# Are Successive Generations Getting Wealthier, and If So, Why?Evidence from the 1990s

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# *Are Successive Generations Getting Wealthier, and If So, Why? Evidence from the 1990s*

THE 1990S WERE a remarkable decade for saving and wealth accumulation. After averaging 3.4 times GDP between 1950 and 1990, aggregate net worth rose from 3.5 times GDP in 1990 to 4.2 times GDP in 2000, its highest level since at least 1950. In nominal dollar terms, net worth rose from $20 trillion in 1990 to $42 trillion in 2000. Much of the increase in wealth was fueled by skyrocketing capital gains in the stock market, which helped boost the aggregate market value of equities from $3 trillion in 1990 to $15 trillion in 2000. The decade also saw widespread diffusion of stock ownership (directly and indirectly through mutual funds) and substantial increases in participation in and contributions to defined-contribution pension plans, typically 401(k)s. At the same time, however, the measured

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saving rate, excluding capital gains, fell over the decade, continuing a longer-term pattern.[1]

These patterns created a rich environment in which to examine household saving and wealth accumulation. Previous researchers have followed particular birth cohorts through the 1990s, separating the wealth changes that each cohort experienced into a component due to capital gains and a component due to active saving. These studies aimed to develop estimates of the age-wealth and age-saving profile, and to determine among which birth cohorts and among which types of assets wealth rose and active saving fell during the 1990s. Other studies have examined the extent to which households chose to use their accumulated capital gains in the 1990s to finance increased consumption expenditure or early retirement.[2]

This paper also focuses on the 1990s but addresses a different set of questions and thus takes a different approach to the data. Unlike previous studies, ours does not focus on tracking particular birth cohorts through time. Instead we examine the relative wealth status of *different* birth cohorts as they reach *similar stages of the life cycle.* Thus, for example, we compare (using data from the 1989–2001 Surveys of Consumer Finances) the 2001 wealth of households where the head was between the ages of 65 and 74 in 2001 with the 1989 wealth of households where the head was between 65 and 74 in 1989. The idea behind this type of comparison is to exploit the fact that households of a given age in 1989 had not experienced the 1990s, whereas households of the same age, observed in 2001, had. Thus, by controlling for other factors that may vary across generations—such as educational attainment, marital status, health status, and differing work norms for women—we can measure the effects of exposure to the 1990s on saving and wealth.

1. For data on aggregate wealth and equities, see Flow of Funds Accounts of the United States: Annual Flows and Outstandings 1945–2004 Z.1, table F.6, line 1; table B.100, line 42; and table B.100.e, line 6. For data on the diffusion of stock ownership and of 401(k) plans, see Aizcorbe, Kennickell, and Moore (2003), Kennickell and Starr-McCluer (1994), and Poterba and Samwick (1995, 1999). For evidence on the saving rate, see Gale and Sabelhaus (1999), Bosworth and Bell (2005), and Sabelhaus and Schwabish (2006). To adjust the figures in the text to generate real increases in net worth and capital gains, note that cumulative inflation between 1990 and 2000 was 28 percent, as measured by the consumer price index research series using current methods. For a discussion of overarching trends and the general prosperity of the 1990s, see Blinder and Yellen (2001).

2. See Bosworth and Bell (2005), Coile and Levine (2004), Coronado and Perozek (2003), Dynan and Maki (2001), Juster and others (2006), Maki and Palumbo (2001), Sabelhaus and Schwabish (2006), and Sabelhaus and Pence (1999).

Our approach can provide insights regarding three questions: To what extent are successive generations of American households wealthier than their predecessors? What are the principal determinants of the trends in wealth across successive generations? And what are the implications? The answers to the first two questions turn out to be surprising and simple. The answer to the third is more complex.

We find that the rise in aggregate net worth over the 1990s (that is, the rise in net worth in 2001 relative to 1989) accrued almost entirely to older age groups. Older households (those with heads aged 55–64, 65–74, or 75–84 years) in 2001 had significantly more wealth than did similarly aged households in 1989. For example, real median wealth among 65- to 74-year-olds in 2001 was about $100,000 (60 percent) greater than among 65- to 74-year-olds in 1989. For these older households, economically and statistically significant increases in wealth occurred at almost all points in the wealth distribution and across all major wealth categories: retirement accounts, other financial assets, housing equity, and other real assets. In contrast, the typical younger household (aged 25–34, 35–44, or 45–54) in 2001 did not have more wealth than a typical younger household in 1989.

We also show that, despite the large capital gains, the rapid diffusion of stock ownership, and the significant increase in 401(k) participation and contributions in the 1990s, the principal factor determining changes in wealth across successive generations appears to be changes in household-level demographic characteristics, and not changes in the relationship between these characteristics and wealth. Informally, certain key demographic characteristics that affect wealth accumulation shifted substantially across age groups in a manner consistent with the differing trends in wealth. For example, compared with similarly aged households in 1989, older households in 2001 were more likely to be married, more likely to report their health as "excellent" or "good," and more likely to contain men who had completed postsecondary education. In contrast, for younger households in 2001, each of these trends was reversed relative to similarly aged households in 1989. Formal regression and decomposition analysis shows even more strongly that changes in demographic characteristics are closely tied to changes in median wealth, mean wealth, and the distribution of wealth between 1989 and 2001 for older generations. Indeed, information on households' 2001 demographic characteristics and the relationship between those characteristics and wealth that held in the 1989 sample predicts extremely accurately the distribution of wealth in 2001, without any reference to

changes in capital gains, stock ownership, or participation in defined-contribution plans.

The rest of the paper is organized as follows. We begin by describing the data set. We then present trends across successive cohorts in wealth holdings and demographic characteristics. Next we describe the various tests and the econometric specifications we use to compare the wealth of successive cohorts. We then present our main empirical findings. Next we provide information on the role of capital gains, diffusion of stock ownership, and pension coverage across successive cohorts. We conclude by discussing alternative interpretations and implications of the results.

## Data

The Survey of Consumer Finances (SCF) is designed specifically to measure household wealth (net worth) and its components.[3] To capture how assets and debt are held broadly in the population, about two-thirds of the unweighted sample are drawn from a stratified, nationally representative random sample. To capture the concentration of assets and debt among high-wealth households, the remaining third are randomly selected from statistical records derived from tax returns, using a stratification technique that oversamples households likely to have substantial wealth. This sample design allows for more efficient and less biased estimates of wealth than are generally feasible through simpler designs.

Although the SCF has been conducted every three years since 1983, we focus on the data from 1989 to 2001, a period during which the survey has employed a consistent methodology. This period, of course, also brackets the sharp increase in the ratio of aggregate net worth to GDP described earlier. A key advantage of the SCF is that it covers all age groups and almost all household assets and liabilities, financial and real, including defined-benefit pension wealth. The only important exception is that households wealthy enough to be in the Forbes 400 are excluded. The main drawback of the SCF is its relatively small sample size of approximately 4,000 households in each survey year.

3. For an overview of the 2001 SCF, see Aizcorbe, Kennickell, and Moore (2003). For an overview of the SCF sample design and survey methodology, see Kennickell (2005).

Our measures of net worth and its components follow the SCF definitions except for the treatment of pension wealth. Because the SCF defines net worth as resources that a household may access and control immediately, the survey's definition of wealth excludes defined-benefit pensions (which cannot be accessed until retirement) and includes only liquid defined-contribution plans: 401(k)s, thrift plans, defined-contribution plans from past jobs, and other plans that can be borrowed against or withdrawn from. These definitions understate pension wealth at any point in time and likely lead to systematic overstatements of the growth in pension benefits over time. Over the past twenty years, the employer pension system has moved dramatically toward defined-contribution plans and away from defined-benefit plans. Furthermore, among defined-contribution plans, firms have shifted from illiquid to liquid plans (as defined by the SCF). To address these issues, we include all defined-contribution balances, as well as estimates of defined-benefit wealth, in the wealth definition.[4]

Our definition of net worth, like the measure in the SCF, does not include expected future Social Security or Medicare benefits or taxes. Although Social Security benefits are a significant part of wealth for many lower- and middle-income households, their inclusion would not alter the results. There were no new legislated changes in Social Security over the sample period, although the retirement age did rise slightly as legislated by the 1983 Social Security reform. If anything, Social Security benefits increased over this time period for elderly households, accentuating rather than offsetting the trends in private wealth. Data from the Current Population Survey, for example, indicate that the median annual household Social Security benefit received by a household aged 65–74 was $9,935 in 1989 (expressed in 2001 dollars) and $11,330 in 2001. This increase likely reflects higher lifetime real wages and increased female labor force participation among the cohort aged 65–74 in 2001 compared with the cohort aged 65–74 in 1989 (as described below). Although legislated changes to Medicare over this period affected health

4. The appendix describes our procedures for calculating defined-benefit wealth. Kennickell and Sundén (1997) and Wolff (2002) have previously estimated the value of defined-benefit wealth from SCF data. Samwick and Skinner (2004) estimate the employer-reported values of defined-benefit pensions from the Pension Provider Surveys that accompanied the 1983 and 1989 SCFs.

care providers, it is not clear what net effect, if any, these changes had on household wealth.[5]

The SCF also includes information on household demographic characteristics, income, and current and past jobs held by the household head and spouse. We use these data to construct a series of variables described below.

## Trends in Wealth and Demographics

In this section we explore the differences in total wealth between the 1989 and 2001 samples for each of the different age groups, on average, at the median and other selected points in the wealth distribution, and for the entire distribution for two of the age groups. We also look at differences across the same period for the different age groups with respect to each of several main categories of wealth. Among demographic variables, we examine trends in marital status, longevity, health, education, and labor force participation.

### *Wealth*

Although the growth in equity markets and aggregate net worth over the 1990s is well documented, the distribution of these gains across age groups is not, and the differences in trends across age groups are striking. Older households, defined as those headed by a person aged 55 or older, had significantly more wealth in 2001 than did households in the same age range in 1989, whereas younger households in 2001 generally had the same amount of wealth as similarly aged households in 1989.[6]

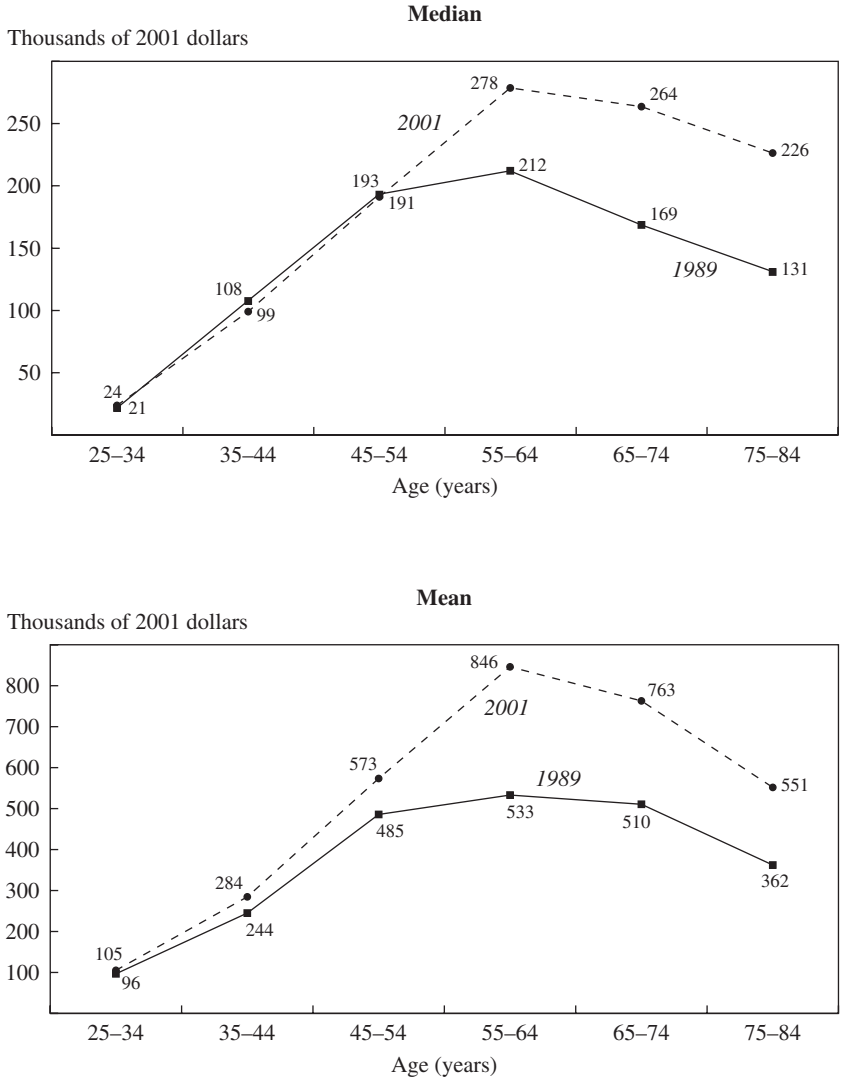
The top panel of figure 1 shows that real median wealth for households with a head between the ages of 65 and 74 rose by almost 60 percent, from $169,000 in 1989 to $264,000 in 2001.[7] The other two older age groups—

5. The Balanced Budget Act of 1997 (P.L. 105-33) introduced new managed care options for Medicare participants through the Medicare+Choice program and reduced the payments to medical providers for some services. These payment cuts were partly reversed in the Medicare, Medicaid, and SCHIP Balanced Budget Refinement Act of 1999 (P.L. 106-113) and the Benefits Improvement and Protection Act of 2000 (P.L. 106-554).

6. Tables A-2 and A-3 in the appendix reports detailed data on wealth by age group and year.

7. All values are deflated to 2001 dollars using the consumer price index research series using current methods. Using the personal consumption expenditure deflator instead would have no significant effect on the relative changes in wealth by age group.

**Figure 1. Median and Mean Net Worth by Age Group, 1989 and 2001**




Source: Authors' calculations using Survey of Consumer Finances data.

those aged 55–64 and 75–84—also enjoyed substantial absolute and relative increases in wealth. In contrast, the median net worth of households with a head between the ages of 35 and 44 actually fell from $108,000 in 1989 to $99,000 in 2001. The other two younger age groups—those aged 25–34 and 45–54—fared similarly. The bottom panel of figure 1 shows similar trends for mean net worth. Mean wealth for each of the older three cohorts was roughly 50 percent higher in 2001 than for households of a similar age in 1989. For the three younger age groups, mean wealth grew by only about 10 to 20 percent.

Figure 2 shows similar trends for the 10th, 25th, 75th, and 90th percentiles of the wealth distribution for each age group. At each percentile the older cohorts in 2001 had substantially more wealth than did their counterparts in 1989. The younger cohorts in 2001 had about the same wealth as did their counterparts in 1989.

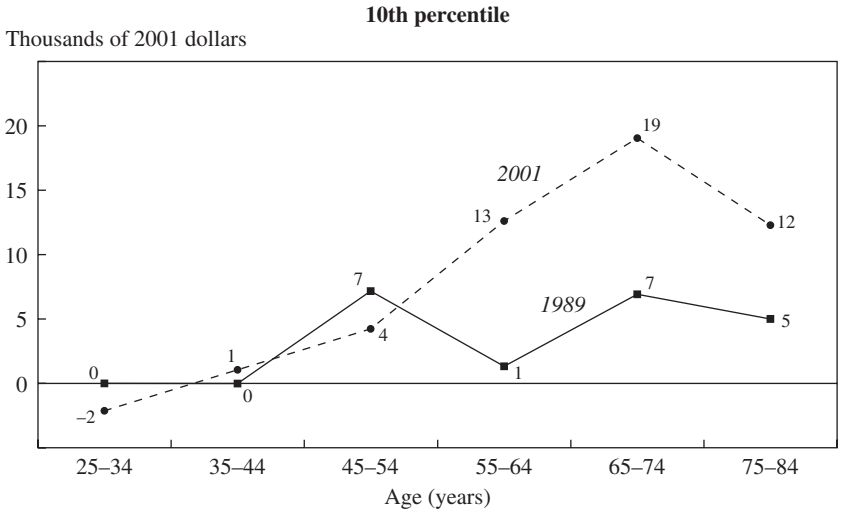
The top panel of figure 3 shows the entire distribution of net worth in 1989 and 2001 for households with heads aged 65–74 in those years—the "middle" older cohort. For this group the cumulative distribution function (CDF) of net worth in 2001 lies to the right of the corresponding CDF in 1989, indicating that the 2001 sample was richer all across the distribution. The differences are statistically significant at a 95 percent confidence level at each decile break from the 30th to the 80th percentile.[8] The bottom panel of figure 3 shows the analogous results for households aged 35 to 44 in 1989 and 2001—the "middle" younger cohort. For these groups the distribution of wealth in 1989 approximately coincides with the distribution of wealth in 2001. No statistically significant differences occur at any decile of these distributions.[9]

Data for average holdings of particular components of wealth—retirement assets, other financial wealth, home equity, and other real assets—show

8. The difference between the deciles was bootstrapped with 999 replicates drawn in accordance with the SCF sampling design. See Kennickell (2000) for information on the construction of these replicates. Although not shown, similar statistically significant differences at the 95 percent confidence level exist for the 10th, 20th, 40th, 50th, 60th, 80th, and 90th percentiles for comparisons of the 55- to 64-year-old age groups in 1989 and 2001, and for each decile from the 20th to the 80th percentile for comparisons of the 75- to 84-year-old groups in the two years.

9. For the 25–34 age group, the household at the 10th percentile in 1989 has statistically significantly more wealth than the household at the 10th percentile in 2001 (not shown). The 1989 and 2001 CDFs are statistically insignificantly different at all other deciles for the three younger groups.

**Figure 2. Various Percentiles of Net Worth by Age Group, 1989 and 2001**



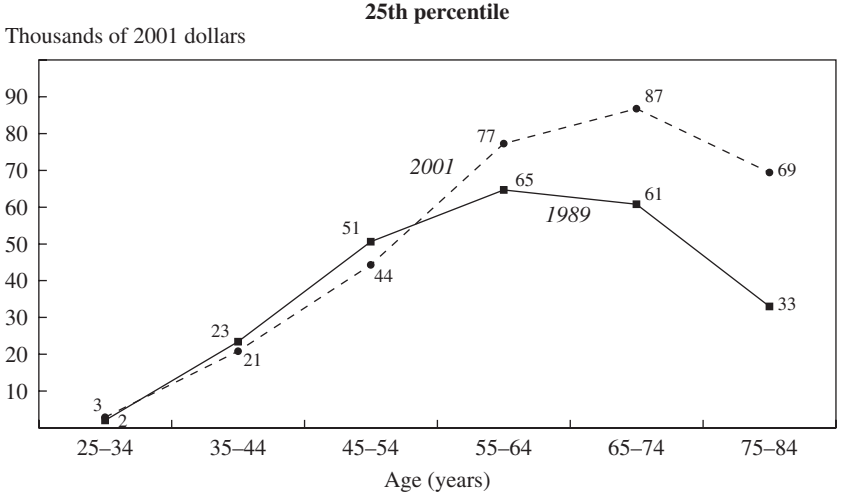




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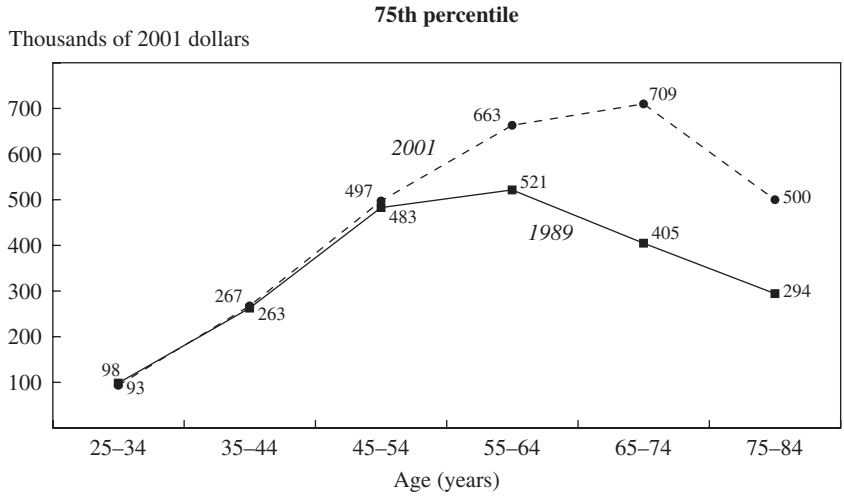
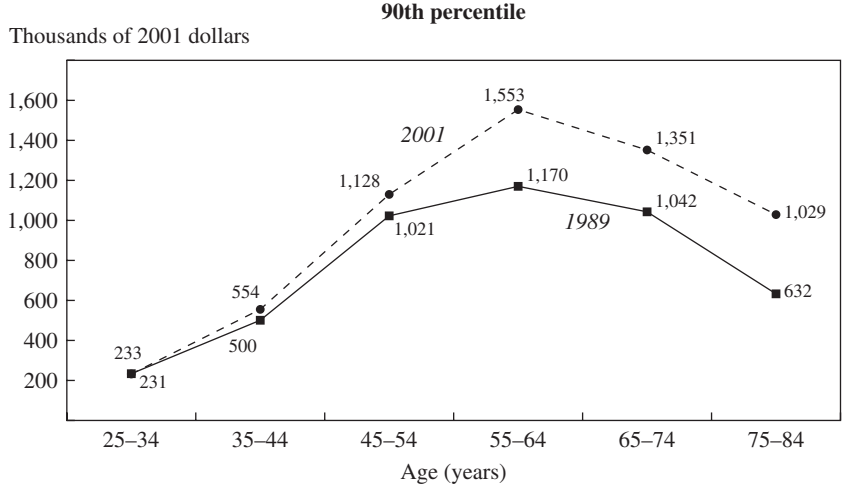
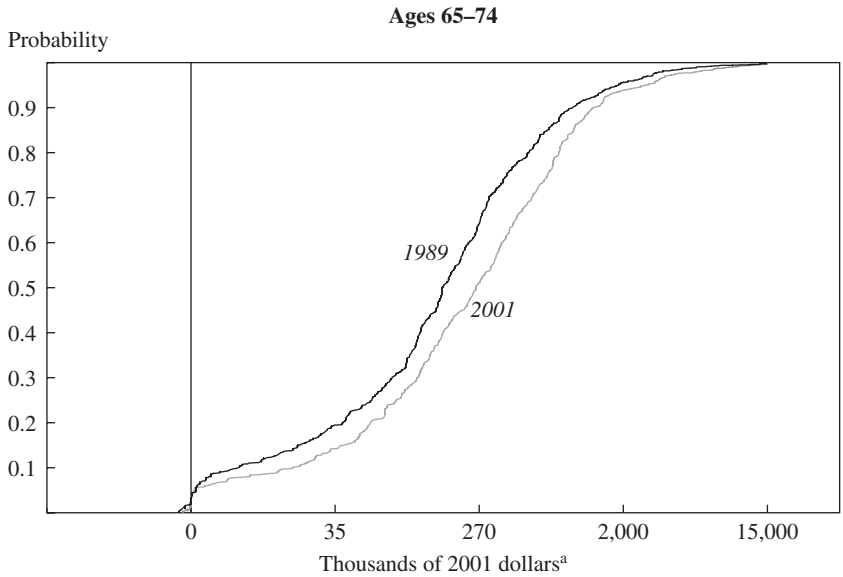
**Figure 2. Various Percentiles of Net Worth by Age Group, 1989 and 2001 (*continued*)**

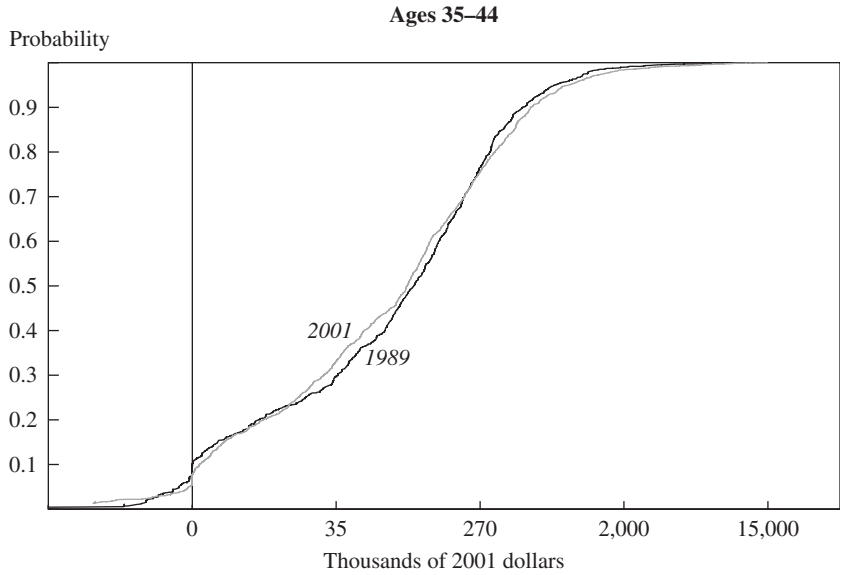



Source: Authors' calculations using Survey of Consumer Finances data.

**Figure 3. Cumulative Distribution Function of Net Worth for Households Ages 35–44 and 65–74, 1989 and 2001**




Source: Authors' calculations using Survey of Consumer Finances data.
a. Scaled in inverse hyperbolic sine units.

patterns that are similar to those in the aggregate data but, not surprisingly, somewhat noisier, given that not all households hold all types of assets: some own their home but hold no financial wealth, for example, whereas others have pension wealth but do not own a home, and so on. In general, however, for each component of wealth, average holdings were higher in 2001 than in 1989 for older cohorts but not necessarily for younger cohorts.

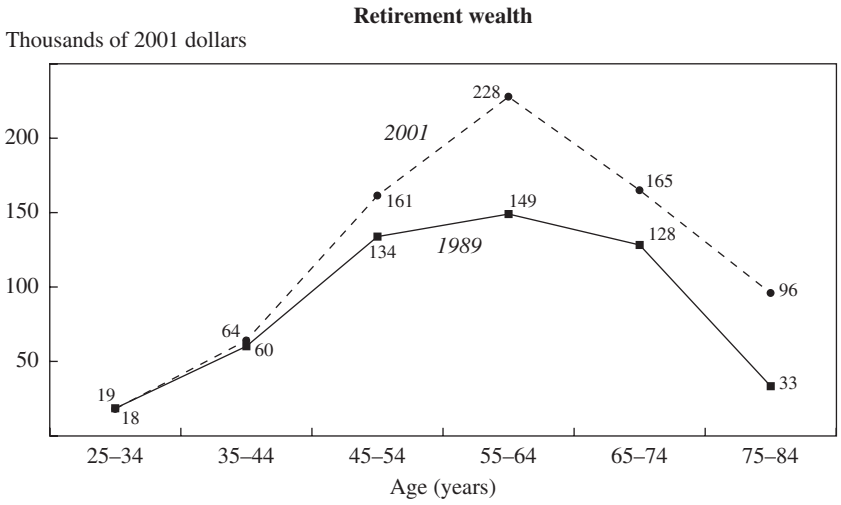
The first panel of figure 4, for example, shows that average retirement wealth was $79,000 higher in 2001 for the 55–64 group, $37,000 higher for the 65–74 group, and $63,000 higher for the 75–84 group. Among the younger groups, the 45–54 group had a mean increase of $27,000, but the increases for the other two groups were $4,000 or less. Likewise, the average home equity of households in the 65–74 group rose from $95,000 in 1989 to $133,000 in 2001 (second panel of figure 4). In contrast, households in the 45–54 group had about the same average home equity ($104,000) as the 65–74 group in 1989, but by 2001 the home equity of households in this age group had not advanced beyond its 1989 level.[10] Mean financial assets rose for all age groups (third panel of figure 4). Although the absolute difference was larger for the older groups, the proportional increases were quite large for all groups. Other real assets, which include equity in vehicles, investment real estate, closely held businesses, and other miscellaneous assets, rose for the 55–64 and 65–74 groups and were roughly flat for the younger groups and the 75–84 group (last panel of figure 4).

Several aspects of the wealth trends noted above are significant. First, given the well-known trend toward greater income inequality over the sample period,[11] it is worth noting that the data do *not* simply show that wealthy age groups became wealthier. Median wealth for 45- to 54-year-olds in 1989 was $193,000, for example, substantially larger than that for households aged 65–74 ($169,000) or 75–84 ($131,000). Yet by 2001 median wealth for households aged 45–54 was virtually the same as in 1989 ($191,000), whereas median wealth had risen by about $100,000 for cohorts aged 65–74 and 75–84 relative to similarly aged counterparts in 1989 (figure 1).

10. Although not shown in the figure, average home equity dropped for almost all age groups in the recession of the early 1990s, but the drops were much larger, and the subsequent increase in home equity was substantially more muted, for younger households (see table A-3 in the appendix).

11. See Burtless and Jencks (2003), for example.

**Figure 4. Mean Net Worth by Asset Class and by Age Group, 1989 and 2001**



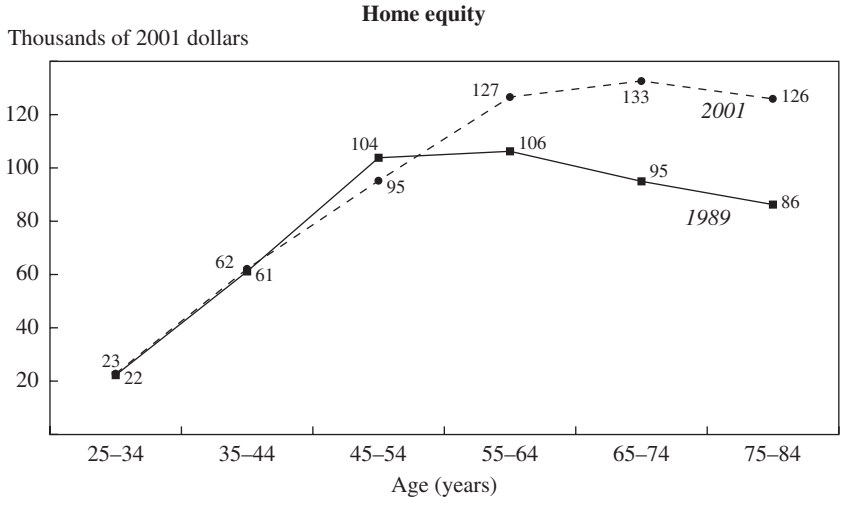




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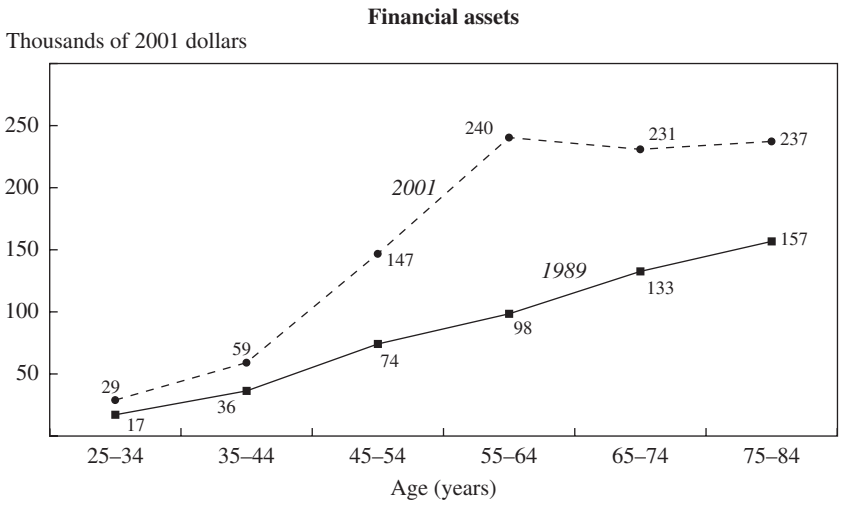
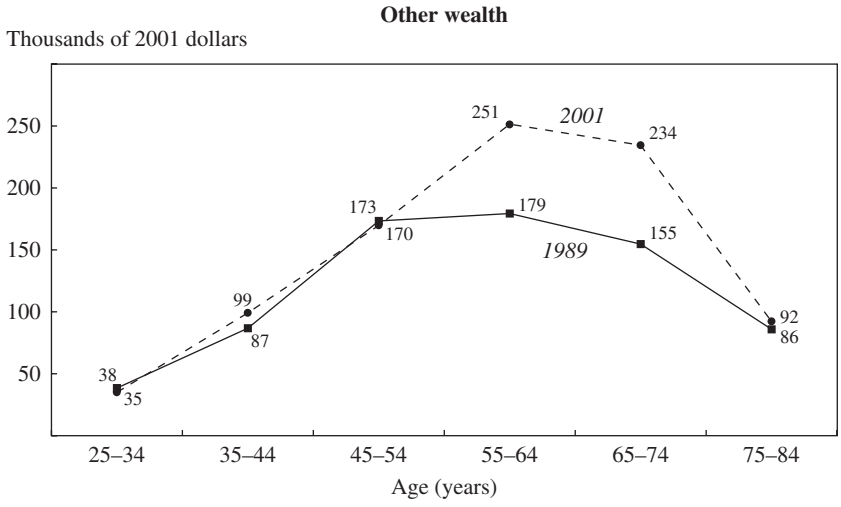
**Figure 4. Mean Net Worth by Asset Class and by Age Group, 1989 and 2001 (*continued*)**




Source: Authors' calculations using Survey of Consumer Finances data.

Second, the results do not show that, within each age group, the rich got richer. The differences at the 75th and the 90th percentile occur only in the older groups, not in the younger groups (figure 3). Moreover, in the distribution of net worth for 65- to 74-year-olds, significant differences exist between the 1989 and 2001 distributions for the 30th to the 80th percentiles but not for the 90th percentile. These results are consistent with the finding by Arthur Kennickell that although the share of wealth held by households in the top 1 percent of the wealth distribution appears to have increased from 1989 to 2001, the change is not statistically significant.[12]

Third, the results are not consistent with the view that younger households (as defined here) simply do not save very much, so that they benefited little from the capital gains of the 1990s. In fact, median wealth for 45- to 54-year-olds in 1989 was the second highest of all groups (figure 1).

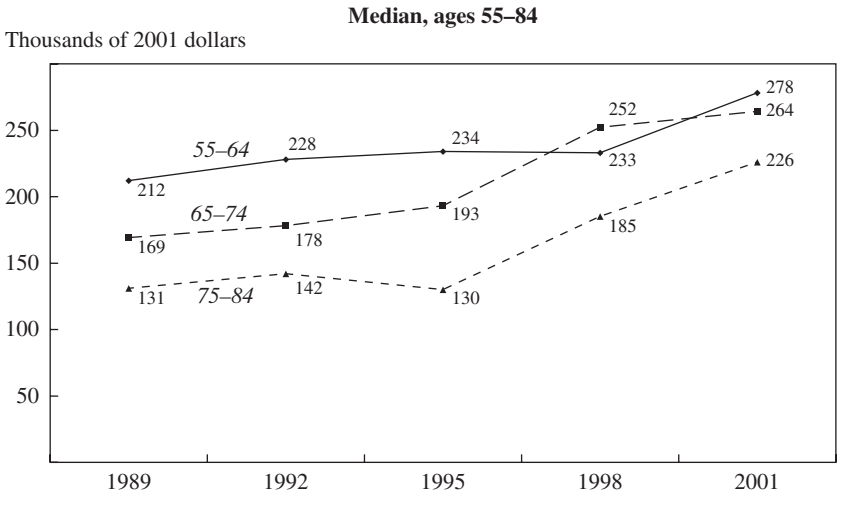
Fourth, the results show increases in all forms of wealth and increases in overall wealth across the entire wealth distribution for older households. This suggests that the determinants might be more than just capital gains or the spread of 401(k) plans, because both of these are distributed quite unequally across the wealth distribution.

Finally, it is worth noting that the facts documented here do indeed look like trends that have occurred over time, rather than simply two isolated sets of data points. Figure 5 shows median and mean wealth for successive cohorts for each SCF year in the sample period: 1989, 1992, 1995, 1998, and 2001. Because of the relatively small sample size within each age-year cell, and because economic conditions and asset returns naturally vary over time, the year-by-year data in these figures are necessarily noisier than the snapshots of the 1989 and the 2001 data.

Nonetheless, the figure shows that although macroeconomic conditions clearly affected all households, older households fared better than younger households regardless of the state of the economy. The median net worth of older households stayed level during the early-1990s recession and then skyrocketed in the booming second half of the decade (first panel of figure 5). In contrast, the median net worth of households aged 35–44 and 45–54 fell in the recession years and only came close to regaining its 1989 level in 2001 (second panel of figure 5). Likewise, older and younger households experienced comparable drops in average wealth between 1989

12. Kennickell (2003). Kopczuk and Saez (2004) and Piketty and Saez (2003) present complementary evidence that wealth inequality did not increase markedly over the 1990s.

**Figure 5. Median and Mean Net Worth by Year, for Ages 25–54 and 55–84**



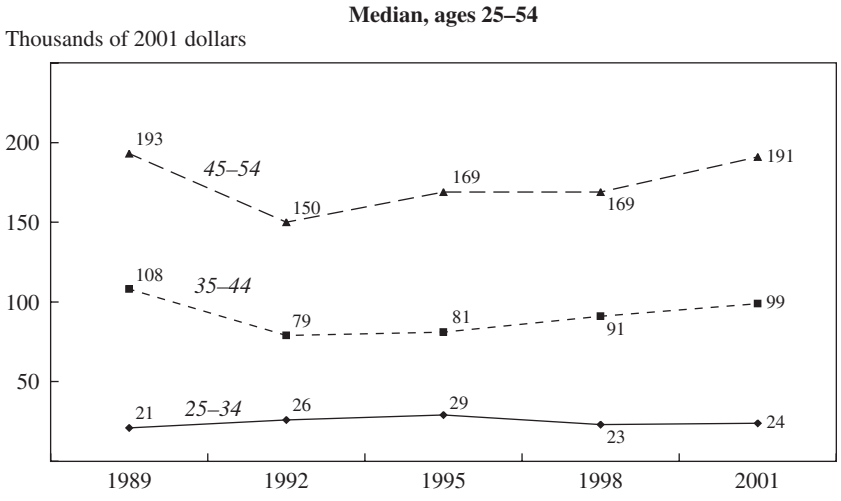




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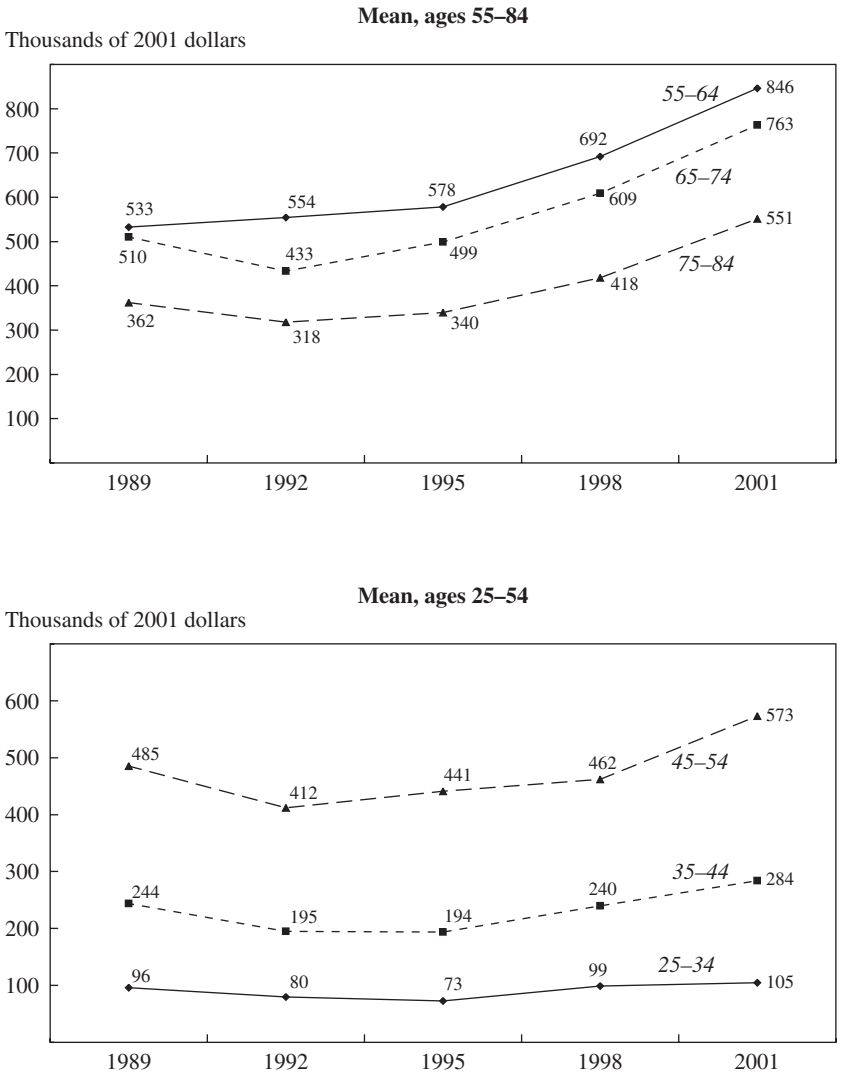
**Figure 5. Median and Mean Net Worth by Year, for Ages 25–54 and 55–84 (*continued*)**




Source: Authors' calculations using Survey of Consumer Finances data.

and 1992, but older households subsequently experienced much larger wealth gains (last two panels of figure 5). By focusing on 1989 and 2001—two years that were both preceded by several strong years in the stock and housing markets—we are able to abstract from some of this year-to-year macroeconomic variability.

*Demographics*

There is a long tradition in economics, dating at least as far back as Franco Modigliani's work in the 1950s, relating household demographic characteristics to wealth accumulation. Even after controlling for age, demographic factors such as marital status, health, education, and labor force participation can have significant effects on wealth and saving. Married households benefit from the economies of scale and household production associated with marriage and thus may save a larger fraction of their income than unmarried households.[13] Widowed households, in contrast, often face a negative income shock from decreased pension and Social Security benefits after a spouse's death, as well as a wealth shock from large out-of-pocket medical expenses incurred in the last year of the deceased spouse's life.[14] Advances in health affect wealth indirectly by reducing the number of widowed households. In addition, workers with better health may spend more years in the labor force and face lower out-of-pocket medical expenses.[15] Better-educated workers generally have higher lifetime earnings and are more likely to be invested in the stock market.[16] Education also appears to promote better health outcomes, even after controlling for income and wealth.[17] Finally, workers who spend more years in the labor force will have higher lifetime earnings, all else equal.

13. See Lupton and Smith (2003) for evidence that married households save more than other types of households.

14. McGarry and Schoeni (2005) document that out-of-pocket medical expenses in the last year of life are a significant factor in the poverty rate of widows.

15. Aaronson and others (this volume, table 3) document that the labor force participation rate of men and women aged 65–69 rose 4.4 and 5.8 percentage points, respectively, from 1985 to 2000. Smith (2004) presents evidence that the out-of-pocket medical expenses and drop in labor force participation associated with health shocks can have large negative effects on wealth.

16. See Dynan, Skinner, and Zeldes (2004) for evidence that saving increases with education.

17. Smith (2004).

Notably, the trends in these key demographic characteristics across cohorts in the 1990s generally mirror the patterns shown in the wealth accumulation data. Specifically, demographic characteristics "improved" in a number of ways for older households in 2001 relative to those in 1989, and they either did not improve or actually deteriorated for younger households in 2001 relative to their 1989 counterparts.[18] For example, the share of married household heads rose among older households and decreased among younger households. In 2001, 58 percent of household heads between the ages of 65 and 74 were married, compared with 50 percent in 1989. In contrast, among 35- to 44-year-olds, the share fell from 64 percent to 58 percent (table 1). Data from the CPS (not shown) display a similar but more muted pattern, with the share of married households increasing from 53 percent to 55 percent for the 65–74 age group and decreasing from 65 percent to 61 percent for the 35–44 age group.[19]

The increase in the share of older married households may stem from increases in male longevity. Since 1975, male longevity at older ages has increased relative to female longevity, because smoking-related deaths have increased relatively more for women and because men have benefited disproportionately from decreases in cardiovascular disease.[20] Over the 1989–2001 period, for example, male life expectancy at age 65 increased by 12 months, whereas female life expectancy increased by only 2 months.[21] Perhaps reflecting these trends, the share of SCF households headed by a widow in the 65–74 age group fell from 31 percent in 1989 to 17 percent in 2001.

Among younger households, the decline in the married share appears to stem from delays in the age of first marriage. From 1989 to 2001 the share of households aged 35–44 with a never-married head (some of whom are living with a partner) increased from 16 percent to 22 percent. Although the share of married 35- to 44-year-olds fell, the share living with a partner or married held constant at 67 percent in both years.

18. He and others (2005) provide a comprehensive overview of trends in the demographics of older households in the United States.

19. The SCF provides detailed demographic data for the head and spouse only. To make the SCF and CPS tabulations comparable, we limit all CPS tabulations in this paper to heads, spouses, and primary individuals.

20. Fu and others (2005).

21. Bell and Miller (2002, table 10).

**Table 1. Demographic Characteristics by Year and Age Group[a]**

| *Characteristic and age group* | *1989* | *2001* | *Change from 1989 to 2001 (percentage points)* |
|---|---|---|---|
| Percent married | | | |
| 25–34 | 57 | 47 | –10*** |
| 35–44 | 64 | 58 | –6** |
| 45–54 | 65 | 58 | –7** |
| 55–64 | 60 | 61 | 1 |
| 65–74 | 50 | 58 | 8** |
| 75–84 | 39 | 49 | 10** |
| Percent with "excellent" or "good" health | | | |
| 25–34 | 89 | 83 | –6*** |
| 35–44 | 87 | 83 | –4** |
| 45–54 | 79 | 77 | –2 |
| 55–64 | 62 | 71 | 9*** |
| 65–74 | 57 | 61 | 4 |
| 75–84 | 49 | 60 | 11*** |
| Percent of men with postsecondary education | | | |
| 25–34 | 51 | 57 | 6* |
| 35–44 | 60 | 56 | –4 |
| 45–54 | 50 | 62 | 12*** |
| 55–64 | 37 | 54 | 17*** |
| 65–74 | 31 | 49 | 18*** |
| 75–84 | 24 | 42 | 18*** |
| Percent of women with postsecondary education | | | |
| 25–34 | 43 | 57 | 14*** |
| 35–44 | 49 | 59 | 10*** |
| 45–54 | 44 | 57 | 13*** |
| 55–64 | 31 | 49 | 18*** |
| 65–74 | 27 | 40 | 13*** |
| 75–84 | 22 | 33 | 11*** |
| Average full-time years in the labor force, men | | | |
| 25–34 | 10.1 | 9.7 | –0.4 |
| 35–44 | 18.5 | 18.8 | 0.3 |
| 45–54 | 28.6 | 28.1 | –0.5 |
| 55–64 | 36.9 | 36.3 | –0.6 |
| 65–74 | 41.8 | 42.1 | 0.3 |
| 75–84 | 46.4 | 45.5 | –0.9 |
| Average full-time years in the labor force, women | | | |
| 25–34 | 7.0 | 7.3 | 0.3 |
| 35–44 | 11.3 | 13.8 | 2.5*** |
| 45–54 | 15.1 | 18.8 | 3.7*** |
| 55–64 | 17.8 | 22.1 | 4.3*** |
| 65–74 | 18.9 | 22.3 | 3.4*** |
| 75–84 | 21.7 | 23.9 | 2.2 |

Source: Authors' calculations using Survey of Consumer Finances data.

a. Estimates are weighted with the SCF analysis weights. Difference in means is statistically significantly different from zero at the *10 percent, **5 percent, or ***1 percent level. Standard errors are bootstrapped with 999 replicates in accordance with the sample design and adjusted for imputation uncertainty.

Consistent with the increases in longevity noted above, the share of older households who reported their health as "excellent" or "good" increased over the 1989–2001 period (table 1). Among households in the 65–74 age group, that share rose from 57 percent in 1989 to 61 percent in 2001. Similarly, the share of CPS respondents aged 65–74 who described their health as "excellent," "very good," or "good" increased from 67 percent in 1995 to 70 percent in 2001 (not shown).[22] These self-reported health improvements are consistent with documented declines in chronic disabilities among older households.[23] The self-reported health of younger households, however, deteriorated: the share of households in the 35–44 age group who rated their health as "good" or "excellent" fell from 87 percent in 1989 to 83 percent in 2001. Although sampling fluctuations may account for this drop, there is some evidence that increased rates of asthma and diabetes have eroded the health of younger households.[24]

Educational attainment rose substantially for women in all age groups between 1989 and 2001 but rose more for successive older male cohorts than for younger male cohorts. The share of men in the 65–74 age group with postsecondary education increased from 31 percent in 1989 to 49 percent in 2001, whereas the share fell from 60 percent to 56 percent for men in the 35–44 age group (the other two younger age groups saw moderate increases in the share of men with postsecondary education; table 1). For women the corresponding increases were from 27 percent to 40 percent for the 65–74 group and from 49 percent to 59 percent for the 35–44 group. CPS data show similar trends.[25] These increases are consistent with the surge in college matriculation rates after World War II. Although college enrollment increased strongly throughout the twentieth century, the rise was especially pronounced after World War II, when the share of 18- to

22. Data from the National Health Interview Survey also show a similar increase in the share of older households describing their health as good or better over the 1989–2001 period; compare table 21 in Lucas, Schiller, and Benson (2004) with table 70 in Adams and Benson (1990). Costa (2002) and Cutler and Richardson (1997) explore the trends underlying these improvements in health.

23. For more details see the discussion in He and others (2005, pp. 60–63).

24. Lakdawalla, Bhattacharya, and Goldman (2001).

25. The corresponding 1989–2001 changes in the CPS "percent with post-secondary education" are as follows: men aged 65–74, from 28 percent to 44 percent; men aged 35–44, unchanged at 58 percent; women aged 65–74, from 23 percent to 35 percent; women aged 35–44, from 49 percent to 59 percent. These CPS estimates suggest that the SCF overstates the increase in education among older households.

24-year-olds enrolled in college rose from 10 percent in 1945 to nearly 30 percent in 1965.[26] The GI Bills for World War II and Korean War veterans, the democratization of the college application process, the rise in community colleges, and the advent of birth control account for some of this and later increases.[27]

Lifetime labor force participation increased for women in all age groups over this period but stayed constant for men. For example, on average, women in the 65–74 group had nineteen years of full-time work experience in 1989 and twenty-two years of experience in 2001 (table 1). Men in this age group had forty-two years of experience in both years. The forces underlying the increase in women's labor force participation include labor-saving devices that made housework less burdensome, the rise of the clerical sector, the growth of formal education, and decreased sex discrimination, as well as increased access to birth control.[28]

## Modeling the Effects of Demographic Changes on Wealth

We use four different methods to provide perspectives on how changes in demographic characteristics affect the wealth accumulation of successive cohorts. The methods focus on differences in the median, mean, and distribution of wealth.

### *Median*

We run least absolute deviation (LAD) regressions on the pooled 1989 and 2001 data. Initially, we specify wealth for household *i* as a function of just a constant and an indicator variable for being an observation in the 2001 sample:

$$w_i = \alpha_1 + \beta_1 \left(\text{year} = 2001\right)_i + \varepsilon_{1i}. \tag{1}$$

In this specification the coefficient $\beta_1$ captures the change in median wealth between the 1989 and 2001 groups and is equal to the change in medians shown in figure 1.

26. Snyder (1993).
27. See Goldin (1999, 2006), Goldin and Katz (2002), and Stanley (2003).
28. See Bailey (2006), Costa (2000), and Goldin (2006).

In the second LAD specification, we incorporate demographic variables, denoted by *X:*

$$w_i = \alpha_2 + \beta_2 \left(\text{year} = 2001\right)_i + \gamma_2 X_i + \varepsilon_{2i}. \tag{2}$$

If demographic changes explain most of the change in wealth between 1989 and 2001, $\beta_2$ should be close to zero, and the demographic variables should enter as economically and statistically significant.[29] This method assumes that the relationship between wealth and demographic characteristics is the same in both years (other than a shift in the intercept).

*Mean*

We use the familiar Blinder-Oaxaca decomposition to examine how much of the change in mean wealth for each age group comes from changes in the demographic characteristics over time and how much comes from all other factors, that is, from changes in the relationship between wealth and demographic characteristics over time.[30] Whereas the median regression imposes the same coefficients on the 1989 and 2001 data, this decomposition technique allows the relationship between demographics and wealth to differ in the two years.

Suppose that wealth $w$ in a given year (say, 2001) is estimated as a linear combination of demographic characteristics $X$: $w_{01} = X_{01}\beta_{01} + \varepsilon_{01}$. By the assumptions of ordinary least squares, $\mathrm{E}(w_{01}) = \mathrm{E}(X_{01}\beta_{01}) = \mathrm{E}(X_{01})\beta_{01}$. We estimate $\mathrm{E}(X_{01})$ with its sample analog $\overline{X}_{01}$ and thus can express the difference between mean wealth in 2001 and mean wealth in 1989 as

$$\begin{aligned} \mathrm{E}\left(w_{01}\right) - \mathrm{E}\left(w_{89}\right) &= \left(\overline{X}_{01}\beta_{01} - \overline{X}_{01}\beta_{89}\right) + \left(\overline{X}_{01}\beta_{89} - \overline{X}_{89}\beta_{89}\right) \\ &= \left(\overline{X}_{01}\beta_{01} - \overline{X}_{89}\beta_{01}\right) + \left(\overline{X}_{89}\beta_{01} - \overline{X}_{89}\beta_{89}\right). \end{aligned} \tag{3}$$

In equation 3 the term in which $X$ is constant shows the change in wealth attributable to changes in $\beta$, whereas the term in which $\beta$ is constant shows the change in wealth attributable to the change in $X$. The term in which

29. Angrist, Chernozhukov, and Fernández-Vál (2006) show that coefficients from a median regression, like coefficients from a mean regression, can be interpreted as partial regression coefficients.

30. Blinder (1973); Oaxaca (1973).

$\beta$ is constant will be large if changes in demographic factors explain a substantial share of the change in wealth. Dividing each term in this equation by the change in expected wealth, $E(w_{01}) - E(w_{89})$, yields the share of the change in wealth due to demographic characteristics versus the share due to other factors.

*Distribution*

To examine the effects of demographic changes on the distribution of wealth, we ask the following counterfactual question: what would the distribution of wealth in 2001 look like if we took the distribution of demographic characteristics from 2001 but applied the relationship between demographics and wealth from 1989? Note that the latter relationship (loosely, $\beta_{89}$) excludes all effects of the 1990s. Thus the counterfactual question allows us to calculate the share of the actual difference in wealth that can be explained by differences in demographic variables alone. If the relationship between demographics and wealth was approximately the same in 1989 and 2001, this counterfactual distribution should look quite similar to the actual 2001 distribution. If instead the demographics-wealth relationship was quite different in the two years, the counterfactual and the actual 2001 distributions should diverge.

We generate the counterfactual distribution in two ways. The first is a reweighting technique based on a paper by John DiNardo, Nicole Fortin, and Thomas Lemieux.[31] The idea is to reweight the households in the 1989 SCF so that they reflect the distribution of demographic characteristics in the 2001 SCF. The resulting distribution of household wealth thus reflects the 2001 demographic characteristics (due to the reweighting) and the 1989 relationship between demographics and wealth (since it still uses 1989 data). The second approach is a resampling technique based on a paper by José Machado and José Mata.[32] Here we create a predicted wealth value for 2001 by pairing the demographic characteristics from a randomly chosen household in the 2001 SCF with the coefficients from a quantile regression (using a randomly chosen quantile) of wealth on demographic characteristics from the 1989 SCF. Repeating this procedure over and over generates a counterfactual distribution.

31. DiNardo, Fortin, and Lemieux (1996).
32. Machado and Mata (2005).

More formally, we want to simulate the distribution of net worth as a function of demographic characteristics from 2001 and of the relationship between wealth and demographics from 1989. Borrowing notation and exposition from DiNardo, Fortin, and Lemieux, we write the density of wealth at a point in time, $f(w)$, as the integral of the density of wealth conditional on a set of demographic characteristics $X$ and on a date $t_w$, $f(w|X, t_w)$, over the distribution of individual attributes $F(X|t_x)$ at a date $t_x$:

$$(4) \quad f\left(w; t_w = 1989, t_x = 2001\right) = \int f\left(w|X, t_w = 1989\right) \mathrm{d}F\left(X|t_x = 2001\right).$$

DiNardo, Fortin, and Lemieux note that equation 4 can be rewritten as

$$f\left(w; t_w = 1989, t_x = 2001\right) = \int f\left(w|X, t_w = 1989\right) \psi_x \mathrm{d}F\left(X|t_x = 1989\right),$$

where the weight $\psi_x = \mathrm{d}F(X|t_x = 2001)/\mathrm{d}F(X|t_x = 1989)$.[33] This term reweights the households in the 1989 SCF so that their distribution of demographic characteristics matches the distribution from the 2001 survey.

To estimate $\psi_x$, note that by Bayes' law,

$$\frac{\mathrm{d}F\left(X|t_x = 2001\right)}{\mathrm{d}F\left(X|t_x = 1989\right)} = \frac{\mathrm{prob}\left(\mathrm{year} = 2001|X\right)\mathrm{prob}\left(\mathrm{year} = 1989\right)}{\mathrm{prob}\left(\mathrm{year} = 1989|X\right)\mathrm{prob}\left(\mathrm{year} = 2001\right)}.$$

The first term on the right-hand side can be obtained by estimating a logit model on the pooled 1989 and 2001 SCF data in which the dependent variable is a dummy variable for "year = 2001" and the independent variables are demographic characteristics. (We use the sample weights in estimating this logit.) Exponentiating the predicted value for each observation gives the odds prob(year = 2001|$X$)/prob(year = 1989|$X$). We can ignore the second term because it is constant for all observations. We generate this weight for each household in the 1989 SCF, multiply it by the existing sample weight for the household, and then use standard methods to estimate the weighted quantiles of the distribution.

33. The method is conceptually similar to the standardization technique used in demography; see Kitagawa (1964) for an early example. Barsky and others (2002) and Firpo (forthcoming) show that this method can be used to decompose other features of the distribution such as the mean and percentiles.

Whereas the DiNardo, Fortin, and Lemieux technique uses the actual relationship in the 1989 data to characterize the relationship between demographics and wealth, the Machado and Mata technique specifies this relationship parametrically. Machado and Mata note that the conditional distribution of wealth given demographics can be approximated at each quantile $\theta$ in [0,1] by quantile regressions of the form $w = X\beta_\theta + \varepsilon$. This specification imposes a linear relationship between wealth and demographic characteristics at each quantile. We estimate this specification at each percentile from the 1st to the 99th.

To obtain the distribution of wealth that would occur with the 2001 distribution of demographic characteristics and the 1989 relationship between wealth and demographics using the Machado and Mata technique, we employ the following procedure: In step 1 we randomly draw a quantile $\theta$ from a uniform [0,1] distribution and obtain the corresponding quantile regression coefficients $\beta_\theta$ from the 1989 SCF. (We use the 1989 sampling weights when estimating these regressions.) In step 2 we randomly draw an observation from the 2001 SCF and obtain its set of demographic characteristics $X$.[34] Then we combine the coefficients $\beta_\theta$ from step 1 and the characteristics $X$ from step 2 to obtain an observation from the counterfactual wealth distribution. We repeat this procedure until a sample of the desired size is obtained, and we estimate weighted quantiles from this sample using the 2001 SCF sample weights.[35] In both decompositions, if changes in demographic characteristics explain much of the changes in the distribution in wealth, the counterfactual density based on 2001 demographic characteristics and the 1989 relationship between wealth and demographics should lie near the actual 2001 wealth distribution.

### *Specification of Demographic Characteristics*

Each of the tests above requires the specification of demographic characteristics and wealth. Our specification of demographic variables balances

34. We draw these observations using the bootstrapped replicates provided to the public by the SCF. These replicates are drawn in accordance with the SCF sampling design. The SCF generates a sampling weight for each of these replicates with the same algorithm that creates weights for households on the main data set.

35. This procedure has been used by Albrecht, Björklund, and Vroman (2003) to examine the gender log wage gap in Sweden, and by Autor, Katz, and Kearney (2005a, 2005b) to examine earnings inequality in the United States.

three factors. First, we allow demographic trends to affect men and women differently. Second, our unit of observation is a household, not an individual. Third, our sample size is relatively small (about 500 households per age group per year), which places increased importance on having a relatively parsimonious specification.

To characterize marital status, we define indicator variables for "married couple or unmarried partners" (where the partners can be either of different sexes or of the same sex), for "second or subsequent marriage," and for "divorced or separated."[36] Single or widowed households are the omitted category. Since a divorce or death of a spouse can affect men and women differently, we include an indicator for female-headed households (which can include same-sex households). We also add variables for the number of years a married household has been married and the number of years an individual has been widowed or divorced.

We define variables for postsecondary education, years in the full-time workforce, and fair or poor health separately for men and women.[37] For a married couple the "male" variables correspond to the characteristics of the husband, and the "female" variables to those of the wife. For a household with only one head, the "male" or "female" variables are used and the others are set to zero. For a same-sex couple, the characteristics of the partner designated as the "head" are used, and the demographic characteristics of the other partner are ignored.

Under this specification, the effect of a marriage on wealth accumulation is not simply measured by the coefficient $\beta_{\text{marriage}}$, but also varies with the characteristics of the spouses. For example, the expected wealth of a married couple in which both spouses have postsecondary (post-HS) education is predicted by summing the coefficients $\beta_{\text{marriage}}$, $\beta_{\text{male-post-HS}}$, and $\beta_{\text{female-post-HS}}$, along with the appropriate male and female labor force and health coefficients, whereas the expected wealth of an otherwise observationally identical married couple without postsecondary education would differ by $\beta_{\text{male-post-HS}} + \beta_{\text{female-post-HS}}$.

36. Two unmarried individuals living together are categorized as "partners" by the SCF if they are financially interdependent. The SCF has anywhere from zero to sixteen same-sex couples in any ten-year age group in a given year.

37. We also explored the role of other demographic variables, including number of children, age of the parents of the household head and spouse, number of siblings of the household head, and whether the household head smokes, but these variables did not enter significantly.

*Wealth Transformations*

To establish the robustness of our results, we use the above four techniques to analyze changes in both the level and the inverse hyperbolic sine of wealth. The level-of-wealth results explore the absolute changes in wealth over time, whereas the inverse hyperbolic sine results explore the proportionate changes in wealth over time. We use this transformation, rather than the traditional logarithmic transformation, because it approximates the logarithm but is defined for the zero and negative values that are common in wealth data.

More formally, if $\theta$ is a scaling parameter and $w$ is a measure of wealth, the inverse hyperbolic sine of wealth can be written as $\theta^{-1}\sinh^{-1}(\theta w) = \theta^{-1}\ln[\theta w + (\theta^2 w^2 + 1)^{1/2}]$. This symmetric function is linear around the origin but approximates the logarithm for larger values of wealth. To see this, note that if $w$ is large, $\ln[\theta w + (\theta^2 w^2 + 1)^{1/2}] \approx \ln 2\theta + \ln w$, which is simply a vertical displacement of the logarithm. Following previous research, we set $\theta = 0.0001$.[38] When multiplied by this scaling parameter, coefficients from an inverse hyperbolic sine specification, like coefficients from a logarithmic specification, can be interpreted as the effect of a change in a given demographic variable on the percentage change in wealth, for wealth values that are sufficiently large.[39]

## Results

We report results for median regressions, Blinder-Oaxaca decompositions, and decompositions of the entire net worth distribution.

*Median Regressions*

Table 2 reports the results of the median regressions. The first column shows the coefficient $\beta_1$ from equation 1, that is, the effect of the 2001

38. Using maximum likelihood, Burbidge, Magee, and Robb (1988) find that 0.0000872 (or 0.0001, rounded) is the optimal value for the scaling parameter for net worth in their ordinary least squares specification; Pence (2002) finds that 0.0001 is the optimal value for her median regression specification. Kennickell and Sundén (1997) also use this parameter value for net worth.

39. See Pence (2006) for further exposition of this result and Burbidge, Magee, and Robb (1988) for more information on this transformation.

**Table 2. Explaining Differences in Median Wealth from 1989 to 2001 by Age Group, Levels Specification**[a]
Dollars

| *Age group* | *With no demographic variables* | *With marital variables only* | *With marital and labor force variables* | *With marital and health variables* | *With marital and education variables* | *With all demographic variables* |
|---|---|---|---|---|---|---|
| 25–34 | 2,190 | 2,733 | 590 | 3,888 | –25 | –1,142 |
| | (4,731) | (2,900) | (3,312) | (3,207) | (2,573) | (3,595) |
| 35–44 | –8,573 | –9,302 | –6,100 | –6,755 | 680 | –3,773 |
| | (10,996) | (8,020) | (9,384) | (8,822) | (6,260) | (6,270) |
| 45–54 | –1,812 | 4,712 | 3,037 | 10,685 | –13,956 | –20,656 |
| | (25,394) | (14,664) | (15,049) | (13,734) | (14,095) | (13,976) |
| 55–64 | 66,308** | 68,950*** | 57,653*** | 50,710*** | 20,262 | 12,674 |
| | (27,841) | (23,936) | (20,801) | (16,289) | (17,810) | (18,604) |
| 65–74 | 94,996** | 62,493*** | 63,616*** | 13,150 | –16,651 | –12,919 |
| | (38,263) | (22,842) | (23,688) | (20,114) | (22,485) | (15,956) |
| 75–84 | 95,435*** | 40,494* | 46,138* | 40,379* | 32,173* | 18,940 |
| | (24,440) | (23,152) | (24,813) | (22,514) | (17,118) | (17,716) |

Source: Authors' regressions using Survey of Consumer Finances data.

a. Estimates are weighted and represent the change in median wealth not explained by the indicated demographic variables. Standard errors are in parentheses and are bootstrapped with 999 replicates in accordance with the sample design. Coefficients and standard errors are adjusted for imputation uncertainty. To aid convergence, wealth was divided by 10,000 before this specification was run; coefficients were subsequently converted back to dollars. Asterisks indicate statistical significance at the *10 percent, **5 percent, or ***1 percent level.

indicator before adding demographic characteristics to the equation. The values are small and imprecisely estimated for the three younger age groups, indicating no economically or statistically significant differences in wealth over the course of the 1990s. In contrast, the estimated coefficients are large and significant for the three older age groups. These results, of course, mirror the results in figure 1.

The last column of table 2 shows the coefficient $\beta_2$ in equation 2, that is, the effect of the 2001 indicator after adding all of the demographic characteristics described above. The addition of demographic variables removes almost all of the 1989–2001 increase in wealth for the older cohorts. The difference in median wealth falls from $66,308 to $12,674 for the 55–64 group, from $94,996 to –$12,919 for the 65–74 group, and from $95,435 to $18,940 for the 75–84 group and is now statistically insignificant in all three groups. Controlling for demographic characteristics also changes the difference in median wealth for the younger households, but not in a systematic or statistically significant manner. Thus the $\beta_2$ coefficient in equation 2 indicates that once one controls for demographic characteristics, the increase in wealth observed in older cohorts disappears.

The middle four columns in table 2 show the effects of adding some but not all of the demographic variables to the right-hand side. These specifications are consistent with the demographic changes documented in table 1: when a demographic characteristic is added to the specification, the coefficient $\beta_2$ changes the most for those age groups in which that characteristic changed significantly from 1989 to 2001. The marital status variables, for example, have the largest effects on the two age groups—65–74 and 75–84—that saw large increases in the share of married households. The labor force variables affect only the 55–64 group, the group that saw the largest increase in female labor force participation. The health and education variables, which changed for all three older age groups, likewise contribute to a decrease in the $\beta_2$ coefficient across all three groups.

The pattern of coefficients from the inverse hyperbolic sine specification, shown in table 3, is similar. The first column shows that, when expressed in proportionate terms, the net worth of younger households was approximately the same in both 1989 and 2001.[40] Households in the 35–44 group,

40. To ensure that the coefficient can be interpreted as a percentage change, we use the $e^{\beta} - 1$ transformation proposed by Halvorsen and Palmquist (1980) for indicator variables in semilogarithmic regressions.

**Table 3. Explaining Differences in Median Wealth from 1989 to 2001 by Age Group, Inverse Hyperbolic Sine Specification**[a]
Dollars

| *Age group* | *With no demographic variables* | *With marital variables only* | *With marital and labor force variables* | *With marital and health variables* | *With marital and education variables* | *With all demographic variables* |
|---|---|---|---|---|---|---|
| 25–34 | 0.09 | 0.11 | 0.05 | 0.19 | –0.06 | –0.03 |
| | (0.21) | (0.11) | (0.14) | (0.14) | (0.11) | (0.09) |
| 35–44 | –0.08 | –0.17 | –0.16 | –0.05 | –0.05 | –0.00 |
| | (0.10) | (0.12) | (0.12) | (0.10) | (0.11) | (0.11) |
| 45–54 | –0.01 | 0.03 | –0.03 | 0.01 | –0.14 | –0.11 |
| | (0.13) | (0.12) | (0.11) | (0.13) | (0.08) | (0.17) |
| 55–64 | 0.31** | 0.38*** | 0.29** | 0.26* | 0.19 | 0.04 |
| | (0.15) | (0.16) | (0.15) | (0.16) | (0.14) | (0.11) |
| 65–74 | 0.56*** | 0.38*** | 0.35** | 0.15 | –0.09 | –0.04 |
| | (0.25) | (0.17) | (0.19) | (0.14) | (0.13) | (0.11) |
| 75–84 | 0.73*** | 0.34* | 0.51** | 0.40* | 0.23 | 0.12 |
| | (0.23) | (0.22) | (0.31) | (0.26) | (0.16) | (0.15) |

Source: Authors' regressions using Survey of Consumer Finances data.

a. Estimates are weighted and represent the change in median wealth not explained by the indicated demographic variables. Standard errors are in parentheses and are bootstrapped with 999 replicates in accordance with the sample design. Coefficients and standard errors are adjusted for imputation uncertainty. Coefficients have been multiplied by the scaling parameter for the inverse hyperbolic sine, 0.0001, and then transformed with $e^{\beta} - 1$. Statistical significance is calculated from the untransformed coefficients and standard errors. Asterisks indicate statistical significance at the *10 percent, **5 percent, or ***1 percent level.

for example, had 8 percent less wealth in 2001 than 1989, whereas households in the 45–54 group had 1 percent less wealth. Older households, however, experienced substantial and statistically significant wealth gains: the 65–74 group had 56 percent more wealth in 2001 than in 1989, and the 75–84 group had 73 percent more wealth. These results follow the figure 1 numbers when expressed in percentage terms.

As with the levels specification, older households had about the same amount of wealth in 1989 as in 2001 once demographic variables are included. As shown in the final column of table 3, in the full specification, households in the 65–74 group had 4 percent less wealth in 2001 than in 1989; households in the 75–84 group had 12 percent more. These changes are not statistically different from zero. As before, adding the marital variables has a meaningful effect only on the 65–74 and 75–84 groups, whereas the education variables affect all three older age groups. The younger households have a near-zero change in wealth in almost all specifications, regardless of the control variables.

The coefficients on the demographic variables follow expected patterns across the various specifications (table 4). Wealth increases with educational attainment for both men and women; these coefficients are large and statistically significant at the 1 percent level. Households in which either men or women describe their health as "fair" or "poor" have lower wealth. Wealth increases with male labor force participation but not female labor force participation. Female labor force participation may have little effect on wealth accumulation because, historically, lower-income women have been more likely to work outside the home. Over the twentieth century this pattern changed somewhat, as the stigma attached to working outside the home decreased and the returns from market work for most women exceeded the returns from home production. Consistent with this pattern, our regressions indicate that female labor force participation is positively associated with wealth accumulation for the younger groups and negatively associated with it for the older age groups, although neither relationship is statistically significant.[41]

Married couples have more wealth than widowed or single households; divorced and separated households have about the same wealth as widowed or single households. Wealth increases with years of marriage for the 35–44 age group, but not the 65–74 age group. Since the coefficients are

41. See Costa (2000) and Ramey and Francis (2006) for further discussion.

**Table 4. Median Regression Coefficients from Pooled 1989 and 2001 Data[a]**

| | *Ages 35–44* | | *Ages 65–74* | |
|---|---|---|---|---|
| *Variable* | *Levels* | *Inverse hyperbolic sine* | *Levels* | *Inverse hyperbolic sine* |
| Year = 2001 | –3,773 | –0.00 | –12,919 | –0.04 |
| | (6,270) | (0.11) | (15,956) | (0.11) |
| Male, postsecondary education | 78,966*** | 1.03*** | 349,414*** | 1.23*** |
| | (11,827) | (0.19) | (75,307) | (0.30) |
| Female, postsecondary education | 71,123*** | 0.97*** | 231,482*** | 1.00*** |
| | (9,636) | (0.18) | (41,843) | (0.24) |
| Male, health fair or poor | –19,169** | –0.43*** | –79,329** | –0.32*** |
| | (–9,508) | (0.08) | (34,522) | (0.09) |
| Female, health fair or poor | –27,877*** | –0.54*** | –97,026*** | –0.51*** |
| | (8,596) | (0.07) | (16,632) | (0.06) |
| Male, years working full-time | 3,409*** | 0.05*** | 3,174*** | 0.01 |
| | (952) | (0.01) | (1,120) | (0.01) |
| Female, years working full-time | 121 | 0.01* | –675 | –0.00 |
| | (438) | (0.01) | (452) | (0.00) |
| Married or partner | 29,330* | 1.12** | 223,869*** | 1.03* |
| | (15,988) | (0.65) | (75,247) | (0.76) |
| Second marriage | –16,726 | –0.06 | –43,999 | –0.06 |
| | (14,766) | (0.14) | (48,489) | (0.17) |
| Divorced or separated | 7,314 | 0.57* | 18,400 | 0.15 |
| | (8,224) | (0.41) | (25,829) | (0.38) |
| Female head only | 51,012** | 0.16 | 116,546** | –0.06 |
| | (21,027) | (0.36) | (55,206) | (0.33) |
| Years married | 2,134** | 0.02** | –1,843 | 0.00 |
| | (967) | (0.01) | (1,573) | (0.01) |
| Years since divorce or death of spouse | –839 | –0.02 | –1,479** | –0.01* |
| | (735) | (0.01) | (729) | (0.01) |
| Age of household head | 4,151*** | 0.05*** | 1,710 | 0.01 |
| | (1,248) | (0.02) | (3,238) | (0.02) |
| Constant | –197,330*** | –1.40** | –89,930 | 2.53*** |
| | (51,213) | (0.67) | (238,988) | (1.48) |

Source: Authors' regressions using Survey of Consumer Finances data.

a. Estimates are weighted. Standard errors are bootstrapped with 999 replicates in accordance with the sample design and are adjusted for imputation uncertainty. Coefficients on indicator variables in the inverse hyperbolic sine specifications have been transformed with $e^{\beta} - 1$; all coefficients in these specifications, like coefficients in a logarithmic regression, can be interpreted as percentage changes. Statistical significance is calculated from the untransformed coefficients and standard errors. Asterisks indicate statistical significance at the *10 percent, **5 percent, or ***1 percent level.

conditional on age group, the results suggest that the marginal returns to an extra year of marriage are high for younger households but not for older households, who may have been married for many years. The number of years since becoming widowed or divorced is associated with wealth decreases for the older group but not for the younger group.

*Blinder-Oaxaca Decompositions*

Turning next to average net worth, we focus on the Blinder-Oaxaca decompositions for age groups that had statistically and economically significant increases in mean wealth. This includes the three cohorts aged 55–64, 65–74, and 75–84. The bottom three rows of each panel in table 5 show that by far the greater part of the change in the average wealth of older households stems from demographic changes. In the levels-of-wealth decompositions, about half of the increase in net worth for the group aged 55–64 and almost all of the increase for the groups aged 65–74 and 75–84 can be attributed to changes in demographic variables. In the inverse hyperbolic sine decompositions, nearly all of the net worth increase in all three age groups can be attributed to changes in demographic variables.[42] Notably, these results are robust to whether the decomposition holds 2001 characteristics and 1989 βs constant, or holds 1989 characteristics and 2001 βs constant. In addition, at traditional significance levels, we can reject the hypothesis that the change stemming from changes in demographic variables is zero.

Consistent with our finding that changes in demographic variables explain most of the change in average wealth for these age groups, almost none of the 1989 βs are statistically significantly different from the 2001 βs (not shown). Only two coefficients change in a consistent and statistically significant manner across specifications and age groups: One is the "female, postsecondary education" coefficient, which is larger in 2001 than in 1989 for the 45–54 group in both specifications, and smaller in 2001 than in 1989 for the 75–84 group in the levels specification and for the 65–74 and 75–84 groups in the inverse hyperbolic sine specification; the other is the "years since divorce or death of spouse" coefficient,

42. This decomposition explains the average percentage change in wealth over the 1989–2001 period. This is not equivalent to the percentage change in average wealth that could be calculated from figure 2.

**Table 5. Blinder-Oaxaca Decompositions**[a]

| | | *2001 Xs, 1989 βs* | | *1989 Xs, 2001 βs* | |
|---|---|---|---|---|---|
| *Age groups* | *Total change* | *Percent explained by β* | *Percent explained by X* | *Percent explained by β* | *Percent explained by X* |
| *Levels regressions* | | | | | |
| 25–34 | $8,220 | 16 | 84 | 9 | 91* |
| | (16,785) | | | | |
| 35–44 | $39,604 | 140** | –40 | 85 | 15 |
| | (29,336) | | | | |
| 45–54 | $87,590* | 86 | 14 | 48 | 52* |
| | (52,569) | | | | |
| 55–64 | $312,828*** | 60** | 40*** | 52*** | 48*** |
| | (65,141) | | | | |
| 65–74 | $252,237*** | –1 | 101*** | 9 | 91*** |
| | (69,620) | | | | |
| 75–84 | $189,005*** | 8 | 92*** | 19 | 81*** |
| | (55,081) | | | | |
| *Inverse hyperbolic sine regressions* | | | | | |
| 25–34 | 0.4% | –1,437 | 1,537* | 474 | –374 |
| | (8.3) | | | | |
| 35–44 | –2% | 60 | 40 | 535* | –435*** |
| | (8.3) | | | | |
| 45–54 | –2% | 255 | –155 | 1,305*** | –1,205*** |
| | (10.1) | | | | |
| 55–64 | 33%*** | –8 | 108*** | 18 | 82*** |
| | (12.9) | | | | |
| 65–74 | 50.6%*** | –6 | 106*** | –4 | 104*** |
| | (18.3) | | | | |
| 75–84 | 65%*** | 21 | 79*** | 14 | 86*** |
| | (23.3) | | | | |

Source: Authors' regressions using Survey of Consumer Finances data.

a. Estimates are weighted. Standard errors are bootstrapped with 999 replicates in accordance with the sample design and are adjusted for imputation uncertainty. Asterisks indicate statistical significance at the *10 percent, **5 percent, or ***1 percent level.

which is smaller in 2001 than in 1989 in the levels specification for all three younger age groups and in the inverse hyperbolic sine specification for the 25–34 group.

For purposes of completeness, table 5 also reports Blinder-Oaxaca decompositions for groups that did not have statistically significant changes in wealth. In principle, these regressions are more difficult to interpret, because there is no statistically significant change in wealth to explain in the first place and because many of the changes in means are small in economic terms as well. In practice, the results of the decomposition are

significantly less stable for the younger groups than for the older groups. Although some of these decompositions indicate that demographic characteristics explain part of the change in average wealth, our main finding for these groups is that the results are not consistent across $X$ and $\beta$ combinations or across the levels and inverse hyperbolic sine specifications. Some of the results are also not statistically significant. The jumbled and inconsistent pattern of results that emerges for the younger groups (where there were no significant changes in wealth) is, at the very least, quite different from the very clear and dominant role for demographic factors that emerges for the older groups (where the changes in wealth are large in economic terms and precisely estimated).

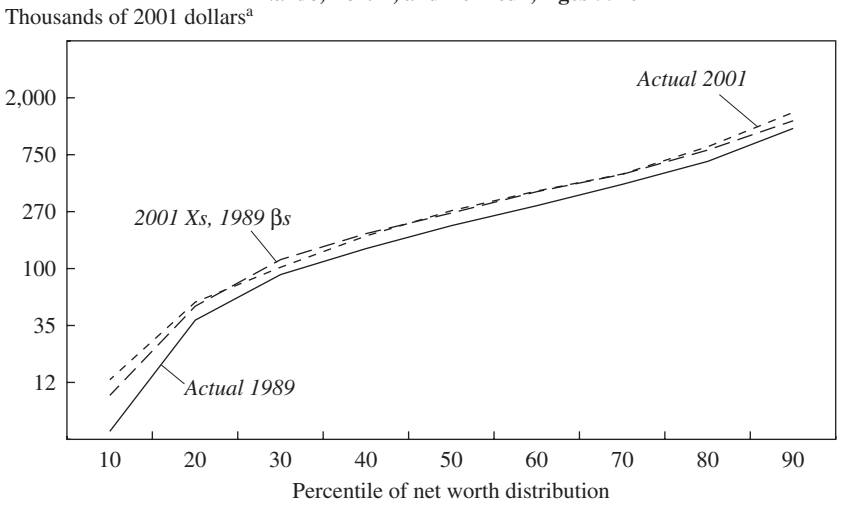
### *Distribution of Net Worth*

The decompositions of the entire net worth distribution provide perhaps the most powerful evidence that demographic characteristics are a significant determinant of the greater wealth of older households in 2001. Figure 6 shows the 1989 and 2001 distributions of net worth and a counterfactual distribution of net worth based on the 2001 characteristics and the 1989 coefficients (that is, the 1989 relationship between demographics and wealth) for the three older age groups and for both the DiNardo-Fortin-Lemieux decomposition and the Machado-Mata decomposition. For expositional ease, net worth is shown on a logarithmic scale on the vertical axis; these decompositions are estimated only for the inverse hyperbolic sine specification. If the change in demographic variables explains the change in wealth, the counterfactual and the actual 2001 distributions should largely coincide. If instead other factors (such as historically unique capital gains) explain the changes in wealth, the counterfactual and the actual 2001 distributions should diverge.

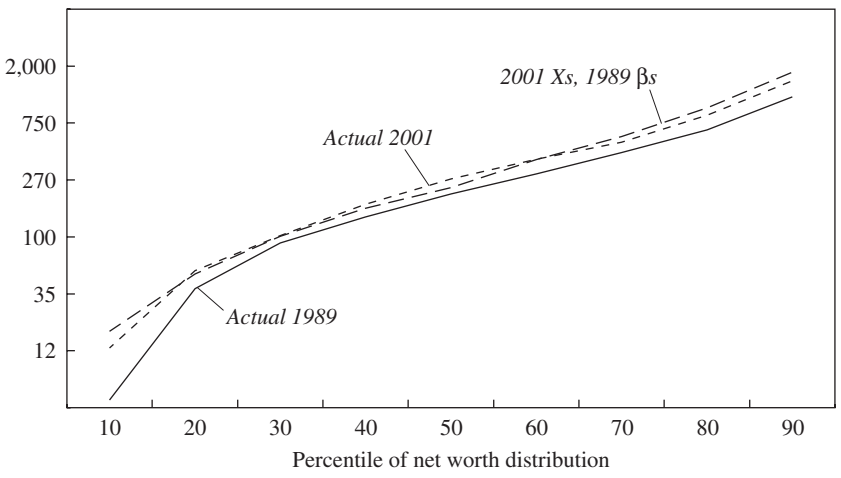
The figure presents the striking result that the counterfactual distributions of net worth (as defined above) nearly exactly coincide with the actual distribution of net worth in 2001 for the 55–64 and 65–74 age groups. This implies that almost all of the change in wealth for those successive cohorts can be explained by changes in demographic status, without appealing at all to any special factors in the 1990s; those special factors would show up as changes in the relationship between demographic characteristics and wealth. Likewise, changes in demographic characteristics can explain about half of the wealth increase for the

**Figure 6. Simulated Net Worth Distributions for Older Age Groups**

**DiNardo, Fortin, and Lemieux, Ages 55–64**



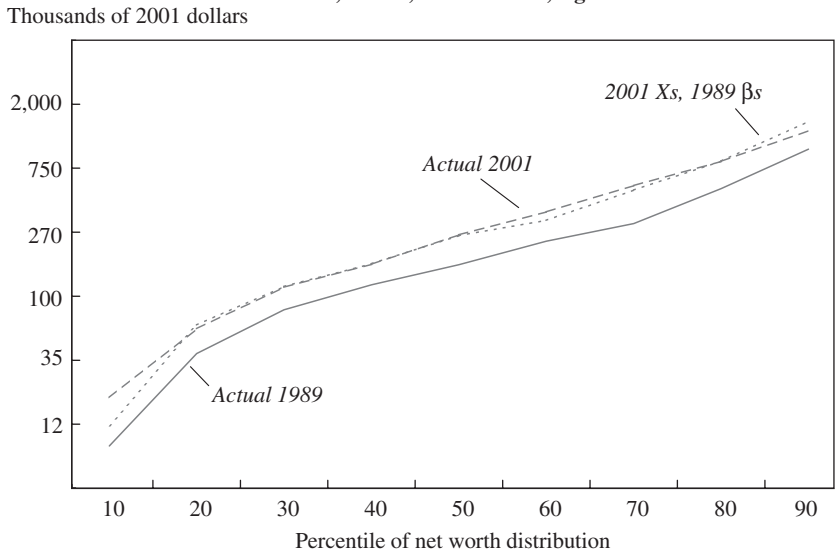

**Machado and Mata, Ages 55–64**



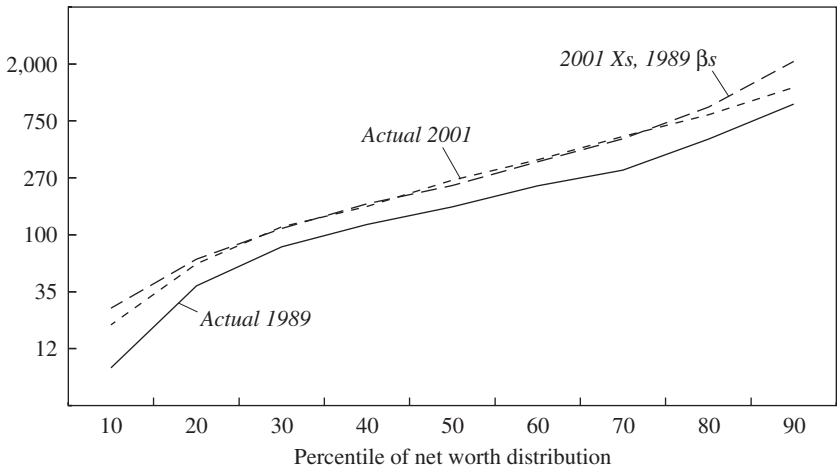

(*continued*)

**Figure 6. Simulated Net Worth Distributions for Older Age Groups (*continued*)**

**DiNardo, Fortin, and Lemieux, Ages 65–74**



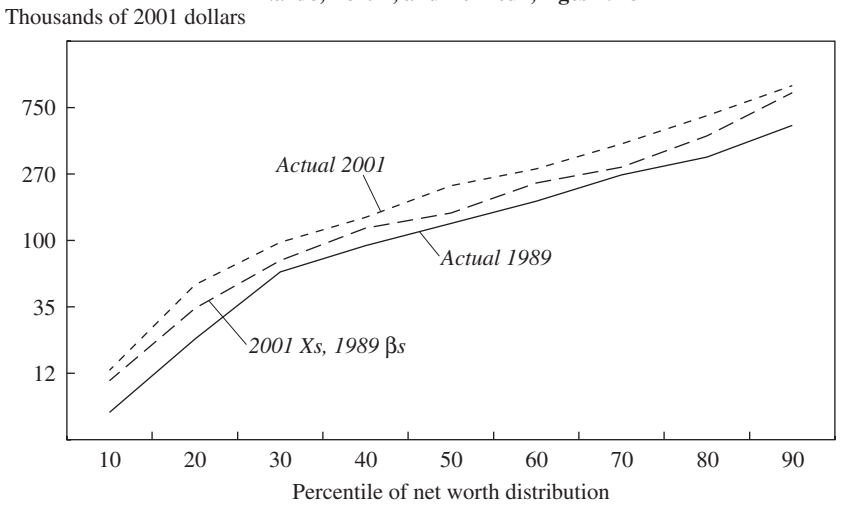

**Machado and Mata, Ages 65–74**



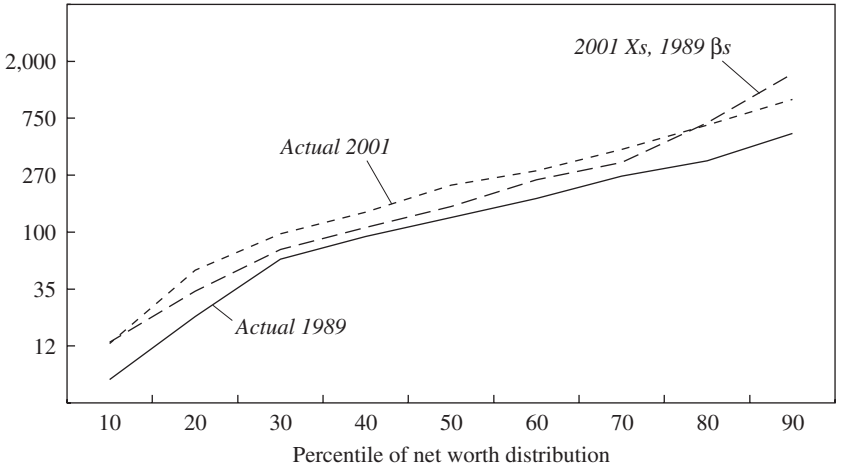

(*continued*)

**Figure 6. Simulated Net Worth Distributions for Older Age Groups (*continued*)**

**DiNardo, Fortin, and Lemieux, Ages 75–84**




**Machado and Mata, Ages 75–84**




Source: Authors' calculations using Survey of Consumer Finances data.
a. Scaled in inverse hyperbolic sine units.

75–84 group. The deciles of the counterfactual distribution are statistically significantly different from the deciles of the actual 1989 distribution except at the tails.[43] This result is robust to the choice of decomposition technique, although the Machado-Mata technique appears to behave erratically in the tails of the distribution.

For the younger age groups (figure 7), the 2001 distribution of net worth is almost the same as the 1989 distribution. Thus the decomposition has very little difference in wealth to explain, and the counterfactual distribution lies close to the actual distribution. The deciles of the counterfactual distributions are not statistically significantly different from the 1989 distribution for any of the younger age groups.

To explore the robustness of our results for the older age groups, we repeat the exercise but attempt to backcast 1989 wealth based on 1989 demographic characteristics and the 2001 relationship between demographics and wealth. Note that the latter relationship includes any impact of the 1990s. If the change in demographic characteristics is a major factor in the change in wealth, and if the relationship between demographics and wealth was the same in 1989 and in 2001, we should find that this counterfactual 1989 distribution is similar to the actual 1989 distribution. Indeed, as shown in figure 8, for the three older age groups this counterfactual distribution lies almost on top of the actual 1989 distribution.

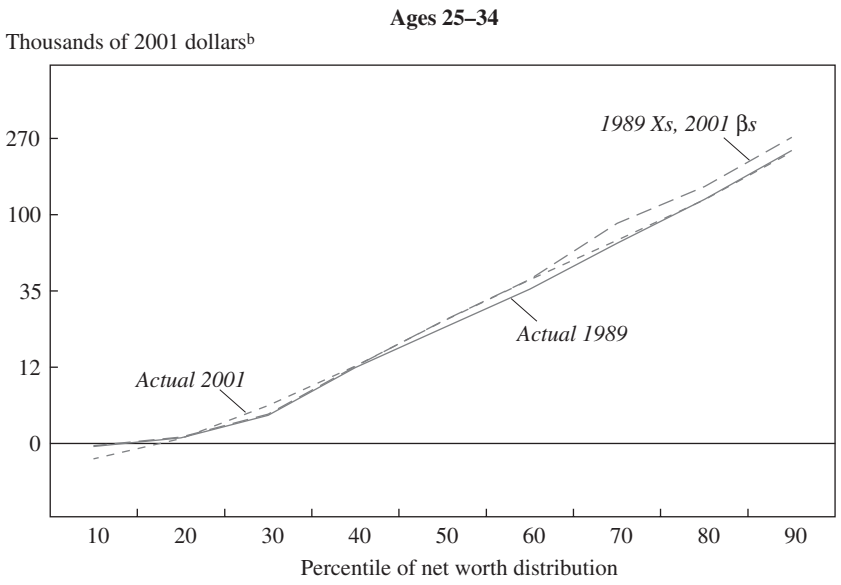
The fact that the results from both these decompositions and the earlier Blinder-Oaxaca decompositions are robust to which year is used for the distribution of demographic characteristics, and to which year is used for the relationship between demographics and wealth, is notable evidence of a robust relationship. In some empirical literatures the results are sensitive to this choice. Barsky and his coauthors, for example, note that the role that the black-white earnings gap plays in explaining the black-white wealth gap appears to depend on whether the decomposition is based on the black or the white earnings distribution.[44]

43. The difference between the deciles was bootstrapped with 999 replicates drawn in accordance with the SCF sampling design. The differences are statistically significant at a 95 percent confidence level for the 30th through the 80th percentiles for the 55–64 age group, for the 20th through the 90th percentiles for the 65–74 age group, and for the 10th through the 80th percentiles for the 75–84 age group. Statistical significance was estimated only for the DiNardo-Fortin-Lemieux decompositions.

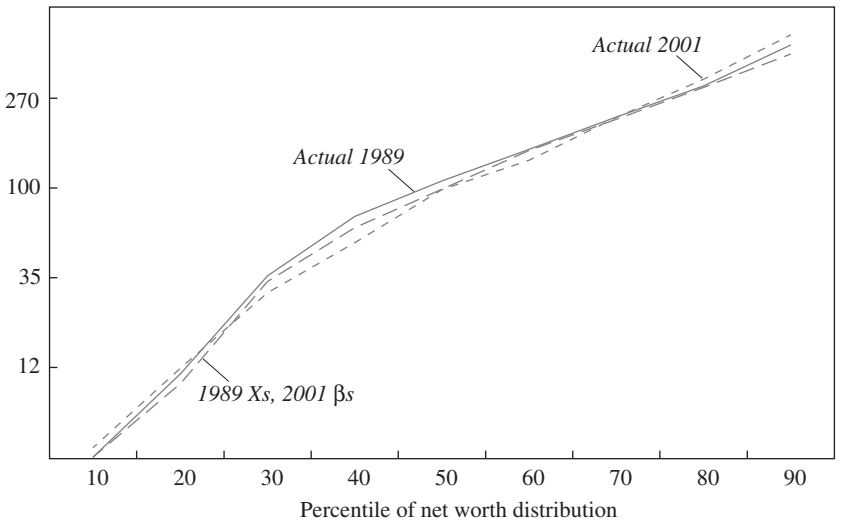
44. Barsky and others (2002).

**Figure 7. Simulated Net Worth Distributions for Younger Age Groups**[a]

**Ages 25–34**



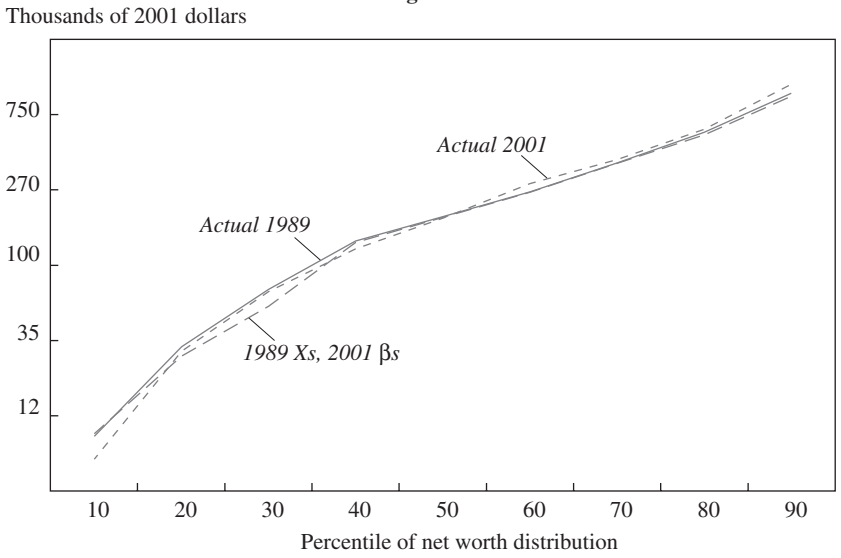

**Ages 35–44**




(*continued*)

**Figure 7. Simulated Net Worth Distributions for Younger Age Groups[a] (*continued*)**

**Ages 45–54**




Source: Authors' calculations using Survey of Consumer Finances data.
a. All simulations use the DiNardo, Fortin, and Lemieux decomposition.
b. Scaled in inverse hyperbolic sine units.

**Figure 8. Net Worth Distributions Simulated Using the DiNardo, Fortin, and Lemieux Decomposition, for the Older Age Groups**

**Ages 55–64**

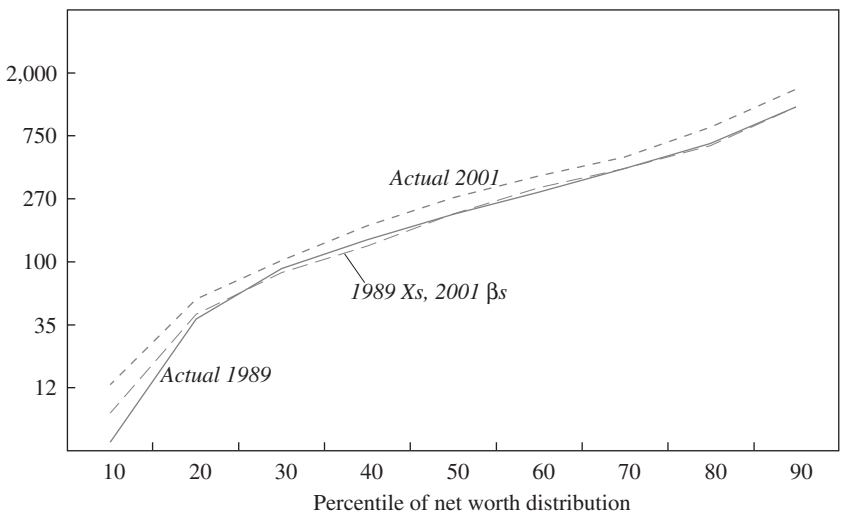
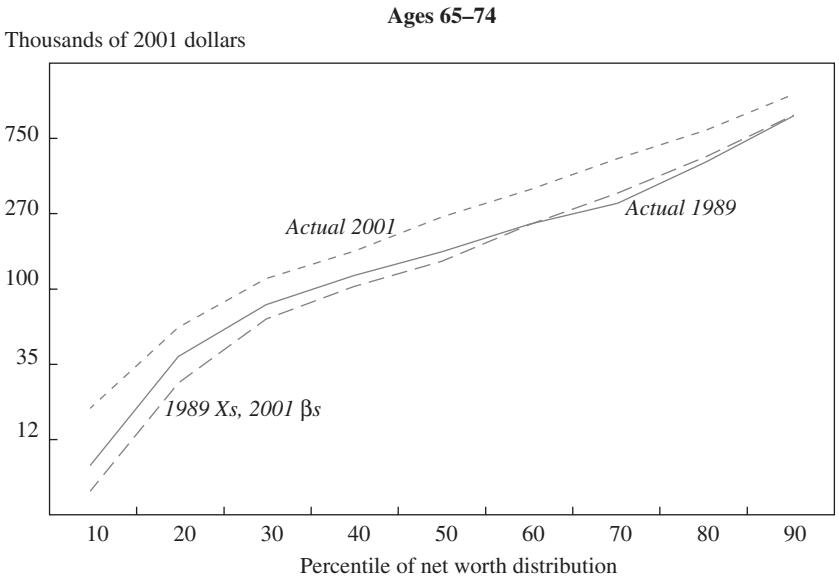
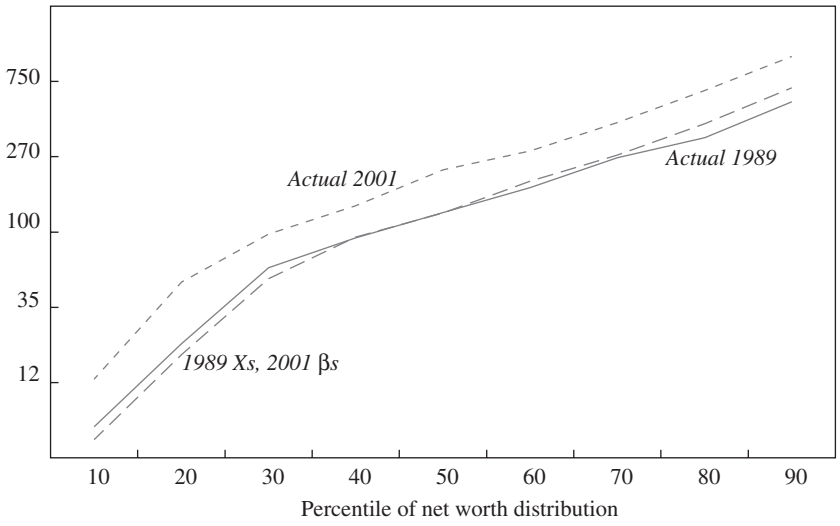


**Figure 8. Net Worth Distributions Simulated Using the DiNardo, Fortin, and Lemieux Decomposition, for the Older Age Groups (*continued*)**

**Ages 65–74**




**Ages 75–84**




Source: Authors' calculations using Survey of Consumer Finances data.
a. Scaled in inverse hyperbolic sine units.

**Capital Gains, Stock Ownership Diffusion, and 401(k) Plans**

The story of wealth accumulation described above is one of demographic change. Usually, however, the 1990s are characterized in terms of large capital gains, significant diffusion of stock ownership, and a substantial expansion of 401(k) plans. Here we discuss the relation between these two sets of findings.

Our results are perfectly consistent with the presence of atypically large capital gains in the 1990s. But our results also show that, once the dust had settled on the 1990s, the relationship between household demographic variables and household wealth had not changed relative to 1989. Had there been large, enduring capital gains that households had saved (and not offset with other dissaving), the relationship between demographic variables and wealth would have been different in 2001 relative to 1989. Thus our results suggest either that the capital gains had dissipated by 2001,[45] or that there was nothing unusual about the level and distribution of capital gains across households defined by demographic characteristics in the 1990s, or that households with large capital gains had chosen to consume them by 2001.[46] It would be an interesting task for future work to test among these scenarios or other scenarios that are consistent with both the large capital gains that appear in aggregate data and the stable relationship between household demographic characteristics and household wealth in 1989 and 2001 that is documented above.

Similarly, our results do not deny that 401(k) participation, contributions, and assets expanded substantially during the decade. But whatever expansion occurred did not alter the relationship between observed demographic characteristics and wealth that existed before 1990. Hence, con-

45. The 2001 SCF was conducted from June to December 2001. By early September—the approximate midpoint of this period—the Wilshire 5000 had fallen 28 percent from its peak in March 2000 and had retraced all the gains accumulated since December 1998.

46. For evidence on this point, see Maki and Palumbo (2001) and Dynan and Maki (2001), who present evidence that households with substantial capital gains in the 1990s significantly increased their consumption. Juster and others (2006) document that households who received significant capital gains from equities decreased their saving. Poterba (2000) provides an overview of the link between stock market wealth and consumption.

trolling for demographics, there appears to be little room for a separate influence on wealth from this trend.[47]

Demographic characteristics, of course, may be related to changes in asset markets or pension coverage. Increases in education may induce increases in stock ownership, for example, and increases in women's labor force participation influence pension coverage. Nevertheless, it is unlikely that capital gains or pensions, without reference to demographic shifts, are the dominant explanation of how wealth changed across successive cohorts in the 1990s, for the three reasons discussed below.

### *Trends in Asset Ownership and Pension Coverage across Age Groups*

Unlike trends in demographic characteristics, trends in stock ownership and pension coverage align very poorly with the changes in wealth observed above. The share of households owning stock was 13 to 26 percentage points higher in 2001 than in 1989 (table 6), depending on the age group. In contrast with the demographic factors, however, stock ownership increased the most for *younger* households. This is exactly the opposite of the wealth patterns described above.

Homeownership rose by 2 percentage points for the youngest age group and by 5 to 6 percentage points for the two oldest age groups. This pattern is consistent with the wealth changes described above, but some of the change in homeownership among older households may be related to the change in demographic characteristics. For example, improved health and a reduced probability of being widowed may have made it feasible for more older households to remain in their homes.[48]

Trends in pension coverage—where coverage is defined as having a pension from a current or past job or an Individual Retirement Account

47. For related evidence and discussion of the effects of 401(k)s on wealth accumulation, see Benjamin (2003), Bernheim (2002), Engen and Gale (2000), Engen, Gale, and Scholz (1994, 1996), Pence (2006), and Poterba, Venti, and Wise (1995, 1996).

48. Changes in financial products also made it easier for elderly households to extract housing equity for consumption purposes without having to move, although it is not clear that such products are very popular. Innovations in mortgage underwriting, such as decreases in the size of down payments, may have boosted homeownership among younger households.

**Table 6. Asset Ownership Characteristics by Year and Age Group[a]**

| *Characteristic and age group* | *1989* | *2001* | *Change from 1989 to 2001 (percentage points)* |
|---|---|---|---|
| Own stock | | | |
| 25–34 | 29 | 55 | 26*** |
| 35–44 | 40 | 60 | 20*** |
| 45–54 | 44 | 59 | 15*** |
| 55–64 | 36 | 57 | 21*** |
| 65–74 | 26 | 40 | 14*** |
| 75–84 | 23 | 36 | 13** |
| Own stock through defined-contribution plan or IRA | | | |
| 25–34 | 20 | 46 | 26*** |
| 35–44 | 30 | 54 | 24*** |
| 45–54 | 33 | 53 | 20*** |
| 55–64 | 23 | 44 | 21*** |
| 65–74 | 8 | 24 | 16*** |
| 75–84 | 4 | 14 | 10*** |
| Own stock through mutual fund outside of retirement account | | | |
| 25–34 | 0 | 12 | 12*** |
| 35–44 | 5 | 16 | 11*** |
| 45–54 | 7 | 19 | 12*** |
| 55–64 | 7 | 20 | 13*** |
| 65–74 | 4 | 17 | 13*** |
| 75–84 | 6 | 19 | 13*** |
| Own stock directly | | | |
| 25–34 | 13 | 19 | 6*** |
| 35–44 | 17 | 22 | 5** |
| 45–54 | 22 | 22 | 0 |
| 55–64 | 21 | 27 | 6* |
| 65–74 | 19 | 20 | 1 |
| 75–84 | 18 | 22 | 4 |
| Own house | | | |
| 25–34 | 46 | 48 | 2** |
| 35–44 | 66 | 68 | 2 |
| 45–54 | 76 | 76 | 0 |
| 55–64 | 80 | 83 | 3 |
| 65–74 | 78 | 83 | 5* |
| 75–84 | 71 | 77 | 6* |

Source: Authors' calculations using Survey of Consumer Finances data.

a. Estimates are weighted. Differences in means are statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level. Standard errors are bootstrapped with 999 replicates in accordance with the sample design and adjusted for imputation uncertainty.

(IRA)—display patterns that are inconsistent with the wealth changes examined above (table 7). Pension coverage rose most in the youngest (25–34) and the oldest (75–84) groups but was roughly constant in the other age groups. The increase in coverage for the 75–84 age group may result from the strong growth in pension coverage over the 1950s and early 1960s: the proportion of the labor force covered by pensions rose from 22 percent in 1950 to 40 percent in 1965.[49] Thus pension coverage may have been low in the early working years for households aged 75–84 in 1989.

Pension coverage has risen especially among women, for several reasons: their labor force participation rose, more women have earned pension benefits based on their own work records, and more widows are receiving spousal benefits. Pension coverage among widows increased after the Retirement Equity Act of 1984 required married defined-benefit pension beneficiaries to receive benefits in the form of a joint-and-survivor annuity unless the spouse explicitly waived this right.[50] In the SCF data the share of women with pension benefits, either from their own work records or from a survivor's benefit, was 10 percentage points higher in 2001 than in 1989 for the youngest age group and was 4 to 10 percentage points higher for the three oldest age groups.

As defined-contribution plans have become more established, the number of years that households have participated in them has increased. For example, the median length of participation in a defined-contribution plan for 35- to 44-year-old men working full-time increased from four years to six years. Nevertheless, wealth did not rise for this group, as shown above.[51]

### *Trends in the Distribution of Wealth within Age Groups*

Not only are trends in stock ownership and pension coverage not consistent with trends in wealth across age groups, but at least two patterns of wealth changes within age groups are inconsistent with a key role for stocks or pensions. Notably, both of these anomalies are consistent with the view that demographic characteristics were the driving force behind wealth accumulation.

49. Ippolito and Kolodrubetz (1986, table 28).

50. Aura (2005).

51. We exclude women from this calculation so as not to confound increases in the length of defined-contribution participation with increases in labor force participation.

**Table 7. Pension Coverage Characteristics by Year and Age Group**[a]

| *Characteristic and age group* | *1989* | *2001* | *Change from 1989 to 2001 (percentage points)* |
|---|---|---|---|
| Any retirement plan coverage | | | |
| 25–34 | 52 | 58 | 6** |
| 35–44 | 72 | 70 | –2 |
| 45–54 | 77 | 76 | –1 |
| 55–64 | 72 | 77 | 5* |
| 65–74 | 66 | 68 | 2 |
| 75–84 | 49 | 62 | 13*** |
| Defined-contribution or IRA coverage | | | |
| 25–34 | 39 | 53 | 14*** |
| 35–44 | 52 | 64 | 12*** |
| 45–54 | 56 | 65 | 9*** |
| 55–64 | 50 | 60 | 10*** |
| 65–74 | 30 | 45 | 15*** |
| 75–84 | 8 | 31 | 23*** |
| Defined-benefit coverage | | | |
| 25–34 | 31 | 18 | –13*** |
| 35–44 | 49 | 29 | –20*** |
| 45–54 | 60 | 40 | –20*** |
| 55–64 | 57 | 49 | –8** |
| 65–74 | 58 | 47 | –11*** |
| 75–84 | 45 | 50 | 5 |
| Both defined-contribution or IRA and defined-benefit coverage | | | |
| 25–34 | 18 | 14 | –4** |
| 35–44 | 29 | 22 | –7*** |
| 45–54 | 38 | 30 | –8*** |
| 55–64 | 34 | 31 | –3 |
| 65–74 | 22 | 23 | 1 |
| 75–84 | 04 | 18 | 14*** |
| Any retirement plan coverage, women | | | |
| 25–34 | 33 | 43 | 10*** |
| 35–44 | 49 | 51 | 2 |
| 45–54 | 58 | 58 | 0 |
| 55–64 | 56 | 60 | 4 |
| 65–74 | 42 | 52 | 10*** |
| 75–84 | 31 | 44 | 13*** |
| Median years participating in a defined-contribution plan, male participants working full-time | | | |
| 25–34 | 4 | 3 | –1 |
| 35–44 | 4 | 6 | 2*** |
| 45–54 | 6 | 8 | 2 |

Source: Authors' calculations using Survey of Consumer Finances data.

a. Estimates are weighted. Differences in means are statistically significantly different from zero at the *10 percent, **5 percent, or ***1 percent level. Standard errors are bootstrapped with 999 replicates in accordance with the sample design and adjusted for imputation uncertainty.

First, changes in ownership of equities and participation in defined-contribution plans cannot explain the growth in wealth among the substantial majority of lower-wealth older households who have neither. For example, the entire wealth distribution shifted for older households (figure 3), even though fewer than a quarter of 65- to 74-year-old households in the bottom half of that age group's wealth distribution in 2001 participated in a defined-contribution plan or IRA or held stocks in any form. Second, since capital gains on equities accrue disproportionately to wealthier households, who own the vast majority of stocks, the sizable capital gains of the 1990s should have affected the relationship between demographics and wealth at the top of the wealth distribution. Yet figure 3 provides no evidence of such a shift.

*The Magnitude of Capital Gains*

Finally, some simple calculations indicate that capital gains on pre-existing assets cannot explain all of the observed wealth accumulation in the 1990s. The approach we use here is fundamentally different from the earlier calculations in the paper. Whereas the earlier calculations looked at successive cohorts reaching the same age in different calendar years, the calculations here track a given birth cohort over time. Nevertheless, the approach may be useful in clarifying some of the issues raised above.

The basic calculation begins with wealth data from the 1989 SCF for households in cohorts defined by their age in 2001. Thus, for example, for the 45- to 54-year-old cohort in 2001, we examine data on households who were between the ages of 33 and 42 in the 1989 SCF. We then add an estimate of capital gains that accrued over the 1989–2001 period for stocks and home values. The stock estimates are based on the Wilshire 5000 index, and the housing estimates on the Office of Federal Housing Enterprise Oversight house price index. We exclude from the wealth measure privately held businesses and investment real estate, because it is difficult to estimate capital gains on these assets; we exclude defined-benefit pension wealth because, by construction, it increases until retirement and then declines.

We also adjust for differences in mortality from 1989 to 2001 by calculating a new weight for each household in the 1989 data. We obtain this weight by multiplying the household's sampling weight by the estimated probability that the head, his or her spouse, or both survive until 2001.

This estimated probability is based on data presented in a paper by Jay Bhattacharya and Darius Lakdawalla and allows mortality to vary with the age, sex, and education of both the head and the spouse.[52] When we calculate average wealth with this weight, we are putting more weight in 1989 on the more educated, wealthier households, who are more likely to have survived until 2001. Without this adjustment we might overstate the increase in household wealth for each cohort. The result of the capital gains and mortality adjustments is an estimate of the 2001 wealth that the 45–54 cohort would have been expected to have, given their 1989 wealth, trends in mortality, and the capital gains that accrued between 1989 and 2001. Note that this calculation assumes that the cohort does no active saving from 1989 to 2001. We then compare this value with the actual wealth of the cohort in the 2001 SCF, after subtracting any bequests that members of the cohort reported receiving between 1989 and 2001 (as well as excluding the value of any privately held businesses, investment real estate, and defined-benefit pension wealth, as mentioned above). This allows us to measure how much of the change in the cohort's wealth between 1989 and 2001 can be explained by accruing capital gains on the 1989 wealth stock (adjusted for differences in mortality within the cohort).

These calculations, reported in table 8, show that, for the cohort aged 35–44 in 2001, only about 13 percent of the change in average wealth between 1989 and 2001 (adjusted for mortality and bequests) can be explained by capital gains on the 1989 wealth stock. This figure is so low because this cohort did not own much in the way of stocks or housing when it was aged 23–32, and because much of the wealth gain occurred mechanically, as a result of single households getting married and pooling their assets.

As we move through the subsequent age cohorts, a pattern emerges: the share of the change in wealth explained by capital gains on the 1989 wealth stock increases with cohort age. This share is about a fifth of the change in wealth (18 percent) for the cohort aged 45–54 in 2001, about a third of the change in wealth (32 percent) for the cohort aged 55–64, and about half (58 percent) for the cohort aged 65–74. For the oldest group—those aged 75–84—the change in wealth is more than explained (111 percent) by capital gains. These results are consistent with the notion that active saving is concentrated among younger households. It is interesting that these

52. Bhattacharya and Lakdawalla (2006). We are grateful to these authors for providing us with their data.

**Table 8. Calculating Capital Gains as a Share of Overall Wealth Change from 1989 to 2001**
Thousands of 2001 dollars

| | *Age in 2001 (years)* | | | | |
|---|---|---|---|---|---|
| *Average net worth*[a] | *35–44* | *45–54* | *55–64* | *65–74* | *75–84* |
| (1) In 1989 | 44 | 114 | 214 | 260 | 279 |
| (2) In 1989 with imputed 1989–2001 capital gains | 60 | 151 | 297 | 353 | 374 |
| (3) In 1989 with imputed capital gains and differential mortality | 60 | 153 | 301 | 365 | 414 |
| (4) In 2001 | 176 | 350 | 514 | 461 | 413 |
| (5) Bequests received since 1989 | 11 | 18 | 26 | 21 | 12 |
| (6) In 2001 excluding bequests received since 1989 | 165 | 332 | 488 | 440 | 401 |
| Percent of wealth change explained by capital gains [(3)–(1)]/[(6)–(1)] | 13 | 18 | 32 | 58 | 111 |

Source. Authors' calculations using Survey of Consumer Finances data.
a. Excluding defined-benefit wealth, privately held businesses, and investment real estate.

younger households had no wealth increase relative to earlier generations, given how much active saving they apparently did. Of course, the relevant comparison is how much active saving they did relative to the active saving of earlier cohorts.

These figures are consistent with the view that capital gains were large during the 1990s, but they also suggest that capital gains alone do not come close to explaining overall wealth accumulation for the cohorts who were plausibly in the accumulation stage of the life cycle. This, however, only adds to the puzzle presented above, since it suggests that there must have been significant active saving, whereas other studies have shown that active saving rates in the 1990s were lower than in previous decades.[53]

## Conclusion

We have documented that the remarkable wealth accumulation that occurred in the 1990s accrued overwhelmingly to older households and

53. Bosworth and Bell (2005); Gale and Sabelhaus (1999).

that these gains accrued across the entire wealth distribution for older households. Younger households in 2001 generally had not accumulated more wealth than similarly aged households in 1989. The observed trends are not simply a reflection of the rich getting richer or of the (mistaken) notion that younger households, as defined here, do not accumulate any wealth under any circumstances. Rather, the trends reflect broad-based changes in demographics across birth cohorts and the role of demographic factors in influencing wealth accumulation. Although there were clearly large changes in capital gains, diffusion of stock ownership, and expansion of 401(k) plans, those changes do not appear to have altered the observed relationship between demographic factors and wealth in 2001 from what it had been in 1989. Developing hypotheses that are consistent with both these macro trends for stocks and pensions and the micro evidence presented here on the relationship between demographics and wealth is an important direction for future research.

Although our results establish a strong reduced-form link between household demographic characteristics and wealth outcomes, we have not investigated the channels through which this link occurs. Demographic factors such as education clearly raise lifetime earnings.[54] As discussed earlier, the same factors could also raise saving rates and could affect portfolio choices and hence the return to saving. Understanding the relative importance of each of these channels remains another important issue for future research.

Other research using successive cross sections has yielded mixed results. Edward Wolff uses a similar approach to ours, looking at successive cross sections, but reaches a different conclusion about basic trends in wealth for older households.[55] He estimates declines in wealth for the age group aged 47–64 in 1998 compared with a similar age group in 1983. The difference in results may be due to the emphasis on different age groups, time periods, data adjustments, or econometric techniques.[56] Another possible

54. See, for example, Scholz, Seshadri, and Khitatrakun (forthcoming).

55. Wolff (2002).

56. For example, Wolff uses a different method to estimate Social Security wealth in 1983 than in subsequent years. The ensuing change in this wealth partly drives his conclusion. In addition, he scales up the reported wealth variables in the SCF to match aggregate data from the Flow of Funds Accounts, a procedure that raises some issues: there are many different ways to adjust the data to match the aggregates, and the differences between the raw trends and the adjusted wealth trends are substantial and sometimes even have different signs. Weicher (1999), Kennickell (1999), and Juster, Smith, and Stafford (1999)

factor is that the SCF shows a larger increase in aggregate wealth than do the Flow of Funds Accounts over the 1998–2001 period.[57] We have not resolved this discrepancy but believe it is of less importance for our analysis, which examines household-specific wealth and controls for demographic factors, than for measures of trends in aggregate wealth. For example, if the estimate of wealth from the SCF data differs from that from the Flow of Funds because the SCF over- or undersampled particular demographic groups, our regressions and analysis would in essence control for that concern by controlling for demographic factors.

Steven Venti and David Wise also follow successive cohorts and document a central fact similar to our main result, namely, that more-recent retirees have more wealth than earlier retirees;[58] however, they focus on a different time period (1984–91) and attribute the results to a different cause (the growth of retirement plans). Eric Engen, Gale, and John Karl Scholz provide alternative interpretations of the Venti and Wise results.[59]

Our results also relate to the literature on the adequacy of households' saving for retirement.[60] In particular, the finding of higher wealth among more-recent older working cohorts and retirees than among previous older working cohorts and retirees does not necessarily imply that more-recent retirees and older workers have greater ability to maintain their living standards in retirement. The same demographic factors that appear to have fueled the increase in wealth also are likely to raise the expenditures needed to maintain living standards in retirement. Married couples consume more than single households. Highly educated households likely enjoyed higher consumption during their working years and may want to sustain that consumption in retirement. Healthier people will live longer and hence have a longer period of retirement to finances, at any given retirement age. Thus welfare assessments of higher wealth levels need to be made carefully, and some simple measures, such as wealth-to-earnings ratios for households at a given age, may prove misleading over time.

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discuss some similar issues with Wolff (1998), who responds to these criticisms in Wolff (1999). Wolff's most recent work (Wolff, forthcoming) does not make these adjustments.

57. See Bosworth and Bell (2005, table 2) for more details.

58. Venti and Wise (1996).

59. Engen, Gale, and Scholz (1996).

60. See Engen, Gale, and Uccello (1999) and Congressional Budget Office (2003) for a review of the literature, and Hurst (2003), Scholz, Seshadri, and Khitatrakun (forthcoming), and Engen, Gale, and Uccello (2005a, 2005b) for more recent work.

The analysis may be particularly unfavorable for the prospects of the baby-boom generation, whose members were between the ages of 37 and 55 in 2001. These households have less favorable demographic characteristics than similarly aged households in 1989, and, despite having lived through the bull market decade of the 1990s, they had no more wealth, on average, than their 1989 counterparts. This conclusion is consistent with the finding of Barbara Butrica and Cori Uccello that the "late boomers" (those born during 1956–64) are likely to have less wealth at retirement than their "early boomer" predecessors (those born during 1946–55), in part because of unfavorable demographic characteristics.[61] Furthermore, households from the baby-boom and later generations seem unlikely to make up any wealth shortfall through inheritances from earlier generations. In all three of the younger SCF age groups, the share expecting to receive a bequest was lower in 2001 than in 1989. For example, 14 percent of households aged 45–54 in 2001 expected to receive a substantial inheritance in the future, compared with 20 percent in 1989.[62]

Looking forward, there are serious questions about how the maturation of the baby-boomers into old age and the aging of society in general will affect financial markets. Previous literature examining this issue has focused on the role of cohort size, with generally mixed results.[63] Our results suggest that the demographic characteristics of retiring generations, rather than just cohort size, may matter significantly for wealth accumulation and financial behavior. Thus trends in education, health, family composition, retirement age, and so on could well have first-order effects on the wealth accumulation and financial status of today's young generations and future generations.

More generally, and perhaps most important, our findings highlight the role of demographic factors in wealth accumulation. With skyrocketing equity markets in the 1990s, it was natural to focus on how financial markets affect wealth. Our results serve to highlight a long, but sometimes downplayed, tradition in economics—dating back at least to the original formulation of the life-cycle model by Modigliani and coauthors—

61. Butrica and Uccello (2004).

62. See also Hurd and Smith (2002).

63. See Bakshi and Chen (1994), Brooks (2003), Geanakoplos, Magill, and Quinzii (2004), and Poterba (2001).

that emphasizes the role of demographic variables in wealth accumulation.[64] In recent years many government initiatives have attempted to boost wealth by providing direct incentives for asset purchases. An implication of our results is that policies that raise investment in health, education, and other forms of human capital could have far-reaching consequences for saving and wealth accumulation.

## APPENDIX

## *Valuing Pension Wealth*

THE SCF ASKS each spouse in each surveyed household to report information on up to three pension plans from his or her current job. In addition, the household may report information on up to six plans from previous jobs of either spouse and up to six plans from which either spouse is currently receiving benefits. Estimating the value of defined-contribution pension plans and IRAs is straightforward: we simply sum the reported account balances for all such plans.

For defined-benefit pensions, the SCF asks households when they expect to start receiving benefits and what they expect their monthly benefits to be. Households may report benefits as a percentage of pay at retirement or as a monthly dollar amount. We estimate the expected present value of this stream of payments using year-specific life tables from the National Center for Health Statistics.[65] To ensure that changes in pension wealth over time are not driven by temporary changes in interest rates and inflation, we use nominal discount rates of 6 percent and inflation rates of 3 percent in all years in computing these present values. For households that report benefits as a percentage of pay at retirement, we assume 1 percent annual real wage growth from the year of the survey until the worker's expected year of retirement.

Comparing the current value of defined-contribution accounts with the expected present value of future defined-benefit payments is problematic, however, because defined-contribution account balances reflect

64. For recent evidence, see Almond and Mazumder (2005), Attanasio and Browning (1993), Browning and Crossley (2001), Browning and Ejrnaes (2002), Goldin (2006), Rosen and Wu (2003), Smith (1995, 2001, 2004), and Smith and Ward (1980).

65. Available at www.cdc.gov/nchs/products/pubs/pubd/lftbls/lftbls.htm.

only wealth accumulation to date whereas defined-benefit wealth reflects wealth accumulated over a worker's entire past and future career. As a result, if a defined-benefit plan and a defined-contribution plan pay identical benefits in each year of retirement for a worker with a given set of characteristics, the reported value of the defined-contribution plan will be lower than the reported value of the defined-benefit plan, using the standard methods above, at every age except retirement, when they would be equal.[66]

We experiment with two methods for putting defined-contribution and defined-benefit wealth on the same basis. First, we transform defined-benefit wealth to defined-benefit wealth accrued to date. Let $g$ be real growth in wages, $T$ the number of years that the worker has been on the job, $N$ the number of years until the worker leaves the job, $w$ the worker's annual wage, and $a$ the accrual rate. Assume that pension benefits are based on a maximum of thirty years of earnings. Then the benefit earned by the worker to date is

$$B_T = w(1+g)^T a[\min\{T,30\}], \tag{A-1}$$

and the benefit earned by the worker over his or her entire career is

$$B_{T+N} = w(1+g)^{T+N} a[\min\{T+N,30\}]. \tag{A-2}$$

To transform defined-benefit wealth into defined-benefit wealth accrued to date, we multiply defined-benefit wealth by the ratio of the values from equations A-1 and A-2:[67]

$$\frac{B_T}{B_{T+N}} = \frac{\min\{T,30\}}{(1+g)^N \min\{T+N,30\}}.$$

In computing this ratio we use the self-reported year in which the worker expects to leave his or her job.

Second, we transform defined-contribution wealth to wealth accumulated over the worker's career by adding the expected present value of future employee and employer contributions. The SCF asks households the percentage of pay that the employee and the employer contribute to

66. See Gale (1998) for further discussion.
67. We thank Paul Smith for suggesting this approach.

**Table A-1. Comparison of SCF and HRS Defined-Benefit Wealth**
1992 dollars

| | *Defined-benefit wealth* | |
|---|---|---|
| *Data set (1992)* | *Mean* | *Median* |
| Survey of Consumer Finances | 95,808 | 14,785 |
| Health and Retirement Study | 106,041 | 17,327 |

Source: Survey of Consumer Finances and Scholz and others (forthcoming).

the account, and when the workers in the household expect to leave their current jobs. We assume, as before, 1 percent real wage growth and assume that workers and employers hold constant the percentage that they contribute to the plan until the worker's expected year of leaving the job. Like the first method, this one has the advantage of putting defined-benefit and defined-contribution wealth on a similar basis. However, because this method puts defined-benefit and defined-contribution wealth on a different basis than all other forms of wealth, we emphasize the first method in our empirical work. We have verified, however, that our results are robust to using the second method.[68]

One limitation of these data, obviously, is that they are self-reported. As several studies have documented, workers are often not well informed about their pension benefits.[69] As a rough check on our results, we compare the mean and median of our defined-benefit wealth measure with the equivalent mean and median from the Health and Retirement Study extract constructed by Scholz, Ananth Seshadri, and Surachai Khitatrakun.[70] The latter measures are based on employer-reported data when available and worker-reported data otherwise. Both samples are limited to households whose head was between the ages of 51 and 61 in 1992; defined-benefit wealth is expressed in 1992 dollars. The means and medians of the two data sets are fairly close in magnitude, despite the differences in data sources and estimation procedures (table A-1). A possible additional refinement, which we do not pursue in this paper, is to adjust the pension benefits for taxes as described in Poterba (2004).

68. Khitatrakun, Kitamura, and Scholz (2001) use this method to put defined-benefit and defined-contribution wealth on the same basis.

69. Mitchell (1988), Gustman and Steinmeier (1989, 2004), and Starr-McCluer and Sundén (1999) compare employer and employee reports of pension benefits and conclude that some workers are poorly informed about their pension benefits.

70. As reported in table 1 of Scholz, Seshadri, and Khitatrakun (forthcoming).

**Table A-2. Net Worth by Year and Age Group**
Thousands of 2001 dollars

| *Measure and age group* | *1989* | *1992* | *1995* | *1998* | *2001* |
|---|---|---|---|---|---|
| Net worth, median | | | | | |
| 25–34 | 21 | 26 | 29 | 23 | 24 |
| 35–44 | 108 | 79 | 81 | 91 | 99 |
| 45–54 | 193 | 150 | 169 | 169 | 191 |
| 55–64 | 212 | 228 | 234 | 233 | 278 |
| 65–74 | 169 | 178 | 193 | 252 | 264 |
| 75–84 | 131 | 142 | 130 | 185 | 226 |
| Net worth, mean | | | | | |
| 25–34 | 96 | 80 | 73 | 99 | 105 |
| 35–44 | 244 | 195 | 194 | 240 | 284 |
| 45–54 | 485 | 412 | 441 | 462 | 573 |
| 55–64 | 533 | 554 | 578 | 692 | 846 |
| 65–74 | 510 | 433 | 499 | 609 | 763 |
| 75–84 | 362 | 318 | 340 | 418 | 551 |
| Net worth, 10th percentile | | | | | |
| 25–34 | 0 | –1 | 0 | –6 | –2 |
| 35–44 | 0 | 1 | 1 | 1 | 1 |
| 45–54 | 7 | 5 | 7 | 4 | 4 |
| 55–64 | 1 | 9 | 10 | 16 | 13 |
| 65–74 | 7 | 7 | 9 | 14 | 19 |
| 75–84 | 5 | 7 | 19 | 11 | 12 |
| Net worth, 25th percentile | | | | | |
| 25–34 | 2 | 3 | 5 | 1 | 3 |
| 35–44 | 23 | 17 | 18 | 18 | 21 |
| 45–54 | 51 | 43 | 56 | 53 | 44 |
| 55–64 | 65 | 83 | 73 | 76 | 77 |
| 65–74 | 61 | 58 | 62 | 87 | 87 |
| 75–84 | 33 | 49 | 58 | 67 | 69 |
| Net worth, 75th percentile | | | | | |
| 25–34 | 98 | 90 | 83 | 77 | 93 |
| 35–44 | 263 | 191 | 188 | 232 | 267 |
| 45–54 | 483 | 410 | 430 | 456 | 497 |
| 55–64 | 521 | 536 | 587 | 502 | 663 |
| 65–74 | 405 | 385 | 447 | 538 | 709 |
| 75–84 | 294 | 330 | 323 | 411 | 500 |
| Net worth, 90th percentile | | | | | |
| 25–34 | 233 | 189 | 165 | 179 | 231 |
| 35–44 | 500 | 388 | 404 | 481 | 554 |
| 45–54 | 1,021 | 853 | 892 | 802 | 1,128 |
| 55–64 | 1,170 | 1,173 | 1,099 | 1,203 | 1,553 |
| 65–74 | 1,042 | 885 | 949 | 1,138 | 1,351 |
| 75–84 | 632 | 673 | 656 | 805 | 1,029 |

Source: Survey of Consumer Finances.

**Table A-3. Measures of Components of Wealth by Year and Age Group**
Thousands of 2001 dollars

| *Measure and age group*[a] | *1989* | *1992* | *1995* | *1998* | *2001* |
|---|---|---|---|---|---|
| Retirement wealth | | | | | |
| 25–34 | 19 | 21 | 24 | 24 | 18 |
| 35–44 | 60 | 47 | 51 | 61 | 64 |
| 45–54 | 134 | 124 | 152 | 126 | 161 |
| 55–64 | 149 | 181 | 192 | 204 | 228 |
| 65–74 | 128 | 100 | 131 | 155 | 165 |
| 75–84 | 33 | 53 | 56 | 81 | 96 |
| Housing wealth | | | | | |
| 25–34 | 22 | 19 | 13 | 19 | 23 |
| 35–44 | 61 | 44 | 42 | 43 | 62 |
| 45–54 | 104 | 77 | 70 | 72 | 95 |
| 55–64 | 106 | 92 | 90 | 101 | 127 |
| 65–74 | 95 | 92 | 88 | 108 | 133 |
| 75–84 | 86 | 86 | 86 | 102 | 126 |
| Net financial assets | | | | | |
| 25–34 | 17 | 10 | 12 | 22 | 29 |
| 35–44 | 36 | 31 | 33 | 59 | 59 |
| 45–54 | 74 | 65 | 82 | 104 | 147 |
| 55–64 | 98 | 113 | 118 | 182 | 240 |
| 65–74 | 133 | 105 | 143 | 204 | 231 |
| 75–84 | 157 | 116 | 130 | 148 | 237 |
| Other real assets | | | | | |
| 25–34 | 38 | 29 | 24 | 34 | 35 |
| 35–44 | 87 | 74 | 69 | 77 | 99 |
| 45–54 | 173 | 146 | 136 | 160 | 170 |
| 55–64 | 179 | 168 | 178 | 206 | 251 |
| 65–74 | 155 | 136 | 137 | 143 | 234 |
| 75–84 | 86 | 63 | 68 | 87 | 92 |

Source: Survey of Consumer Finances.
a. All estimates are means.

# *Comments and Discussion*

**Alan S. Blinder:** With one exception, which I will come to later, this paper is very readable, fact-based, and enlightening. It reminds me of one of those famous Yogi Berra quotations: "You can observe a lot just by watching." William Gale and Karen Pence *watch* the data on household wealth accumulation from 1989 to 2001 and *observe* two interesting phenomena that others have missed:

—The change in household wealth over this period was concentrated in the upper age groups, such as those 55 and older. The authors' figures 1 and 2 show this clearly and, by the way, indicate that the mean and the median exhibit the same basic pattern.

—These older groups did better because they "improved" their demographics, not because, for example, they held most of the stock as the S&P 500 climbed about 270 percent over those twelve years.

Each of these observations is stated clearly and backed up by impressive data crunching. And, as the authors point out, the two findings are *not* just corollaries of the well-known fact that wealth has become increasingly concentrated. Something else was going on.

As I read the paper for the first time, I wondered why the editors asked *me* to be a discussant. Then I came to the first mention of the Blinder-Oaxaca decomposition, and it was "déjà vu all over again." Since macroeconomics-oriented readers may be unfamiliar with the Blinder-Oaxaca technique, let me just say that it is a simple, regression-based decomposition of the mean difference in the attainment of some left-hand-side variable (wages in my original application, wealth in this case) between two populations (blacks and whites in my original application, wealth holders in 1989 and 2001 in this case) into a portion attributable to differences in

the right-hand-side variables and a portion attributable to differences in the coefficients. So its use here, although probably unprecedented in the Brookings Papers, is appropriate.

Specifically, assume linear regressions explaining the wealth of individual $i$ in year $t$, where $t = 1989$ or $2001$:

$$W_{it} = X_{it}\beta_t + \varepsilon_{it}.$$

The notation indicates that both the attributes $X$ of individuals (such as health or marital status) and the regression coefficients $\beta$ on those attributes may change over time. The question is: How much of the change in mean wealth of one group versus another can be attributed to changes in $X$ and how much to changes in $\beta$? In this case the changes in $X$ indicate how much individual $i$ "improved" herself (changing her attributes so as to generate more wealth), and the changes in $\beta$ indicate how much the economy changed its valuations of those attributes (how much more or less wealth those attributes typically generated).

Conceptually, think of the "time derivative" of equation 1 as being $\Delta W = \beta\Delta X + X\Delta\beta$. There are two discrete-time decompositions:

$$(2a) \qquad E(W_{01}) - E(W_{89}) = \left[E(X_{01}) - E(X_{89})\right]\beta_{01} + E(X_{89})\left[\beta_{01} - \beta_{89}\right]$$

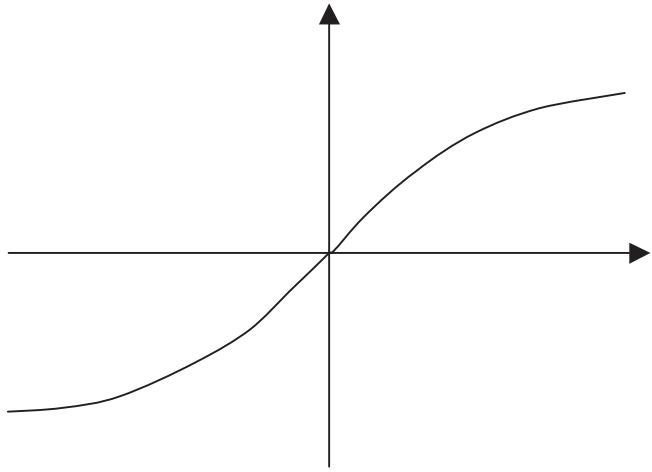
$$(2b) \qquad E(W_{01}) - E(W_{89}) = \left[E(X_{01}) - E(X_{89})\right]\beta_{89} + E(X_{01})\left[\beta_{01} - \beta_{89}\right].$$

In each decomposition the first term measures the portion *attributable to changes in average characteristics* between 1989 and 2001 (the major ones for Gale and Pence being education, health, and marital status), evaluated at one of the two "price vectors." The second term measures the portion *attributable to changes in coefficients* between 1989 and 2001, evaluated at one of the two "quantity vectors." Note that neither decomposition has any inherent claim to superiority. So, unless they lead to approximately the same conclusions, the evidence must be scored as inconclusive—analogous to when a Laspeyres index and a Paasche index give sharply different measures of inflation.

With this in mind, turn now to the upper panel of Gale and Pence's table 5, where the results from both versions of their Blinder-Oaxaca decomposition are displayed. The two versions of equation 2 agree quite well for four of the six age groups. In three of those cases (ages 25–34, 65–74, and 75–84), the story is that virtually all the action stems from changes in demographics—the second of Gale and Pence's findings above.

The two decompositions also agree for the 55- to 64-year-olds, but here the split is closer to 50–50 between changes in $\beta$ and changes in $X$. It is the cases of the 35- to 44-year-olds and the 45- to 54-year-olds that are troubling, because here the two decompositions disagree notably. The decomposition for the 45- to 54-year-olds even "flips" qualitatively, from 86–14 in favor of $\Delta\beta$ to 48–52 in favor of $\Delta X$. Thus Gale and Pence's second finding is not quite as robust as they suggest—although, as they note, it works best where most of the money is found, that is, with the oldest age groups.

Things get murkier with Gale and Pence's other methodological innovation: the use of the inverse hyperbolic sine function, for what I assume is the first time in Brookings Papers history. In the first place, the method itself is hard to decipher. Being a member of the cohort aged 55–64 in 2001, I had to scurry to an ancient reference book from high school—the famous *CRC Standard Mathematical Tables*—to relearn something I may have known then: that the inverse hyperbolic sine function looks like this:



The reader might or might not have figured this out after being told that the function is

$$\sinh^{-1}(\theta w) = \ln\left[\theta w + \left(1 + \theta^2 w^2\right)^{1/2}\right],$$

where $w$ is wealth and $\theta$ is a parameter. This function starts to track $\ln(2\theta w)$ closely once $\theta w$ exceeds 3. For example, for $\theta w = 1$, $\sinh^{-1}(1) =$

**Table 1. Changes in Real Median Net Worth by Age Group**
Percent

| *Age group* | *1989–2001* | *1989–95* | *1995–2001* |
|---|---|---|---|
| 25–34 | +14 | +38 | −17 |
| 35–44 | −10 | −26 | +22 |
| 45–54 | −1 | −11 | +12 |
| 55–64 | +30 | +10 | +18 |
| 65–74 | +56 | +14 | +37 |
| 75–84 | +73 | −1 | +74 |

Source: Author's computations from data in Gale and Pence, this volume, appendix table A-2.

0.88 and ln(2) = 0.69, which is still a considerable distance apart. But for $\theta w = 3$, $\sinh^{-1}(3) = 1.82$ and ln(6) = 1.79, which is getting close.

Forgetting trigonometry is one thing, but the Blinder-Oaxaca decompositions shown in the bottom panel of table 5 left me even more baffled. Are we really to believe, for example, that the decomposition for 45- to 54-year-olds attributes *1,305 percent* of the change in wealth to changes in coefficients and *−1,205 percent* to changes in characteristics? I know this is possible mathematically, but it strains credulity. Notice that in the upper panel of that same table, which uses the more conventional specification based on levels, the corresponding figures are 48 percent and 52 percent. This leaves me confused and wondering whether the problem lies in the $\sinh^{-1}(.)$ approximation. I must admit that I prefer the more familiar linear specification that Yogi would have called "déjà vu all over again."

Let me return to Gale and Pence's first finding, that most of the accretions to wealth over 1989–2001 went to older people. The first column of table 1 above, which I have calculated from their appendix table A-2, summarizes this finding. It shows that the median wealth of the three youngest age groups advanced little, if at all, over the twelve-year period, while that of the older age groups soared. (See also the authors' figure 5.) Yet the story is not quite that clear. The next two columns break the sample period in half, showing that from 1989 to 1995 the largest *percentage* gains by far accrued to 25- to 34-year-olds (although from a small base), while 75- to 84-year-olds gained nothing. From 1995 to 2001 these roles were reversed: the young lost ground while the oldest got rich. But neither column suggests a particularly sharp divide between the three youngest age groups and the three oldest in either subperiod. Did the demographic forces change dramatically around 1995? More likely, the juxtaposition of the two columns suggests the importance of calendar time per se. And one reason may be

**Table 2. Real Mean Wealth Increases of Cohorts Three Years Apart**

| *Birth years* | *Decade over which increase is measured*[a] | *Increase in mean wealth (percent)* |
|---|---|---|
| 1955–64 | 1989–98 | 150 |
| 1958–67 | 1992–2001 | 255 |
| 1945–54 | 1989–98 | 89 |
| 1948–57 | 1992–2001 | 194 |
| 1935–44 | 1989–98 | 43 |
| 1938–47 | 1992–2001 | 105 |
| 1925–34 | 1989–98 | 14 |
| 1928–37 | 1992–2001 | 38 |
| 1915–24 | 1989–98 | −18 |
| 1918–27 | 1992–2001 | 27 |

Source: Author's computations from data in Gale and Pence, this volume, appendix table A-2.
a. Cohorts are chosen such that the first in each pair was the same age in 1989–98 as the second was in 1992–2001.

that the S&P stock index rose 68 percent from 1989 to 1995 but 120 percent from 1995 to 2001.

To pursue the role of calendar time further, one can use the Gale-Pence numbers in their table A-2 to follow the same birth cohorts through time—or, rather, one can *almost* do so. For example, and here I will switch from medians to means, people aged 25–34 in 1989 had mean wealth of $96,000. Nine years later these same people were 34–43 years old, and the table tells us that 35- to 44-year-olds had mean wealth of $240,000 in 1998. So, ignoring the one-year age discrepancy, one can estimate that these people increased their wealth by ($240,000 − $96,000)/$96,000, or 150 percent. Now consider people just three years younger, who were aged 25–34 in 1992 and aged 34–43 (which I treat as the same as 35–44) in 2001. Their approximate increase in wealth was ($284,000 − $80,000)/$80,000 = 255 percent, which is vastly more. This is not an isolated, atypical example. Table 2 above presents parallel calculations for all the birth cohorts that can be analyzed in this way. In every case the cohort three years younger—and thus experiencing the years 1998–2001 instead of 1989–1992—did far better.

My rhetorical question is this: Is it plausible to believe that such a huge difference in wealth accumulation could have been due to dramatically different demographic changes between cohorts born just three years apart? And my suggested answer is no. I further suggest that calendar time—in particular, removing 1989–92 and adding 1998–2001 to the nine-year period of wealth accumulation—probably contributes more to the explanation. The years 1998–2001 were simply a much better time for wealth

accumulation by American households than 1989–92. Nor is this a secret or some kind of new discovery. According to data from the Survey of Consumer Finances, mean family net worth *rose* by 28.7 percent between the 1998 and 2001 surveys but *fell* by 10.2 percent between the 1989 and 1992 surveys.[1]

What about Gale and Pence's second main finding, that the way to accumulate wealth is to be married, healthy, and educated beyond high school? In general, this sounds like good advice for economic success in *any* dimension. For example, everyone knows that being married, healthy, and better educated leads to higher wages. What is striking is how strong their evidence is—maybe too strong, as I will explain in a moment.

Gale and Pence's tables 2 and 3 and the accompanying figures make a rather convincing case that demographic *improvements* in the older age groups and demographic *deteriorations* in the younger age groups go a long way toward explaining their disparate performances in wealth accumulation over the twelve years. It was surprising, to me at least, to find such sharp differences in demographic "performance" in their table 1. I was not surprised that fewer "young" people (ages 25–54) were married in 2001 than in 1989, but I was surprised to learn that more old people (ages 65–84) were. Similarly, although everyone knows that older people (ages 55–84) were healthier in 2001 than in 1989, I did not realize (and in fact am not sure) that younger people (ages 25–54) became *less* healthy. But the biggest surprise for me was that the gains in postsecondary education for men were concentrated in the older age groups (ages 45–84), not the younger ones. For example, 18 percent more 75- to 84-year-olds had postsecondary education in 2001 than in 1989, whereas the corresponding gain for 25- to 34-year-olds was only 6 percent.

That said, I would not dismiss the relevance of calendar time quite as readily as Gale and Pence do. As I mentioned above, Americans accumulated a lot more wealth during 1998–2001 than during 1989–92. It is probably no coincidence that 1998–2001 were boom years whereas 1989–92 included a recession and a sluggish recovery therefrom.

Remember also that wealth accumulation derives from only two sources: net private saving and the returns on wealth, including (prominently) asset revaluations. Now think back to the demographic differences that Gale and

1. For 1998–2001 see Aizcorbe, Kennickell, and Moore (2003, p. 7). For 1989–92 see Kennickell, Starr-McCluer, and Surette (2000, p. 7).

Pence emphasize. I am quite prepared to believe that being married, healthy, and educated all contribute to higher productivity, and therefore to higher real wages and more saving. But net private saving in the National Income and Product Accounts over 1990–2000 came to only about $5 trillion, whereas Gale and Pence state that aggregate net worth rose by about $22 trillion (more than doubling) over the decade. Could it be that being married, healthy, and more educated also contribute to wiser portfolio choices that produce better asset returns? That is an intriguing thought that Gale and Pence's results raise. But the fact that the preponderance of wealth accumulation comes from asset returns does bring me back to the relevance of calendar time per se. With stock prices and home prices soaring, 1989–2001 was a good time to accumulate wealth without the nuisance of saving. Surely that played an important role in the wealth accumulation of every age group, a role separate and distinct from demographic change.

So I do not think the authors' findings on demographic change, interesting as they are, should lead us to dismiss calendar time. Since we have two eyes and two ears, we can entertain two hypotheses at once. Which, of course, reminds me of one final Yogi aphorism: "When you come to a fork in the road, take it."

**John Sabelhaus:**[1] This paper by William Gale and Karen Pence establishes a new set of empirical regularities about wealth accumulation and demographics that will ultimately prove to be very important for the literature on life-cycle saving behavior. The authors show that between 1989 and 2001 several measures of wealth rose significantly for households where the head was of retirement age or older, but that those same measures were unchanged for younger households. The authors argue that these divergent patterns are explained by demographic variables, on the following logic: if one starts with the observed variation in wealth holdings between demographic groups at either point in time the change in the wealth distribution is perfectly explained by the shifts in population across those demographic groups over time. The authors also argue that these relative shifts are not explainable by the extraordinary capital gains that occurred in the 1990s, which they take as further evidence of the importance of demographic changes.

1. The analysis and conclusions expressed in these comments are those of the author and should not be interpreted as those of the Congressional Budget Office.

The first question to ask of a paper like this is whether the newly found empirical regularity is somehow incomplete or misleading. The answer in this case is almost certainly no; the results appear robust. The only issue I will raise concerns how the wealth measures within groups are tabulated in each year. The authors tabulate the data by households, rather than by persons within households, and this approach to measurement could be affecting (in particular) their conclusions about the effect of marriage on wealth accumulation.

The more interesting issue to explore is what the findings suggest for models of life-cycle saving behavior. The main issue I will address is whether the demographic variables are really explanatory in and of themselves; an alternative interpretation is that the demographic variables the authors consider are simply highly correlated with lifetime income. This matters because the richness of life-cycle models is still greatly hampered by computational constraints; parsimony in the state space is still necessary. Can the demographic variables identified by the authors be mapped back onto the traditional state variables, or must the life-cycle models be expanded to accommodate these new findings?

Finally, the authors weigh in on the issue of how ultimate patterns of wealth accumulation are affected by asset revaluations over time. Their goal is to show that the extraordinary capital gains of the 1990s are not driving the relationship between demographics and wealth accumulation. I argue that more work is needed before one can claim to have learned anything really new about the role of capital gains in wealth accumulation. The 1989–2001 period is not as extraordinary as one might think, and it is not clear that the effect of gains is even being measured against any relevant benchmark.

*Measuring wealth distributions across groups and time.* The evidence presented by the authors about shifting wealth distributions is compelling and significant and appears robust. They show clearly that the entire distribution of household-level wealth shifted outward for older households but did not change for younger households. The inferences later in the paper about the effect of demographics on wealth all come back to this basic finding, and so it is important to consider how the decisions made when constructing the wealth distributions might be affecting the conclusions.

Although the analysis requires many assumptions about what wealth concept to use, how to construct various components, and what statistics to consider, the authors have done a convincing job of sensitivity analysis with

respect to each of these, and so I have no doubt that their conclusions would hold up under close scrutiny. The only consideration I think is worth mentioning—and mostly because it bears on my comments about the implications of these findings for the life-cycle model—is whether wealth should be tabulated by households or by persons. I do not doubt that the effective decisionmaking unit for studying wealth is the household. My concern is about separating the effect of marriage from the effect of lifetime earnings.

The issue is this: if marriage patterns change across cohorts, one should observe changes in household-level wealth distributions at a given age even if lifetime earnings and life-cycle wealth accumulation behavior did not change. Consider two single people between the ages of 35 and 44, each with $20,000 in wealth in the 2001 sample. Then consider the same two people in 1989, but married and holding $40,000 in wealth. Although the per-person wealth levels are equivalent, this would show up as a shift in the household wealth distribution, because two $20,000 observations replace one $40,000 observation. Constructing the distributions using person weights, and assuming married couples share wealth equally, would have shown two $20,000 observations in both years. That could have some impact on the basic observations about how wealth changed across groups, but it also could be important for distinguishing between the effects of changes in lifetime earnings and changes in marital status.

*What are the implications for life-cycle saving theory?* Some of the most compelling evidence in favor of life-cycle saving models comes from simulation exercises. The approach is to specify and solve a recursive utility maximizing model using dynamic programming methods, and then simulate consumption and wealth accumulation for a representative sample and evaluate how well the predicted behavior matches reality. The literature shows that fairly parsimonious models generate savings patterns that match the overall distribution of wealth at given points in time, typical age-wealth trajectories, aggregate consumption responses to changes in income, and even differences in wealth holdings within a micro sample.

In the spirit of this literature, one way to analyze the implications of the Gale and Pence findings would be to solve and simulate a model once using a 1989 state of the world and again using a 2001 state of the world, and then observe under what conditions the divergent shifts in wealth across age groups would be predicted. I think the standard model would do a pretty good job of predicting the divergence in wealth accumulation, but going

through the exercise would reveal that demographics per se did not drive wealth accumulation, but rather lifetime earnings, which (in this case) is highly correlated with demographics. It would be very useful to try to separate the lifetime income and demographic effects, because that is how the important messages for life-cycle model development could be distilled.

Data on lifetime earnings from Social Security earnings records (obtained via the Congressional Budget Office microsimulation model) are consistent with a lifetime earnings story. I computed average cumulative real earnings for each age group as of 1989 and 2001 and found exactly the same pattern that the authors found for wealth. For the youngest age group that the authors study, those aged 25–34, the data showed very little change in cumulative real earnings between 1989 and 2001. For the next two age groups, those aged 35–44 and 45–54, earnings growth over the period was positive but fairly modest, at about 11 percent. For the 65–74 age group earnings growth over the same period was much higher, at about 46 percent. Every age group grew richer in absolute terms over the twelve-year period, but the oldest groups grew relatively much richer in a lifetime sense.

This differential growth was almost certainly related to some of the demographic variables that the authors focus on to explain wealth change, particularly education and labor force participation. The earnings differences are probably also related to health status, but it is not clear whether low earnings cause bad health or bad health causes low earnings (probably both are true). But in addition to the demographic variables that the authors focus on for explaining wealth, some unexplained cohort effects show up in the earnings data. For example, the data show that baby-boomer males have had (holding education constant) lower relative earnings than their fathers.

The life-cycle model suggests that wealth at any given age should increase with lifetime earnings, holding fixed the other inputs such as the Social Security benefit formula, expected earnings growth, and expected rates of return on financial assets. Thus the lifetime earnings data and an unchanged macroeconomic and policy environment are basically consistent with the observed differences in wealth over time. There is perhaps a little more explaining to do, because the wealth of younger age groups was constant whereas lifetime earnings went up modestly, but that could be attributable to increases in person-level earnings being offset by changes in household composition. More of the young were single in 2001 than in 1989, and given the authors' decision to tabulate the data on a household basis, that shifts the wealth distribution in a way that offsets the increased

lifetime earnings. This shows up in the authors' analysis as an effect of marriage, but it could actually be an artifact of how the data are tabulated.

The lifetime earnings data and the wealth change data give consistent results, which is good news for the life-cycle model but also suggests that the effect of demographics on wealth can and should be explored more deeply. Suppose one used the authors' framework to predict future wealth: if demographic characteristics stay the same but higher productivity lifts lifetime earnings across all age groups, the empirical approach in the paper predicts that wealth will remain constant, which is contrary to life-cycle theory. The authors have identified an important reduced-form relationship for this period of time, but the insights for life-cycle models remain buried. Uncovering those insights will require decomposing the effects of demographics on lifetime earnings, and then looking for any residual unexplained changes in wealth across age groups and time.

*The role of capital gains.* The authors' analysis of the role of capital gains in wealth seems intended to respond to the following argument: The reason wealth rose for the older age groups in the 1990s is that capital gains were unusually large. The older groups in the population hold most of the wealth at any point in time, and so the basic findings could just be a natural consequence of these unusual gains. However, given my belief that the empirical regularity uncovered by the authors is explainable by basic life-cycle theory, I am in league with the authors in rejecting that argument. In addition, I have a few comments about the role of gains that further explore what these empirical findings imply for life-cycle behavior.

One response to the unusual-gains argument is that, in retrospect, it is not even clear how unusual the period 1989 to 2001 really was. Certainly stock market gains were strong in the latter part of the period, but total asset revaluations relative to income were only marginally higher than in the 1980–89 period.[2] The stock market gains were offset in part because gains on housing, especially early in the period, were more modest than in the past. Since 2000 there has been a shift back toward gains on tangible assets, with increased housing values of course leading the way.

It seems that, when thinking about the effect of capital gains on saving, the real questions are, How much should one expect asset values to change over time? How should people react to those changes? And how did people actually react when historical revaluations differed from expectations?

2. Gale and Sabelhaus (1999).

The idea is to construct a benchmark against which to compare actual wealth accumulation behavior, and then try to infer what effect capital gains have on saving. The authors estimate how much of the overall wealth change is accounted for by gains, but there is nothing to compare those numbers against. The simplest life-cycle model suggests that consumption of any unexpected gains (with no mean reversion) should be smoothed over the remaining lifetime, which suggests that older people would consume a lot more of their gains. On the other hand, the buffer-stock variant of the basic model suggests that younger agents may be more likely than older agents to spend capital gains, because of the tension between high discount rates and expected future income.

The best way to disentangle the effects of gains on behavior would be to use high-quality panel data, but such data do not exist. The second-best way would be to have high-quality synthetic-panel data, but the Survey of Consumer Finances is conducted on a fairly small sample, and synthetic-panel inferences are confounded by sampling variability. Another alternative, which ties back to the more general comments above, is to try to develop a life-cycle simulation model that would predict the observed changes in wealth accumulation across groups during this or other time periods, using actual capital gains as an input. That may be the best way to further draw insights from these very interesting empirical findings.

**General discussion:** Several panelists were surprised at the authors' finding that the extraordinary capital gains of the 1990s did not appear to have altered the relationship between demographic factors and wealth. Henry Aaron observed that wealth accumulation for each cohort is a product of lifetime experiences over roughly four decades. It is therefore important to take into consideration differences in external events over the entire adult lifetime of the various cohorts, not just the one decade studied by the authors. But the fact that the older age groups in 1989 would have been in the prime of their working lives and accumulating assets in the 1970s, when the stock market was performing poorly, adds to the puzzle.

Robert Gordon agreed with Aaron on the need to consider a longer time period, and he explored the reasons why the net worth of today's 50-year-olds is vastly greater than that of their parents, even when they have had similar real income streams in their working years. First, the parent's generation's peak earnings occurred during roughly 1965–82, a period when the stock market contributed little to their wealth compared with what

happened in the following two decades. Moreover, the shift toward defined-contribution pension plans has allowed the younger generation to enjoy enormous capital gains, which their employers would have retained under defined-benefit plans. He suggested that the increasing use of mutual funds, which allow individuals to better optimize their portfolios, has also been important. However, speculating that the extraordinary capital gains of the 1980s and 1990s will not be repeated, Gordon doubted that future generations would be able to accumulate comparable net worth.

Jeffrey Brown observed that even though these factors had affected different cohorts differently, the wealth-to-income ratio for given age brackets remained remarkably stable between 1983 and 2001 in the Survey of Consumer Finances data, consistent with the paper's conclusions. James Duesenberry noted that the wealth tables stop at the 90th percentile, but a large fraction of capital gains goes to the top 10 percent and is thus not reported.

Duesenberry also stressed the importance of intergenerational transfers and suggested that the desire to pass wealth to their children may influence the behavior of the elderly. Richard Cooper was also interested in the quantitative importance of bequests and observed that they may influence the behavior of the younger as well as the older generation. For example, 30-year-olds whose parents and grandparents are quite well off may anticipate bequests and consequently save less than they might otherwise. Benjamin Friedman noted that bequests are extremely concentrated in the upper tail of the distribution, and that if they played an important role in the behavior of the older generations, one would expect to see significant differences between the 75th and the 90th percentile; this, however, does not appear to be the case in the authors' figures.

Friedman agreed with Alan Blinder that married, educated, and healthy individuals may make better portfolio allocations than others. But what might be more important is that these individuals have higher incomes and therefore higher saving in the first place. Hence they would have benefited from large capital gains in the 1990s and would have done unusually well even if they did not make superior portfolio allocations. Friedman and Aaron both suggested that demographic characteristics such as education may have an important effect on the saving rate even given income.

Cooper thought the paper's most striking result was the absence of an increase in net worth for the three youngest cohorts. Noting that the young accumulated more consumer durables over the 1990s than had previous generations, he wondered whether the inclusion of consumer durables other

than those captured in the authors' measures would have altered the results. Cooper also observed that the consumption patterns of people over age 70 are considerably different from those of 30-year-olds, and he suggested using age-specific deflators. Gordon agreed with Cooper and noted that the consumer price index for consumer durables is more likely to be biased upward than that for any other category. Gordon also noted that although behavior with respect to consumer durables and several other asset categories fits the life-cycle model, with holdings increasing and then declining with age, some categories show no decline with age, which is inconsistent with the model.

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