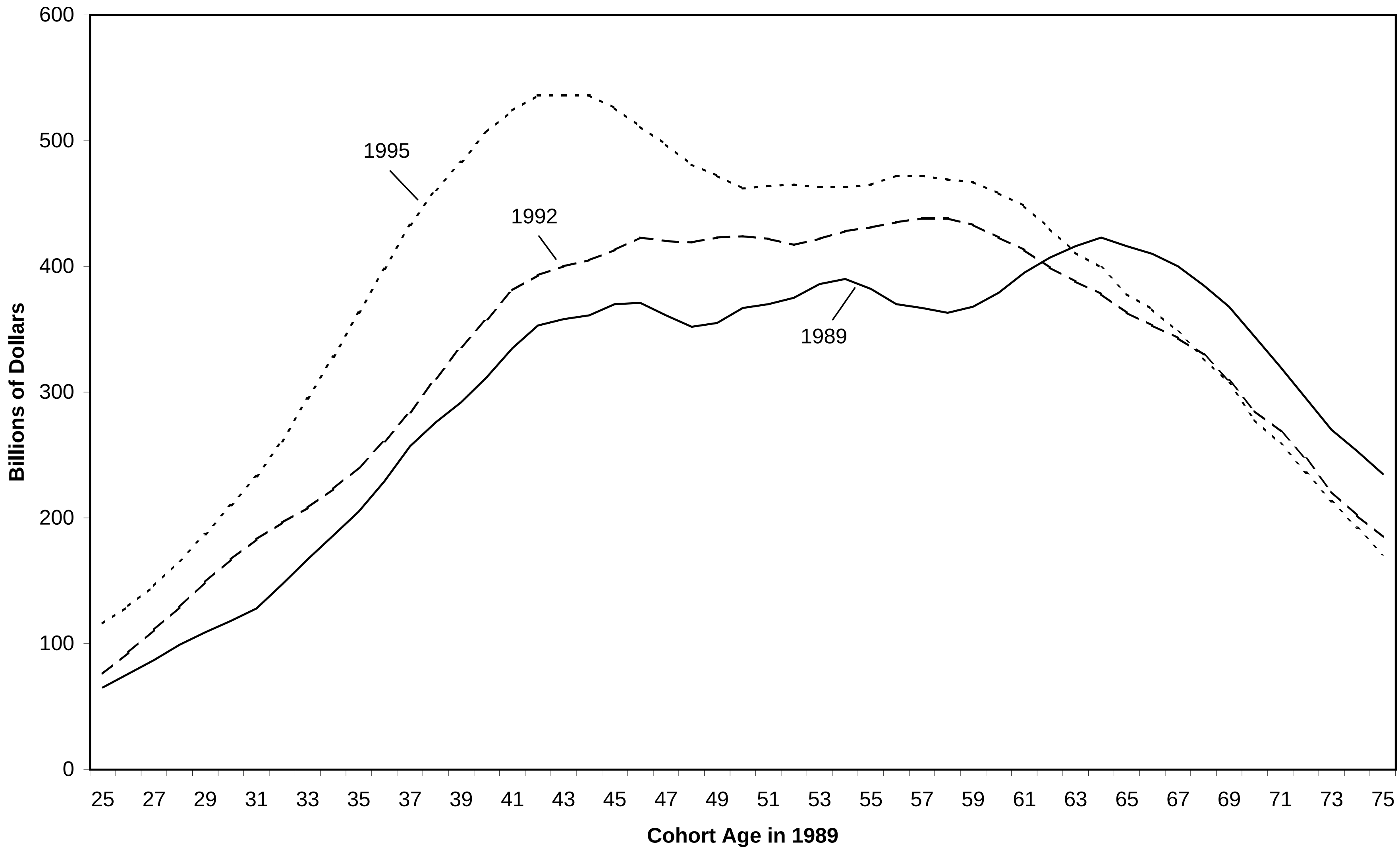

Figure 2

Average Wealth by Cohort in the Surveys of Consumer Finances

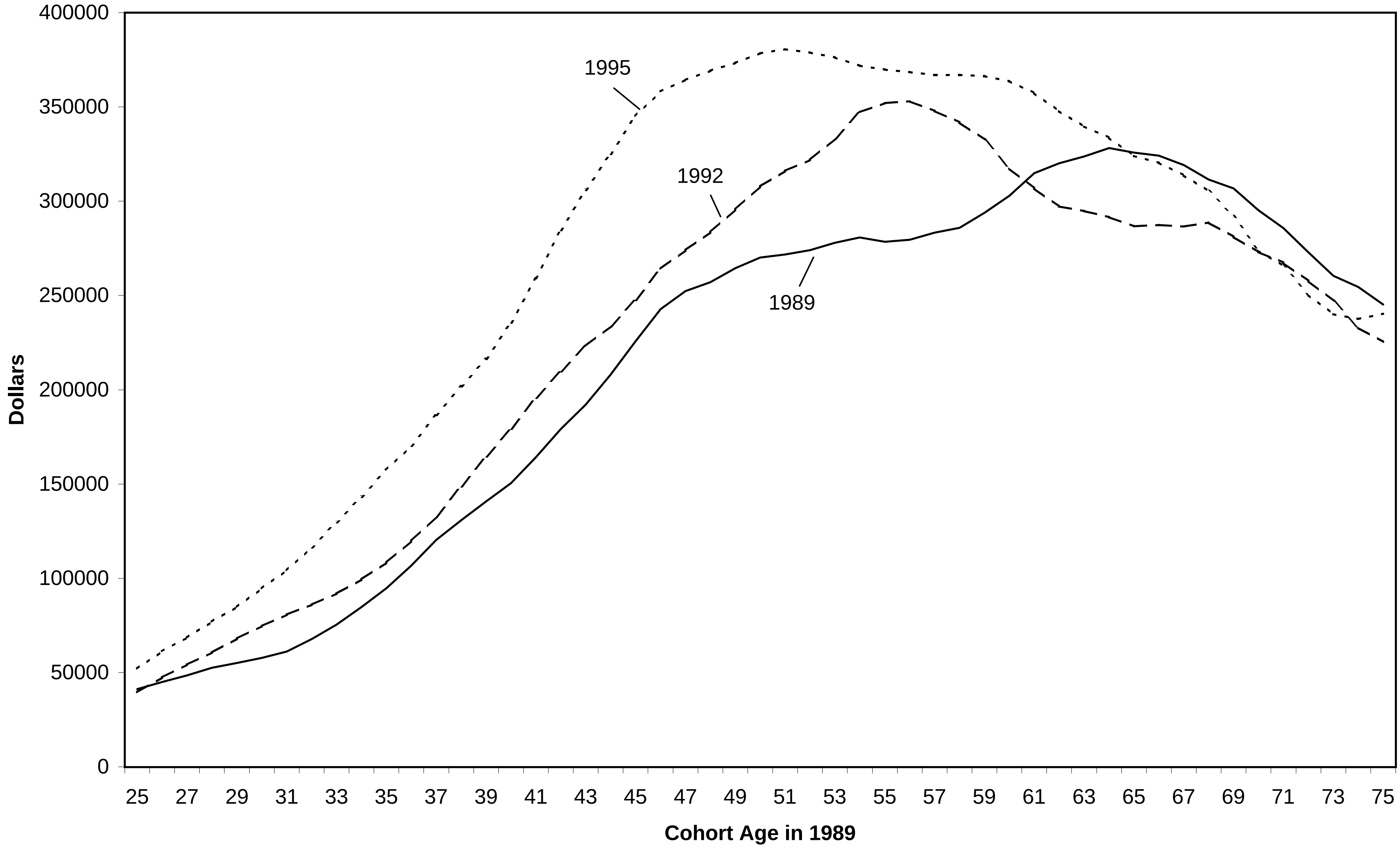

Figure 3

Median Wealth by Cohort in the Surveys of Consumer Finances

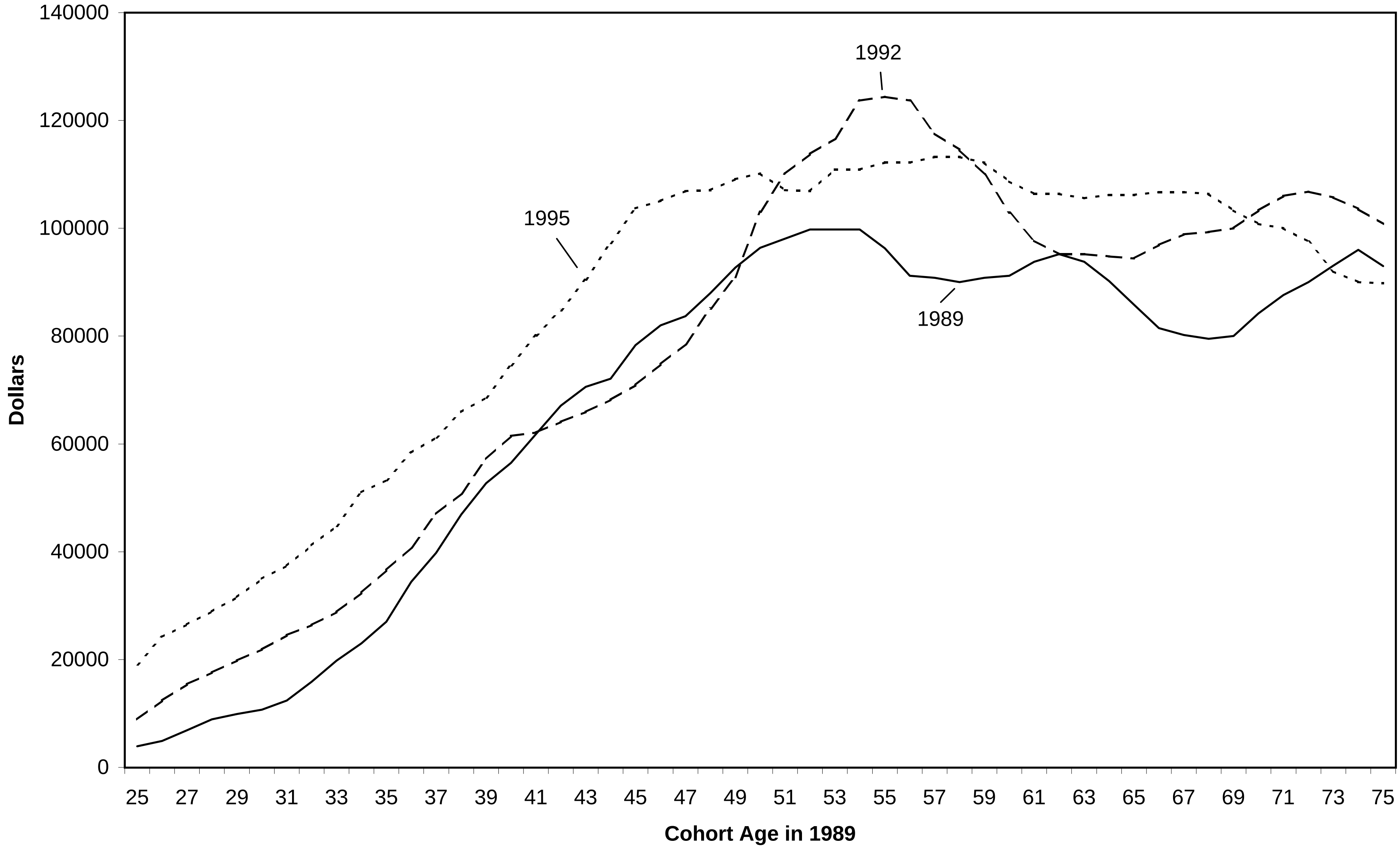

Figure 4

Change in Wealth as a Percent of Income by Cohort in the Surveys of Consumer Finances

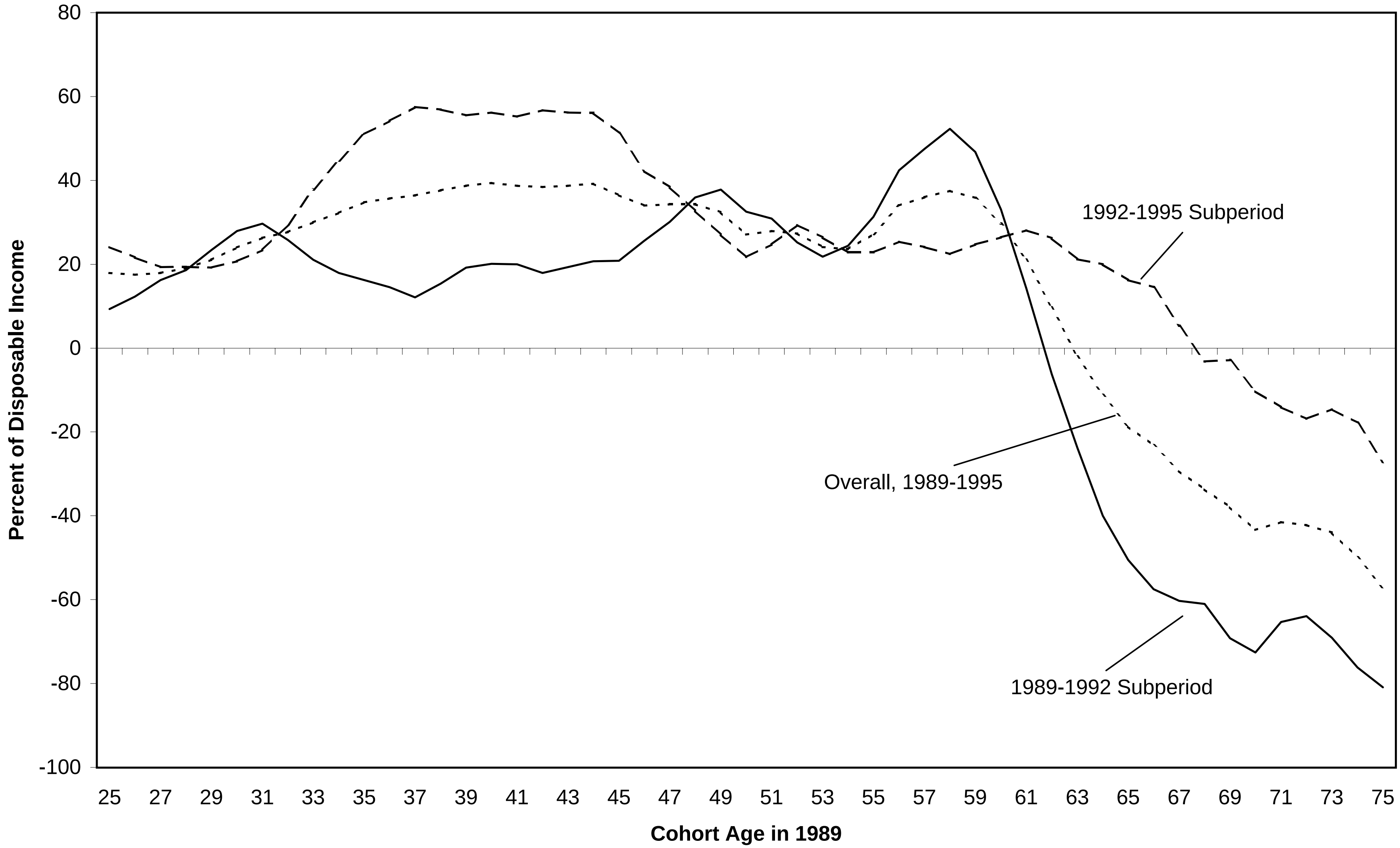

Table 3
Predicted Mortality and Bequests Across Cohorts in the Surveys of Consumer Finances

Change in the Number of Families and Predicted Mortality

	1989-1992 Subperiod			1992-1995 Subperiod		
Cohort Age in 1989	**Actual Change**	**Predicted Mortality**	**Predicted % Actual**	**Actual Change**	**Predicted Mortality**	**Predicted % Actual**
14 to 23	4,313	3	0.1%	5,513	-4	-0.1%
24 to 33	1,591	-16	-1.0	525	-7	-1.4
34 to 43	-841	-22	2.7	1,216	2	0.2
44 to 53	1,055	38	3.6	-1,787	-12	0.6
54 to 63	-375	-138	36.7	47	-112	-238.0
64 and Older	-2,846	-1,668	58.6	-2,955	-2,019	68.3
All	2,898	-1,803	-62.2	2,559	-2,152	-84.1

Estimated Bequests Made and Received

	1989-1992 Subperiod			1992-1995 Subperiod		
Cohort Age in 1989	**Bequests Made (Billions)**	**Bequests Received (Billions)**	**Bequests Net % of Income**	**Bequests Made (Billions)**	**Bequests Received (Billions)**	**Bequests Net % of Income**
14 to 23	$0	$10	-3.8%	$1	$12	-1.6%
24 to 33	6	20	-0.9	9	43	-1.8
34 to 43	27	83	-2.5	36	122	-3.3
44 to 53	66	155	-4.8	96	220	-6.5
54 to 63	167	254	-6.2	215	295	-5.9
64 and Older	715	459	18.5	651	316	29.0
All	982	982	0	1,008	1,008	0

Source: Author tabulations of the 1989, 1992, and 1995 Surveys of Consumer Finances.
All dollar values are nominal. See the data appendix for details.

Table 4
Effect of Estimated Bequests on Wealth Change and Active Saving Rates in the Surveys of Consumer Finances

(All Values Percent of Disposable Income)

	1989-92 Subperiod		1992-95 Subperiod		Overall, 1989-95	
Cohort Age in 1989	**Wealth Change**	**Bequest Adjusted**	**Wealth Change**	**Bequest Adjusted**	**Wealth Change**	**Bequest Adjusted**
14 to 23	48.4%	44.5%	33.0%	31.3%	37.3%	35.1%
24 to 33	20.9	20.0	18.2	16.4	19.4	18.1
34 to 43	14.3	11.9	59.1	55.8	38.1	35.2
44 to 53	28.9	24.1	39.8	33.3	34.4	28.7
54 to 63	27.1	21.0	13.8	7.9	20.6	14.6
64 and Older	-93.8	-75.3	-15.3	13.7	-58.1	-34.8
All	4.6	4.6	29.8	29.8	17.8	17.8

	1989-92 Subperiod		1992-95 Subperiod		Overall, 1989-95	
Cohort Age in 1989	**Active Saving**	**Bequest Adjusted**	**Active Saving**	**Bequest Adjusted**	**Active Saving**	**Bequest Adjusted**
14 to 23	47.5%	43.7%	31.0%	29.4%	35.6%	33.4%
24 to 33	18.4	17.5	11.2	9.5	14.5	13.1
34 to 43	7.8	5.4	44.6	41.3	27.3	24.4
44 to 53	18.9	14.1	16.8	10.3	17.8	12.1
54 to 63	13.0	6.8	-23.0	-28.9	-4.5	-10.6
64 and Older	-119.9	-101.4	-48.1	-19.1	-87.2	-64.0
All	-6.0	-6.0	10.8	10.8	2.7	2.7

Source: Author tabulations of the 1989, 1992, and 1995 Surveys of Consumer Finances. See the data appendix for details.

Figure 5

Wealth Change and Saving Measures by Cohort in the Surveys of Consumer Finances

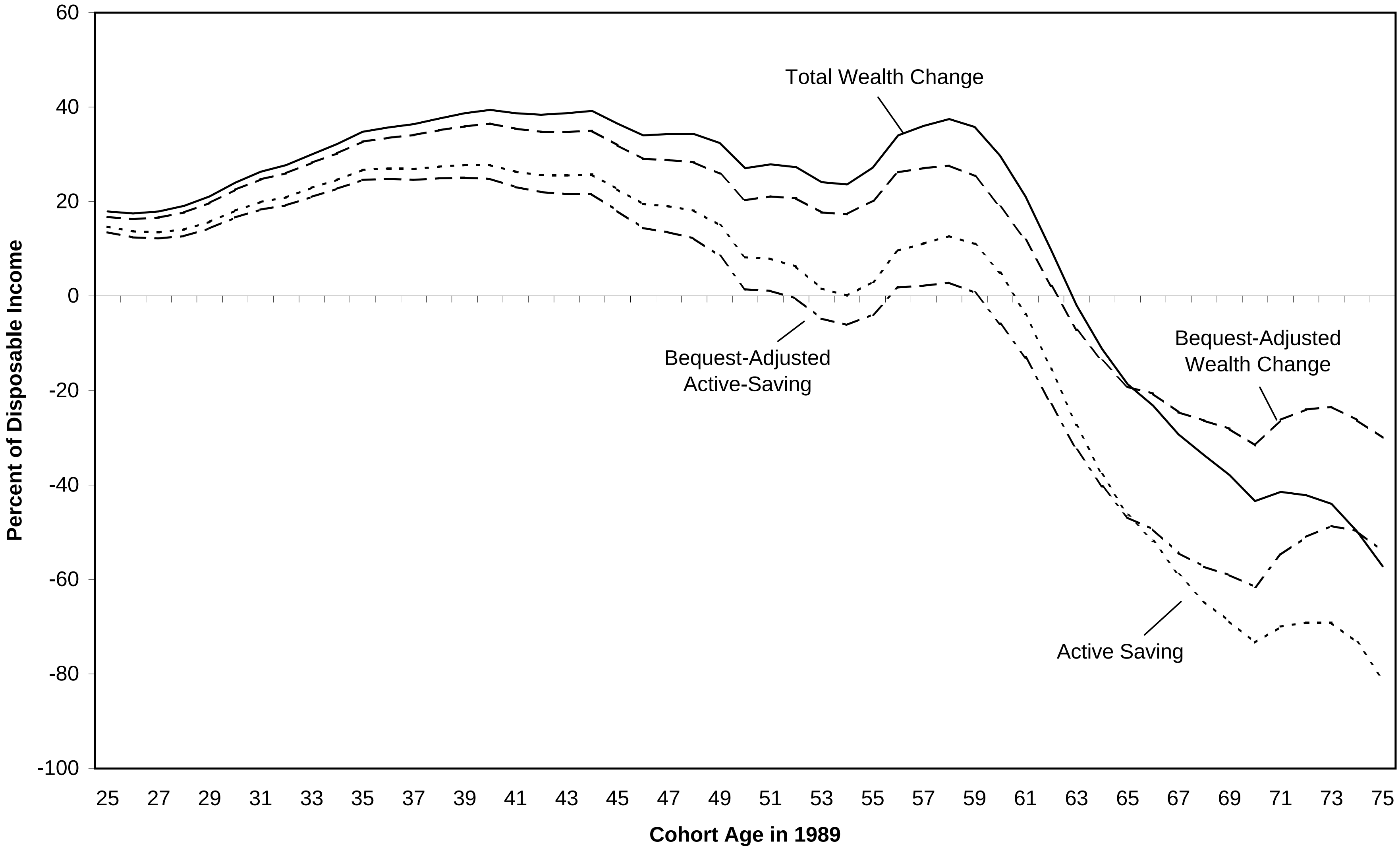

Table 5
Estimated Wealth Change and Active Saving Rates, Excluding Top 1% of Wealthholders in the Surveys of Consumer Finances

(All Values Percent of Disposable Income)

Cohort Age in 1989	1989-92 Subperiod Wealth Change	1989-92 Subperiod Bequest Adjusted	1992-95 Subperiod Wealth Change	1992-95 Subperiod Bequest Adjusted	Overall, 1989-95 Wealth Change	Overall, 1989-95 Bequest Adjusted
14 to 23	47.2%	44.8%	31.6%	30.3%	36.0%	34.4%
24 to 33	20.1	19.5	13.4	12.2	16.5	15.5
34 to 43	-0.4	-2.4	37.0	34.4	19.2	16.9
44 to 53	20.3	15.5	-3.5	-10.0	8.4	2.7
54 to 63	1.9	-3.1	10.1	4.9	5.9	0.8
64 and Older	-45.2	-28.1	-50.0	-23.5	-47.4	-26.0
All	3.5	3.5	10.8	10.8	7.3	7.3

Cohort Age in 1989	1989-92 Subperiod Active Saving	1989-92 Subperiod Bequest Adjusted	1992-95 Subperiod Active Saving	1992-95 Subperiod Bequest Adjusted	Overall, 1989-95 Active Saving	Overall, 1989-95 Bequest Adjusted
14 to 23	46.4%	43.9%	29.6%	28.3%	34.4%	32.7%
24 to 33	17.6	17.0	7.1	5.9	11.9	11.0
34 to 43	-6.2	-8.2	26.8	24.2	11.1	8.8
44 to 53	14.9	10.1	-20.6	-27.2	-2.9	-8.5
54 to 63	-9.3	-14.3	-13.1	-18.3	-11.1	-16.2
64 and Older	-56.9	-39.7	-72.1	-45.6	-63.9	-42.4
All	-3.0	-3.0	-2.1	-2.1	-2.5	-2.5

Source: Author tabulations of the 1989, 1992, and 1995 Surveys of Consumer Finances.
See the data appendix for details.

Table 6
Estimated Wealth Change and Active Saving Rates, Excluding Top 5% of Wealthholders in the Surveys of Consumer Finances

(All Values Percent of Disposable Income)

Cohort Age in 1989	1989-92 Subperiod Wealth Change	1989-92 Subperiod Bequest Adjusted	1992-95 Subperiod Wealth Change	1992-95 Subperiod Bequest Adjusted	Overall, 1989-95 Wealth Change	Overall, 1989-95 Bequest Adjusted
14 to 23	40.5%	38.6%	29.7%	28.7%	32.7%	31.5%
24 to 33	13.2	12.7	13.0	12.2	13.1	12.4
34 to 43	-8.6	-10.1	29.9	27.8	11.5	9.6
44 to 53	2.0	-2.2	3.7	-2.4	2.9	-2.3
54 to 63	15.5	10.4	-7.2	-12.2	4.4	-0.6
64 and Older	-14.3	1.4	-27.7	-4.1	-20.6	-1.2
All	2.7	2.7	11.0	11.0	7.0	7.0

Cohort Age in 1989	1989-92 Subperiod Active Saving	1989-92 Subperiod Bequest Adjusted	1992-95 Subperiod Active Saving	1992-95 Subperiod Bequest Adjusted	Overall, 1989-95 Active Saving	Overall, 1989-95 Bequest Adjusted
14 to 23	39.6%	37.7%	28.3%	27.3%	31.5%	30.2%
24 to 33	10.9	10.4	7.8	6.9	9.2	8.5
34 to 43	-12.0	-13.5	23.1	21.0	6.3	4.5
44 to 53	-1.5	-5.7	-6.5	-12.6	-4.0	-9.2
54 to 63	10.0	4.9	-21.8	-26.7	-5.5	-10.6
64 and Older	-21.1	-5.4	-40.5	-16.9	-30.2	-10.8
All	-1.1	-1.1	2.9	2.9	1.0	1.0

Source: Author tabulations of the 1989, 1992, and 1995 Surveys of Consumer Finances.
See the data appendix for details.