

NBER WORKING PAPER SERIES

PENSIONS IN THE 2000S:
THE LOST DECADE?

Edward N. Wolff

Working Paper 16991
<http://www.nber.org/papers/w16991>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2011

I would like to gratefully acknowledge the financial support of the Upjohn Institute for this work. The paper is drawn from my forthcoming book, *THE TRANSFORMATION OF THE AMERICAN PENSION SYSTEM: WAS IT BENEFICIAL FOR WORKERS?*, to be published by the Upjohn Institute in 2011. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2011 by Edward N. Wolff. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Pensions in the 2000s: the Lost Decade?
Edward N. Wolff
NBER Working Paper No. 16991
April 2011
JEL No. D31,H55,J32

ABSTRACT

One of the most dramatic changes in the retirement income system over the last three decades has been a decline in traditional defined benefit (DB) pension plans and a corresponding rise in defined contribution (DC) pensions. Have workers benefited from this change? Using data from the Survey of Consumer Finances, I find that after robust gains in the 1980s and 1990s, pension wealth experienced a marked slowdown in growth from 2001 to 2007. Projections to 2009 indicate no increase in pension wealth from 2001 to 2009. Retirement wealth is also found to offset the inequality in standard household net worth. However, I find that pensions had a weaker offsetting effect on wealth inequality in 2007 than in 1989. As a result, whereas standard net worth inequality showed little change from 1989 to 2007, the inequality of private augmented wealth (the sum of pension wealth and net worth) did increase over this period. These results hold up even when Social Security wealth and employer contributions to DC plans are included in the measure of wealth and when adjustments are made for future tax liabilities on retirement wealth.

Edward N. Wolff
Department of Economics
New York University
19 W. 4th Street, 6th Floor
New York, NY 10012
and NBER
edward.wolff@nyu.edu

1. Introduction

One of the most dramatic changes in the retirement income system over the last three decades has been the replacement of many traditional defined benefit (DB) pension plans with defined contribution (DC) pensions. The main focus of the paper is to analyze the effects of this substitution on the growth of pension wealth from 1983 to 2007. A second concern of the paper is how the financial crisis of 2007-2009 impacted pension wealth. A third topic of the paper is how retirement wealth (the sum of pension and Social Security wealth) affects overall wealth inequality and, in particular, how the changeover in the pension system influenced the time trend in wealth inequality over these years. The empirical work is based on the Federal Reserve Board's Survey of Consumer Finances for years 1983, 1989, 2001, and 2007. I also make projections to 2009 on the basis of movements in house and stock prices from 2007 to 2009.

My main finding is that after robust gains in the 1980s and 1990s, pension wealth growth slowed substantially from 2001 to 2007. Projections to 2009 indicate no increase in pension wealth from 2001 to 2009. Likewise, "private augmented wealth," the sum of net worth and pension wealth, also showed a marked slowdown in growth during the 2000s in comparison to the 1980s and 1990s. Retirement wealth is also found to offset the inequality in standard household net worth. However, the results show that pensions had a weaker offsetting effect on wealth inequality in 2007 than in 1989. As a result, whereas standard net worth inequality showed little change from 1989 to 2007, the inequality of private augmented wealth did increase over this period. These results hold up even when employer contributions to DC plans are included in the measure of wealth and when adjustments are made for future tax liabilities on retirement wealth.

Though the focus of the paper is on pension wealth, I will also present estimates of Social Security wealth and (total) augmented wealth, the sum of net worth, pension wealth, and Social Security wealth. The main results concerning private augmented wealth also hold up when Social Security wealth is also included in the measure of household wealth.

The next section of the paper (Section 2) provides a review of the pertinent literature on this subject. Section 3 describes the data sources and develops the accounting framework used in the analysis. Section 4 looks at time trends in standard measures of household wealth over the 1983-2007 period. Section 5 investigates changes in pension wealth over these years. Section 6 provides an update to 2009 on the basis of my projections. Concluding remarks are made in Section 7.

2. Literature Review

Several studies have documented changes in pension coverage in the United States, particularly the decline in DB pension coverage among workers over the last two decades. Before this, Kotlikoff and Smith (1983) provided one of the most comprehensive treatments of pension coverage and showed that the proportion of U.S. private-wage and salary workers covered by (traditional DB) pensions more than doubled between 1950 and 1979. Bloom and Freeman (1992), using Current Population Surveys for 1979 and 1988, were among the first to call attention to the decline in DB pension coverage. They reported that the percentage of all workers in age group 25-64 covered by these plans fell from 63 to 57 percent over this period. Among male workers in this age group, the share covered dropped from 70 to 61 percent, while among females in the same age group, the share remained almost constant, at 53 percent.

Gustman and Steinmeier (1992) were among the first to document the change-over from DB plans to DC plans. On the basis of IRS 5500 filings between 1977 and 1985, they estimated that only about half of the switch was due a decline in DB coverage conditional on industry, size, and union status and the other half was due to a shift in employment mix toward firms with industry, size, and union status historically associated with low DB coverage rates. Even and Macpherson (1994) also found a pronounced drop in DB pension coverage among male workers, particularly those with low levels of education.

A US Department of Labor (2000) report found that a large proportion of workers, especially low wage, part-time, and minority workers, were not covered by private pensions. The coverage rate of all private sector wage and salary workers was 44 percent in 1997. Coverage of part-time, temporary and low-wage workers was especially low. This appeared to be ascribable to the proliferation of 401(k) plans and the frequent requirement of employee contributions to such plans. It also found important ethnic differences, with 47 percent of white workers participating but only 27 percent of Hispanics. Another important finding was that 70 percent of unionized workers were covered by a pension plan, compared to only 41 percent of non-unionized workers. Pension participation was found to be highly correlated with wages. While only 6 percent of workers earnings less than \$200 per week had a pension plan, 76 percent of workers earning \$1,000 per week participated.

Using data from the Current Population Survey, Munnell and Perun (2006) reported a sharp drop-off in pension coverage between 1980 and 2004. In fact, participation dropped between 1979

and 1988, rebounded from 1988 to 1999, and then fell off again between 1999 and 2004. In 1979, 51 percent of non-agricultural wage and salary workers in the private sector in age group 25 to 64 participated in a pension plan. By 2004, that figure was down to 46 percent. The authors also found that the decline in pension coverage occurred for all five earnings quintiles, though it was particularly pronounced for the middle quintile.

In general, these studies report an overall increase in pension coverage during the 1980s and 1990s despite the collapse of defined benefit plans because of an offsetting rise in defined contribution plans. However, they also indicate a drop off in pension coverage during the 2000s. I also look at this issue in section 5 and report a rise in overall pension coverage among households from 1989 to 2001 but this was followed by a modest decline from 2001 to 2007.

With regard to the financial crisis of 2007-2009, Gustman, Steinmeier, and Tabatabai (2009) offered a rather sanguine view of the effects of the stock market crash on retirement preparedness. Their findings indicated that although the consequences of the decline in the stock market were serious for those approaching retirement, the average person approaching retirement age was not likely to suffer a life changing financial loss from the stock market downturn of 2007-2009. Using HRS data, they calculated trends in pensions among three cohorts: those aged 51 to 56 in 1992, called the HRS cohort; those 51 to 56 in 1998, called the war baby cohort; and those 51 to 56 in 2004, called the early boomer cohort. They found that pension coverage was much more extensive than was usually recognized. Over three quarters of the households with a person ages 51 to 56 in 2004 were either currently covered by a pension or had pension coverage in the past. Pension wealth accounted for 23 percent of the total wealth (including Social Security wealth) of those on the verge of retirement. For those nearing retirement age, DC plans remained small. As a result, 63 percent of pension wealth held by those aged 51 to 56 in 2004 was in the form of a DB plan.¹ The figures were even higher for older cohorts. Three quarters of the pension wealth of the HRS cohort was from DB plans, as was 65 percent of the pension wealth of the war baby cohort. They argued that the fact that such a higher share of pension wealth was in the form of DB pension wealth should cushion the drop in overall pension wealth from the stock market crash.

Several papers looked at the issue of whether DC plans substituted for other forms of wealth and whether there was any net savings derived from DC plans. Poterba, Venti, and Wise (1992,

¹ These proportions seem a lot larger than the ones I compute from the SCF. For example, DB wealth as a share of total pension wealth among age group 47 to 64 was 47 percent in 2001 and only 41 percent in 2007.

1993, 1995), using SIPP data for 1984 and 1991, Poterba, Venti, and Wise (1998), using HRS data for 1993, and Poterba, Venti, and Wise (2001), using both macro national accounting data and micro HRS data, concluded that the growth of IRAs and 401(k) plans did not substitute for other forms of household wealth and, in fact, raised household net worth relative to what it would have been without these plans. They found no substitution of DC wealth for either DB wealth or other components of household wealth. Indeed, Poterba, Venti, and Wise (1998) suggests that the transition from DB to DC type plans increased pension wealth dramatically.

In contrast, William Gale in a series of papers both by himself and with colleagues, found very little net savings emanating from DC plans. Gale (1995) concluded that when biases in estimation procedures in the previous literature on the subject are corrected, the offset of pension wealth on other forms of wealth can be very high. Using data from the 1984, 1987, and 1991 SIPP, Engen and Gale (1997) estimated that “at best” only a small proportion of 401(k) contributions represent net increments to household savings. In later work, Engen and Gale (2000) refined their analysis to look at the substitution effect by earnings groups. Using data from the 1987 and 1991 SIPP, they found that 401(k)s held by low earners may more likely represent additions to net worth than 401(k)s held by high earners, who hold the bulk of this asset. Overall, only between 0 and 30 percent of the value of 401(k)s represent net additions to private savings. Kennickell and Sunden (1999) found a significant negative effect of both defined benefit plan coverage and Social Security wealth on non-pension net worth but concluded that the effects of defined contribution plans, such as 401(k) plans, on other forms of wealth are statistically insignificant.

The latest word on this subject is from Engelhardt and Kumar (2011). Using detailed information on pensions and lifetime earnings in the 1992 wave of the HRS, they exploited Instrumental Variable estimation techniques to estimate the “crowd-out” effect of private pension plans on household savings. They estimated that each dollar of pension wealth was associated with a 53 to 67 cent decline in non-pension wealth. Most of the effect was concentrated in the upper quantiles of the wealth distribution.

A related issue that will be covered in this paper regards the distributional effects of retirement wealth. Feldstein (1976), in a seminal paper on this subject, found on the basis of the 1962 Survey of Financial Characteristics of Consumers, that the inclusion of Social Security wealth led to a sharp reduction in overall wealth inequality. The Gini coefficient for the sum of net worth

and Social Security wealth among families in age class 35 to 64 was 0.51, compared to a Gini coefficient of 0.72 for net worth.

Wolff followed up by examining the distributional implications of both Social Security and private pension wealth. Wolff (1987), which used the 1969 Measurement of Economic and Social Performance (MESp) database, showed that while Social Security wealth had a pronounced equalizing effect on the distribution of augmented wealth (the sum of marketable wealth and retirement wealth), pension wealth had a much smaller equalizing effect on augmented wealth. In particular, the addition of Social Security wealth to net worth reduced the overall Gini coefficient from 0.73 to 0.48 but the addition of pension wealth to the sum of net worth and Social Security wealth raised the Gini coefficient back to 0.66. The sum of Social Security and pension wealth had, on net, an equalizing effect on the distribution of augmented wealth but substantially less than Social Security wealth alone.²

McGarry and Davenport (1997), using the 1992 wave of the HRS, found that pension wealth was only slightly more equally distributed than net worth and that adding pension wealth to net worth had a modest effect on inequality (with the wealth share of the top decile declining from 52.9 to 44.8 percent with the addition of pension wealth).³ Kennickell and Sunden (1999), using the 1989 and 1992 Survey of Consumer Finances, found a net equalizing effect from the inclusion of these two forms of retirement wealth. In particular, the inclusion of pension and net Social Security wealth reduced the share of total wealth held by the top one percent with a head less than the age of 65 in 1992 from 31.3 percent to 16.2 percent.⁴ Neither paper, however, presented calculations over a long time period as is done here (24 years).⁵

² Also, see Wolff (1992) for a discussion of some of the methodological issues involved in estimating both Social Security and pension wealth.

³ Differences in survey years and age coverage prevent any direct comparisons with my results reported in this paper.

⁴ Net Social Security wealth is defined as the discounted present value of future social security benefits less future taxes paid into the Social Security (OASI) system. Estimates are not provided separately for pensions and social security. As a result, it is not possible to provide direct comparisons with these results and my own (which uses gross social security wealth).

⁵ In contrast, there are a host of studies that examine the intra-cohort redistributive effects of Social Security benefits relative to contributions into the Social Security system. They consider which groups are net gainers and which net losers from the Social Security System as a whole. These papers include Wolff (1993); Coronado, Fullerton, and Glass (2000); Smith, Toder, and Iams (2001); Liebman (2002); and Leimer (2003, 2004).

3. Data Sources and Accounting Framework

The principal data sources used for this study are the 1983, 1989, 2001, and 2007 Survey of Consumer Finances (SCF) conducted by the Federal Reserve Board. Each survey consists of a core representative sample combined with a high-income supplement.⁶ The SCF provides considerable detail on both pension plans and Social Security contributions. The SCF also gives detailed information on expected pension and Social Security benefits for both husband and wife.⁷

The principal wealth concept used here is marketable wealth (or net worth), which is defined as the current value of all marketable or fungible assets less the current value of debts. Total assets are the sum of: (1) the gross value of owner-occupied housing; (2) other real estate owned by the household; (3) cash and demand deposits; (4) time and savings deposits, certificates of deposit, and money market accounts; (5) government bonds, corporate bonds, foreign bonds, and other financial securities; (6) the cash surrender value of life insurance plans; (7) the current market value of Defined Contribution pension plans, including IRAs, Keogh, and 401(k) plans; (8) corporate stock and mutual funds; (9) net equity in unincorporated businesses; and (10) equity in trust funds. Total liabilities are the sum of: (1) mortgage debt, (2) consumer debt, including auto loans, and (3) other debt. I use the symbol NW to refer to standard net worth. It should be stressed that the standard definition of net worth includes the market value of DC pension plans. (We shall return to this point later on in the paper).⁸

A word should be said on why I use the SCF instead of the newer Health and Retirement Survey (HRS), which has much more complete data on earnings histories and has employer-provided information on individual DB pension plans of each employee covered by these plans. There are three reasons. First, the SCF provides much better data on the assets and liabilities that

⁶ See, for example, Kennickell and Woodburn (1992), Kennickell, McManus, and Woodburn (1996), and Kennickell and Woodburn (1999) for details on the construction of the weights used in the SCF files.

⁷ For 1983 the Federal Reserve Board also made its own calculations of the wealth equivalent value of both expected DB pension benefits and Social Security benefits. However, I do not use these estimates in this paper but provide my own to be consistent with the methodology of the other years. Moreover, pension and social security wealth imputations in the 1983 data are rather limited for households under the age of 46. Partly for this reason, I focus mainly on age group 46 to 64.

⁸ Consumer durables, such as automobiles, televisions, furniture, household appliances, and the like, are excluded here in order to be consistent with the national accounts which treat expenditures on these items as consumption rather than investment. As a result, my wealth estimates will differ from the “standard” wealth estimates provided by the Federal Reserve Board, since they *include* the value of automobiles in their wealth definition (see, for example, Kennickell and Woodburn, 1999).

constitute marketable net worth. Second, the SCF data date from 1983, whereas the HRS data start in 1992. Since the transformation of the pension system began in the 1980s, the SCF data allow us to better track this change over the transition period. Third, the age coverage of the HRS is limited whereas the SCF covers the whole population.

The imputation of both pension and Social Security wealth involves a large number of steps, which is summarized below. Greater details can be found in the Appendix.

A. DB pension wealth

For retirees (r) the procedure is straightforward. Let PB be the pension benefit currently being received by the retiree. The SCF questionnaire indicates how many pension plans each spouse is involved in and what the expected (or current) pension benefit is. The SCF questionnaire also indicates whether the pension benefits remain fixed in nominal terms over time for a particular beneficiary or is indexed for inflation. In the case of the former, Defined Benefit (DB) pension wealth is given by:

$$(1a) \quad DB_r = \int_0^{109-A} PB(1 - m_t)e^{-\delta t} dt$$

and in the latter case,

$$(1b) \quad DB_r = \int_0^{109-A} PB(1 - m_t)e^{-\delta^* t} dt$$

where A is the current age of the retiree; m_t is the mortality rate at time t conditional on age, gender, and race; δ^* is the real annual discount rate, set to 2 percent; γ is the inflation rate is assumed to be 3 percent per year; $\delta = \delta^* + \gamma$ is the nominal annual discount rate, equal to 5 percent; and the integration runs from zero to the number of years when the retiree reaches age 109.⁹

Estimates of DB pension wealth (as well as Social Security wealth) are quite sensitive to the choice of inflation rate and discount rate. I choose a 3 percent inflation rate since it is very close to the actual annual change of the CPI-U index from 1983 to 2007. Moreover, I choose a 5 percent nominal discount rate because it likewise is close to the actual average annual rate of return on liquid assets over the same period. These two choices lead to a 2 percent *real* discount rate (the difference between the two rates). A higher real discount rate will lead to lower estimates of DB

⁹ I use age 109 somewhat arbitrarily as the last possible year of living. Moreover, the difference between the two formulas is that in the first the nominal discount rate δ is used whereas in the latter the real discount rate δ^* is used.

pension wealth (and likewise Social Security wealth), and, conversely, a lower discount rate will lead to higher estimates of these two variables. I also use a 3 percent real discount rate to estimate both DB pension and Social Security wealth. The general results contained in this paper are not materially altered by the use of this higher discount rate.¹⁰

Among current workers (w) the procedure is more complex. The SCF provides detailed information on pension coverage among current workers, including the type of plan, the expected benefit at retirement or the formula used to determine the benefit amount (for example, a fixed percentage of the average of the last five year's earnings), the expected retirement age when the benefits are effective, the likely retirement age of the worker, and vesting requirements. Information is provided not only for the current job (or jobs) of each spouse but for up to five past jobs as well. On the basis of the information provided in the SCF and on projected future earnings (see Section C of the Appendix for details), future expected pension benefits (EPB_w) are then projected to the year of retirement or the first year of eligibility for the pension. Then the present value of pension wealth for current workers (w) is given by:

$$(2) \quad DB_w = \int_{LR}^{109-A} EPB(1 - m_t)e^{-\delta t} dt$$

where RA is the expected age of retirement and LR = A - RA is the number of years to retirement. The integration runs from the number of years to retirement, LR, to the number of years when the retiree reaches age 109.¹¹

It should be noted that the calculations of DB pension wealth for current workers are based on employee response, including his or her stated expected age of retirement (see Section D of the Appendix), *not* on employer-provided pension plans.¹²

¹⁰ The results using the 3 percent real discount rate are not shown in this paper because reporting these results would vastly increase the number of tables in the paper. Another crucial choice is the selection of which mortality rates to use in the calculation of DB and Social Security wealth. I have used here the standard ones from the *Statistical Abstract of the United States* based on age, gender and race. However, there are also available unofficial life expectancy estimates for individuals by age, gender, and income class (and even by educational attainment). As is well known, higher income (and more educated) individuals live longer on average than lower income (or less educated) ones. The use of mortality rates conditional on income (or education) will have the effect of increasing estimates of DB pension wealth and Social Security wealth of higher income (and better educated) individuals *relative to* lower income (and less educated) individuals.

¹¹ Technically speaking, the mortality rate m_t associated with the year of retirement is the probability of surviving from the current age to the age of retirement.

¹² A couple of studies have looked at the reliability of employee-provided estimates of pension wealth by comparing self-reported pension benefits with estimates based on provider data. Using, data from the 1992 wave of the HRS, both Gustman and Steinmeier (1999) and Johnson, Sambamoorthi, and Crystal (2000) found that individual reports of

B. Social Security Wealth:

For current Social Security beneficiaries (r), the procedure is again straightforward. Let SSB be the Social Security benefit currently being received by the retiree. Again, the SCF provides information for both husband and wife. Since Social Security benefits are indexed for inflation, Social Security wealth is given

$$(3) \quad SSW_r = \int_0^{109-A} SSB(1 - m_t)e^{-\delta^*t} dt$$

where it is assumed that the current social security rules remain in effect indefinitely.¹³

The imputation of Social Security wealth among current workers is based on the worker's actual and projected earnings history estimated by regression equation (see the Appendix for details). The steps are briefly as follows, First, coverage is assigned based on whether the individual expects to receive Social Security benefits and on whether the individual was salaried or self-employed. Second, on the basis of the person's earnings history, the person's Average Indexed Monthly Earnings (AIME) is computed. Third, on the basis of the rules current at the time of the survey year, the person's Primary Insurance Amount (PIA) is derived from AIME. Then,

$$(4) \quad SSW_w = \int_{LR}^{109-A} PIA(1 - m_t)e^{-\delta^*t} dt$$

As with pension wealth, the integration runs from the number of years to retirement, LR , to the number of years when the retiree reaches age 109.¹⁴

pension benefits tended to differ from those based on provider information. However, the latter also calculated that the median values of DB plans from the two sources were quite close (about a 6 percent difference). As a result, for *average* values of pension wealth, employee-provided estimates of expected pension wealth seem to be fairly reliable.

It should also be noted that my definition of DB wealth is based on a so-called “on-going concern” treatment. It is assumed in this that employees continue to work at their place of employment until their expected date of retirement (this is also true for Social Security wealth). The alternative is to use the accrual value in which DB wealth (and Social Security wealth) is valued as of the current year on the basis of work experience *up to that date only*. The accrual method will produce lower values of both DB and Social Security wealth. Indeed, the accrual method and the on-going concern treatment represent two extremes in the valuation of both DB and Social Security wealth. The latter treatment, in particular, relies on the assumptions that (1) the firm or organization remains in existence over time and (2) the employee continues working at the enterprise.

¹³ Separate imputations are performed for husband and wife and an adjustment in the Social Security benefit is made for the surviving spouse. See Section B of the Appendix for details.

¹⁴ As with pension wealth, the mortality rate m_t associated with the year of retirement is the probability of surviving from the current age to the age of retirement.

Here, too, it should be noted that estimates of Social Security wealth are based on reported earnings at a single point in time. These estimates are likely to be inferior to those based on longitudinal work histories of individual workers (see, for example, Smith, Toder, and Iams, 2001, whose estimates are based on actual Social Security work histories.) In fact, actual work histories do show much more variance in earnings over time than one based on a human capital earnings function projection. Moreover, they also show many periods of work disruption that I cannot completely capture here. In contrast, I do have *retrospective* information on work history provided by the respondent (see Part D of the Appendix for details). In particular, each individual is asked to provide data on the total number of years worked full-time since age 18, the number of years worked part-time since age 18, and the expected age of retirement (both from full-time and part-time work). On the basis of this information, it is possible to approximate the total number of full-time and part-time years worked over the individual's lifetime and use these figures in the estimate of the individual's AIME.¹⁵

I can now define the different accounting measures to be used. Let NWX be marketable household wealth excluding DC wealth or “non-pension” wealth. Then:

$$(5) \quad NW = NWX + DC$$

Total pension wealth, PW, is given by:

$$(6) \quad PW = DC + DB$$

Private augmented wealth PAW is then defined as the sum of NWX and total pension wealth:

$$(7) \quad PAW = NWX + PW$$

The term “private augmented wealth” is used to distinguish contributions to wealth from private savings and employment contracts with both private and government employers from those of social insurance provided by the state – notably, Social Security. Augmented household wealth, AW, is given by

$$(8) \quad AW = NWX + PW + SSW.$$

¹⁵ Though I can approximate the *number* of years of full-time and part-time work for a given worker, I can not determine when in his or her work history periods of non-employment occurred.

C. Employer contributions to defined contribution pension plans

To complete the accounting framework, I lastly consider the contributions made by employers to defined contribution pension plans. So far I have treated defined contribution and defined benefit pension wealth (as well as Social Security wealth) on a comparable footing. However, there is an important difference between DC wealth and the other two in their definition. In particular, I define DB wealth as the discounted future stream of DB pension benefits on the assumption that the employee remains at his or her firm of employment until the person's expected retirement date. The computation of Social Security wealth is also based on the assumption that the worker remains at work until the person's expected retirement date. On the other hand, the valuation of DC pension wealth is based solely on the current market value of DC plans. There is no added value in the calculation of DC wealth from the employee remaining at work (until the expected date of retirement).

What if we put DC wealth on an "equal footing" to DB wealth? To do this, we could add in to DC wealth a projection of the future stream of *employer* contributions to DC accounts like 401(k) plans until the expected year of retirement. Luckily, the SCF does provide information on employer contribution to DC plans (see Part E of the Appendix). If we assume, as in the case of DB pensions, that workers remain at their company until retirement and that the terms of their DC contract with their employer stay the same, then it is possible to do this. In most cases, the employer contribution is a fixed percentage of the employee's salary. On the basis of the estimated human capital earnings functions for each worker and the "on-going concern" assumption, it is possible to calculate the present value of the annual stream of future employer contributions to the DC plan until retirement (which I call DCEMP).¹⁶ Adding DCEMP to DC would then put DC wealth on the same footing as DB wealth, since both would reflect the available retirement wealth at time of retirement due to employer contributions to retirement plans.¹⁷

¹⁶ As noted in footnote 11 above, I have opted for "on-going" concern method rather than the accrual method. In the latter method, it is assumed that the worker stops working as of the year of the survey, say 2007. One can then compute the expected DB pension entitlements as of 2007. One can also make such a calculation for social Security wealth.

¹⁷ I do not include future *employee* contributions to DC plans here, since this represents additional savings by the employee in the same vein as investments in other assets like housing, stocks, and bonds. Likewise, I do not provide for a full projection of total wealth accumulation over time. This process would require a household micro-simulation model such as the MINT model that the Urban Institute and the Social Security Administration use (see, for example, Smith, Toder, and Iams, 2001).

This approach also avoids the difficulty of determining whether DC contributions add to net savings over time or not.

The SCF questionnaire indicates how many DC pension plans each spouse has (up to three per spouse).¹⁸ Information on the employer contribution to DC pensions plans is recorded in two ways. First, in some cases, the contribution is given as a flat dollar amount. Though it is not indicated in the survey data whether the dollar contribution is indexed to inflation over time, I assume that it is indexed to the CPI, which seems the more likely arrangement.¹⁹ Let EMPAMT be the dollar amount of the employer contribution to the DC plan. Then, in the case when employer contributions are recorded as a dollar amount, the present value of the stream of future employer contributions, DCEMP_a, is given by:

$$(9a) \quad DCEMP_a = \int_0^{LR} EMPAMT (1 - m_t) e^{-\delta^* t} dt$$

where m_t is the mortality rate at time t conditional on age, gender, and race; and δ^* is the real annual discount rate, set to 2 percent.²⁰ The integration runs from the current year to LR, where RA is the expected age of retirement and $LR = A - RA$ is the number of years to retirement.

Second, in most cases, the employer contribution is given as a percent of earnings. If we assume that the proportion, EMPPER, is fixed over time, then in the case when the respondent records employer contributions as a percent of earnings, DCEMP_b, is given by:

As discussed in Chapter 3, the evidence is rather mixed, with Poterba, Venti, and Wise (2001) concluding that the growth of IRAs and 401(k) plans did not substitute for other forms of household wealth while the work of Engen and Gale (2000) finding that DC plans did not add to net savings but rather substituted for other forms of savings. Moreover, it is also possible that participation in a DB plan might reduce future savings (see, for example, Munnell, 1976, and Kennickell and Sunden, 1999).

Though with the addition of DCEMP to DC wealth, DC wealth now appears comparable to DB wealth, some differences still remain between the two. In particular, there is greater risk associated with DC wealth. The benefit levels in DB plans are already set by the terms of the plans – that is why these are called *defined benefits*. DB wealth depends only on future labor force participation in the company and future earnings. The establishment of the Pension Benefit Guaranty Corporation in 1974 does, at least, insure the pension benefits (up to a fixed amount) in the event of the bankruptcy of a company. In comparison, DC wealth depends not only on future labor force participation and future earnings but also on future employee contributions, future employer contributions, and future rates of return. Indeed, the stock market experience of the 2000 to 2003 period and of the 2007 to 2009 period shows how difficult it would have been to project the future value of DC wealth even over these short periods. DB benefits are more certain than DC benefits. Indeed, the shifting of the risk from employer to employee is one of the reasons behind the rise of DC plans (see Wolff, 2007c, for a discussion of this issue).

¹⁸ The SCF records DC plans only for the main job of each respondent. No information on DC plans is provided for secondary employment. This does not appear to be a significant problem because in 2001, 99.4 percent of the total labor earnings of the head and 98.8 percent of that of the spouse came from the person's primary job.

¹⁹ This will, if anything, bias upward the estimated employer contribution to the DC pension plan

²⁰ It should be noted that past employer contributions to DC plans are already included in the current market value of DC wealth.

$$(9b) \quad DCEMP_b = \int_0^{LR} EMPPER \cdot E^*_t (1 - m_t) e^{-\delta^* t} dt$$

where E^*_t is the predicted earnings of the worker at time t in constant dollars (see Part C of the Appendix for details).

The basic accounting framework can then be modified as follows:

$$DCEMP = DCEMP_a + DCEMP_b.$$

$$DC^* = DC + DCEMP.$$

$$(6') \quad PW^* = DB + DC^*.$$

$$(7') \quad PAW^* = NWX + PW^*.$$

$$(8') \quad AW^* = NWX + PW^* + SSW.$$

D. Future tax liability on pension wealth

I have so far applied a pre-tax valuation to pension wealth. However, as many of us are painfully aware, contributions to defined contribution plans are tax sheltered or tax deferred when they are made but subject to income tax on withdrawal.²¹ As a result, their post-tax value is lower (and usually quite a bit lower) than their stated (pre-tax) market value. In contrast, most other assets in the household portfolio, such as mutual funds, are not subject to income taxes on withdrawal. As a result, when we include the market value of defined contribution plans as a part of net worth, we are adding an asset with a tax liability attached to it to other assets which do not have this liability.

As a result, in principle, the post-tax value of defined contribution plans should be used when computing net worth. Likewise, defined benefit pension benefits (and lump-sum distributions) are taxable on receipt, so that, in principle, the post-tax value of DB pension wealth should also be used instead of its pre-tax value when computing total pension wealth.²²

I make a somewhat rough adjustment to the values of defined benefit and defined contribution pension wealth for future taxes on income receipt. In principle, to make a proper calculation we would have to predict future income (and its composition), future tax deductions and

²¹ The exception is Roth IRAs, which are not subject to income taxes on withdrawal.

²² Two other taxes associated with wealth holdings are (1) capital gains tax on the sale of an asset and (2) estate tax liability on inheritances. Neither defined contribution nor defined benefit pension wealth are saleable so that a capital gains tax would not apply to these assets. On the other hand, estate tax liability would apply to all asset components of net worth, including defined contribution wealth, though not generally to defined benefit pension wealth. (The exception would be lump-sum distributions from DB plans, which is a relatively small amount – only 2.7 percent of total DB wealth in 2001, for example). It is beyond the scope of this chapter to adjust wealth holdings for capital gains or estate taxes. See Poterba (2004) for further discussion of the tax treatment of retirement savings.

exemptions, and the future tax schedule as well at retirement. For simplicity, I assume that for current workers income at retirement equals 80 percent of the pre-retirement income.²³ In the case of current beneficiaries, I assume that their (post-retirement) income remains fixed over their remaining life. I assume that marital status remains unchanged and that couples file joint returns. I assume that the tax schedule remains fixed over the remaining lifetime of the individual.²⁴ I also treat the taxation of social security benefits according to the tax code current at the time of the survey.²⁵ Note that all estimates of pension and social security wealth shown in the subsequent tables are pre-tax *unless otherwise specified*.

4. Trends in Standard Measures of Household Wealth

A. Background and Summary of Principal Findings

It is useful to begin the paper with a presentation of wealth trends based on the standard definition of wealth. This will serve as a backdrop for the rest of the paper. In particular, we will see how the basic findings on wealth trends change when we include retirement wealth in the definition of household wealth. Moreover, we will be able to see some of the reasons for the plunge in wealth during the “Great Recession” of 2007-2009.

The 1990s witnessed some remarkable events. The stock market boomed. On the basis of the Standard & Poor (S&P) 500 index, stock prices surged 171 percent between 1989 and 2001. Stock ownership spread and by 2001 over half of U.S. households owned stock either directly or indirectly. Real wages, after stagnating for many years, finally grew in the late 1990s. According to BLS figures, real mean hourly earnings gained 8.3 percent between 1995 and 2001.²⁶

²³ The 80 percent figure is a typical replacement rate. I also use adjusted gross income (AGI) as the income concept, which is provided in the SCF data. The use of a higher replacement rate (say 90 percent) would increase the marginal tax rate paid by the household and therefore reduce the estimated value of after-tax pension wealth, Social Security wealth, retirement wealth, and augmented wealth.

²⁴ I also assume that families take the standard deduction and that the number of exemptions is two for singles and four for married couples (this includes the extra exemption for being 65 years of age or over). Moreover, it is assumed that tax exemptions and the standard deduction are fixed in value over time. The latter assumption is plausible since both exemptions and the standard deduction are indexed for inflation.

²⁵ In 1989, 2001, and 2007, Social Security benefits were subject to income tax only if AGI excluding Social Security benefits was greater than \$32,000 for a married couple filing jointly and \$25,000 for singles or couples filing separately. Otherwise, 15 percent of Social Security benefits is excluded from taxable income. In 1983, there was no tax on social security benefits.

²⁶ These figures are based on the Bureau of Labor Statistics (BLS) hourly wage series. The source is Table B-47 of the Economic Report, available at <http://www.gpoaccess.gov/eop/tables09.html>. The BLS wage figures are converted to constant dollars on the basis of the Consumer Price Index (CPI-U).

However, 2001 saw a recession (albeit a short one). Moreover, the stock market peaked in 2000 and dropped steeply from 2000 to 2003 but recovered in 2004, so that between 2001 and 2004 the S&P 500 was down by “only” 12 percent in real terms.²⁷ Real wages rose very slowly from 2001 to 2004, with the BLS real mean hourly earnings up by only 1.5 percent, and median household income dropped in real terms by 1.5 percent.²⁸ On the other hand, housing prices rose steeply. The median sales price of existing one-family homes rose by 18 percent in real terms nationwide.²⁹ The other big story was household debt, particularly that of the middle class, which skyrocketed during these years, as we shall see below.

From 2004 to 2007, the stock market rebounded. The S&P 500 rose 19 percent in real terms. Over the period from 2001 to 2007, the S&P 500 was up 6 percent in real terms. Real wages remained stagnant, with the BLS real mean hourly earnings rising by only 1.0 percent. Median household income in real terms showed some growth over this period, rising by 3.2 percent. From 2001 to 2007 it gained 1.6 percent. From 2004 to 2007 housing prices slowed, with the median sales price of existing one-family nationwide advancing only 1.7 percent over these years in real terms. Over the years 2001 to 2007 real housing prices gained 19 percent.

I find that median net worth, the wealth of the average household, demonstrated robust growth over the years from 1983 to 2007. In fact, the growth rate of median wealth accelerated from the 1980s to the 1990s and into the 2001-2007 period. However, the gains of the 2001-2007 period were based largely on rising home prices financed by increasing mortgage debt. This growth came to an abrupt end in 2007 with the collapse in home prices, and median wealth plummeted from 2007 through 2009.

Household wealth inequality increased sharply between 1983 and 1989. However, in a surprising development, this was followed by a period of almost no change in household wealth inequality from 1989 to 2007. This trend was surprising because the two factors normally

²⁷ The source is Table B-96 of the *Economic Report of the President, 2009*, available at <http://www.gpoaccess.gov/eop/tables09.html>.

²⁸ The source is Table B-33 of the *Economic Report of the President, 2009*, available at <http://www.gpoaccess.gov/eop/tables09.html>. The Census Bureau uses the newer CPI-U-RS series to convert to constant dollars. However, for this period, there is virtually no difference between the CPI-U and the CPI-U-RS.

²⁹ The source is Table 935 of the *2009 Statistical Abstract*, US Bureau of the Census, available at [<http://www.census.gov/compendia/statab/>].

associated with wealth inequality, income inequality and the ratio of stock prices to home prices, both showed a marked rise over the same years, 1989 to 2007.

There was a striking shift in the portfolio composition of household wealth out of liquid assets like savings accounts and money market funds and into defined contribution pension accounts over the years from 1983 to 2007, though particularly from 1989 to 2001. There was also a noticeable expansion of stock ownership from 1989 to 2001 but this was followed by a mild contraction between 2001 and 2007. Defined contribution pension accounts, moreover, became more heavily invested in equities, making them vulnerable to the stock market downturn of 2007 to 2009.

Despite the buoyant economy over the 1980s and 1990s, overall indebtedness continued to rise among American families and then skyrocketed in the early and mid 2000s. Among the middle class, the debt-income ratio reached its highest level in 24 years. The high level of indebtedness made the middle class particularly vulnerable to the collapse of the housing market at the end of the decade of the 2000s.

B. General Wealth Trends

Table 1 documents a robust growth in wealth during the 1990s. After rising by 7 percent between 1983 and 1989, median wealth (the wealth of the household in the middle of the distribution) was 16 percent greater in 2001 than in 1989. As a result, median wealth grew slightly faster between 1989 and 2001, 1.3 percent per year, than between 1983 and 1989, at 1.1 percent per year. However, between 2001 and 2007, median wealth grew even faster, by 19 percent overall or 2.9 percent per year. Most of the increase (63 percent) in median net worth emanated from the pronounced rise in home prices

Mean net worth also showed a sharp increase from 1983 to 1989 of 15 percent and then, buoyed largely by rising stock prices, another surge of 44 percent to 2001. There was an additional rise of 20 percent in 2007. Overall, its 2007 value was almost double its value in 1983 and about three quarters larger than in 1989. Mean wealth grew quite a bit faster between 1989 and 2001, at 3.0 percent per year, than from 1983 to 1989, at 2.3 percent per year. There was then a slight increase in wealth growth from 2001 to 2007 to 3.1 percent per year. This modest acceleration was due largely to the rapid increase in housing prices of 19 percent in real terms over the six years counterbalanced by the reduced growth in stock prices between 2001 and 2007 in comparison to 1989 to 2001, and to the fact that housing comprised 28 percent and (total) stocks made up 25

percent of total assets in 2001. Another point of note is that mean wealth grew about twice as fast as the median between 1983 and 2007, indicating widening inequality of wealth over these years.

Median household income (based on Current Population Survey data), after gaining 11 percent between 1983 and 1989, grew by only 2.3 percent (in total) from 1989 to 2001 and by another 1.6 percent between 2001 and 2007, for a net change of 16 percent from 1983 to 2007. In contrast, mean income rose by 16 percent from 1983 to 1989, by another 12 percent from 1989 to 2001, then fell by 0.8 percent from 2001 to 2007, for a total change of 28 percent from 1983 to 2007. Between 1983 and 2007, mean income grew about twice as fast as median income.

In sum, while household income virtually stagnated for the average American household over the 1990s and 2000s, median net worth grew strongly over this period. In the 2000s, in particular, mean and median income changed very little while mean and median net worth grew.

The figures in Table 2 also show that wealth inequality, after rising steeply between 1983 and 1989, remained virtually unchanged from 1989 to 2007. The share of wealth held by the top 1 percent rose by 3.6 percentage points from 1983 to 1989 and the Gini coefficient increased from 0.80 to 0.83. Between 1989 and 2007, the share of the top percentile actually declined sharply, from 37.4 to 34.6 percent, though this was more than compensated for by an increase in the share of the next four percentiles. As a result, the share of the top five percent increased from 58.9 percent in 1989 to 61.8 percent in 2007, and the share of the top quintile rose from 83.5 to 85.0 percent. The share of the fourth and middle quintiles each declined by about a percentage point from 1989 to 2007, while that of the bottom 40 percent increased by almost one percentage point. Overall, the Gini coefficient was virtually unchanged -- 0.832 in 1989 and 0.834 in 2007.³⁰

The top 1 percent of families (as ranked by income on the basis of the SCF data) earned 21 percent of total household income in 2006 and the top 20 percent accounted for 61 percent -- large figures but lower than the corresponding wealth shares.³¹ The time trend for income inequality also contrasts with that for net worth. Income inequality increased sharply between 1982 and 1988, with the Gini coefficient rising from 0.48 to 0.52 and the share of the top one percent from 12.8 to 16.6 percent. There was again a pronounced increase in income inequality between

³⁰ Kopczuk and Saez (2004), using U.S. estate tax data from 1916 to 2000, also find very little change in the shares of wealth held by the top wealth groups in the 1990s. Indeed, they find very little change in the 1980s as well. The share of the top one percent was 21.1 percent in 1983 and 20.8 percent in 2000.

³¹ It should be noted that the income in each survey year (say 2007) is for the preceding year (2006 in this case).

1988 and 2000, with the share of the top one percent rising from 16.6 to 20.0 percent, that of the top quintile from 55.6 to 58.6 percent, and the Gini coefficient from 0.52 to 0.56.³²

The years between 2000 and 2006 saw a slight abatement in the rise of income inequality. Over these years, the Gini coefficient for income rose 0.56 to 0.57, the share of the top one percent from 20.0 to 21.3 percent, and that of the top quintile from 15.2 to 15.9 percent. All in all, the 2000s witnessed a moderate increase in income inequality and a very slight rise in wealth inequality.³³

C. Household Portfolios

The portfolio composition of household wealth shows the forms in which households save. This aspect is important when we try to understand how wealth changes over time and the exposure to household wealth to asset price changes. In 2007, owner-occupied housing was the most important household asset in the breakdown shown in Table 3, accounting for 33 percent of total assets. However, net home equity -- the value of the house minus any outstanding mortgage -- amounted to only 21 percent of total assets. Real estate, other than owner-occupied housing, comprised 11 percent, and business equity another 20 percent.

Demand deposits, time deposits, money market funds, CDs, and the cash surrender value of life insurance made up 7 percent and pension accounts 12 percent. Bonds and other financial securities amounted to 2 percent; corporate stock, including mutual funds, to 12 percent; and trust equity to 2 percent. Debt as a proportion of gross assets was 15 percent, and the debt-equity ratio (the ratio of total household debt to net worth) was 0.18.

³² The SCF data show a much higher level of income inequality than the CPS data. In the year 2000, for example, the CPS data show a share of the top *five* percent of 22.1 percent and a Gini coefficient of 0.462. The difference is primarily due to three factors. First, the SCF oversamples the rich (as noted above), while the CPS is a representative sample. Second, the CPS data are top-coded (that is, there is an open-ended interval at the top, typically at \$75,000 or \$100,000), whereas the SCF data are not. Third, the income concepts differ between the two samples. In particular, the SCF income definition includes realized capital gains whereas the CPS definition does not. However, the CPS data also show a large increase of inequality between 1989 and 2000, with the share of the top five percent rising from 18.9 to 22.1 percent and the Gini coefficient from 0.431 to 0.462. Further analysis of the difference in income figures between the two surveys is beyond the scope of this paper.

³³ The slight rise in wealth inequality between 2001 and 2007 appears due to two offsetting effects. As shown in my previous work (Wolff, 2002a), wealth inequality is positively related to both income inequality and the ratio of stock prices to house prices (also see Section 8 below). Between 2001 and 2007, the Gini coefficient for household income, as noted above, rose modestly from 0.562 to 0.574 while the ratio of the Standard & Poor 500 stock index to the median sales price of existing one-family homes fell from 8.1 to 7.1. These two effects generally offset each other, resulting in a small rise in wealth inequality.

There have been some notable changes in the composition of household wealth over the period between 1983 and 2007. From the point of view of this work, the most important is the pronounced growth of defined contribution pension accounts, which rose moderately from 1.5 percent of total assets in 1983 to 2.9 percent in 1989 and then shot up to 12 percent in 2001, where it remained in 2007. This increase largely offset the decline in the share of liquid assets in total assets, from 17 percent in 1983 to 7 percent in 2007, so that it is reasonable to conclude that households have to a large extent substituted tax-deferred defined contribution pension accounts for taxable savings deposits.

A second notable change is that the share of (gross) housing wealth in total assets, after fluctuating between 28 and 30 percent from 1983 to 2001, jumped to 33 percent in 2007. There were two factors behind this. The first is the rise in the homeownership rate, which, according to the SCF data, climbed from 63 percent in 1983 to 69 percent in 2007. The second is the sharp rise in housing prices, noted above. Between 2001 and 2007, the median house price for existing one-family homes rose by 19 percent in real terms. The rise in housing prices by itself would have caused the share of housing in total assets to rise by 5.3 percentage points, compared to the actual increase of 4.6 percentage points.

A third and related trend is that net equity in owner-occupied housing (the difference between the market value and outstanding mortgages on the property), after falling from 24 percent in 1983 to 19 percent in 2001, picked up to 21 percent in 2007. The difference between the two series (gross versus net housing values as a share of total assets) is attributable to the changing magnitude of mortgage debt on homeowner's property, which increased from 21 percent in 1983 to 35 percent in 2007. Moreover, mortgage debt on principal residence climbed from 9.4 to 11.4 percent of total assets between 2001 and 2007. The fact that net home equity as a proportion of assets increased between 2001 and 2007 reflected the strong gains in real estate values over these years.

Fourth, the debt-equity ratio fell slightly from 15 percent in 1983 to 14 percent in 2001. However, it then jumped to 18 percent in 2007. In contrast, the ratio of debt to total income increased from 68 percent in 1983 to 81 percent in 2001 and then skyrocketed to 119 percent in 2007, its high for this period. If mortgage debt on principal residence is excluded, then the ratio of other debt to total assets fell off from 6.8 percent in 1983 to 3.9 percent in 2007. One implication is

that over the 1990s and 2000s families used tax-sheltered mortgages and home equity loans rather than consumer loans and other forms of consumer debt to finance consumption.

Fifth, the share of corporate stock and mutual funds in total assets rose rather briskly from 9 percent in 1983 to 15 percent in 2001 before plummeting to 12 percent in 2007. If we include the value of stocks indirectly owned through mutual funds, trusts, IRAs, 401(k) plans, and other retirement accounts, then the value of total stocks owned as a share of total assets more than doubled from 11 percent in 1983 to 25 percent in 2001 and then tumbled to 17 percent in 2007. The rise during the 1990s reflected the bull market in corporate equities as well as increased stock ownership, while the decline in the 2000s was a result of the relatively small rise in the stock market over this period (particularly relative to housing prices) as well as a drop in stock ownership. The change in stock prices by itself would have caused the share of total stocks in assets to rise by 1.4 percentage points between 2001 and 2007, compared to the actual decline of 7.6 percentage points. The decline in the share of stocks in total assets was due to sales of stocks and withdrawals from stock funds.

The tabulation in Table 3 provides a picture of the average holdings of all families in the economy, but there are marked class differences in how middle-class families and the rich invest their wealth. These differences in portfolio composition are important because they affect how wealth changes over time for different parts of the wealth distribution and thus how overall wealth inequality develops.

As shown in Table 4, the richest one percent of households (as ranked by wealth) invested over three quarters of their savings in investment real estate, businesses, corporate stock, and financial securities in 2007. Corporate stocks, either directly owned by the households or indirectly owned through mutual funds, trust accounts, or various pension accounts, comprised 21 percent by themselves. Housing accounted for only 10 percent of their wealth (and net equity in housing only 9 percent), liquid assets another 5 percent, and pension accounts another 6 percent. Their ratio of debt to net worth was only 3 percent, their ratio of debt to income was 39 percent, and the ratio of mortgage debt to house value was 15 percent.

Among the next richest 19 percent of U.S. households, housing comprised 32 percent of their total assets (and net home equity 24 percent), liquid assets another 7 percent, and pension assets 16 percent. Forty-four percent of their assets took the form of investment assets -- real estate, business equity, stocks, and bonds -- and 19 percent was in the form of stocks directly or indirectly

owned. Debt amounted to 12 percent of their net worth and 110 percent of their income, and the ratio of mortgage debt to house value was 26 percent.

In contrast, almost two thirds of the wealth of the middle three wealth quintiles of households was invested in their own home in 2007. However, home equity amounted to only 35 percent of total assets, a reflection of their large mortgage debt. Another 21 percent went into monetary savings of one form or another and pension accounts. Together housing, liquid assets, and pension assets accounted for 86 percent of the total assets of the middle class. The remainder was about evenly split among non-home real estate, business equity, and various financial securities and corporate stock. Stocks directly or indirectly owned amounted to only 7 percent of their total assets. The ratio of debt to net worth was 61 percent, substantially higher than for the richest 20 percent, and their ratio of debt to income was 157 percent, also much higher than the top quintile. Finally, their mortgage debt amounted to almost half the value of their principal residences.

Table 5 compares the wealth composition of the three wealth classes in 1983 and 2007. There is remarkable stability in the composition of wealth by wealth class between 1983 and 2007. The most notable exception is a substitution of pension assets for liquid assets -- a transition that occurred for all three wealth classes but that was particularly marked for percentiles 80-99 and for the middle three quintiles. The debt-equity ratio actually fell for the top one percent from 1983 to 2007, as did the debt-income ratio. The debt-income ratio increased slightly for the next 19 percent, while the debt-income ratio rose sharply, from 73 to 110 percent.

Among the middle three wealth quintiles, pension accounts rose as a share of total assets by almost 12 percentage points (and the proportion of households with a pension account surged by 41 percentage points) from 1983 to 2007 while liquid assets declined as a share by 14 percentage points. This set of changes paralleled that of all households. The share of all stocks in total assets mushroomed from 2.4 percent in 1983 to 13 percent in 2001 and then fell off to 7 percent in 2007 as stock prices stagnated.

Changes in debt, however, were much more dramatic. There was a sharp rise in the debt-equity ratio of the middle class from 37 percent in 1983 to 61 percent in 2007. The rise was much steeper than at the aggregate level. The debt to income ratio skyrocketed over this period, more than doubling. Here, too, much of the increase happened between 2001 and 2007. Moreover, the increase was much steeper than in the aggregate. In fact, in 1983, the debt to income ratio was

about the same for middle class as for all households but by 2007 the ratio was much larger. As for all households, net home equity as a percentage of total assets fell for the middle class from 1983 to 2007 and mortgage debt as a proportion of house value rose. Middle class households were using their homes as a virtual “ATM machine,” withdrawing equity to sustain their normal consumption.

The rising indebtedness of the middle class, particularly in the form of mortgage debt, made it very vulnerable to the home price collapse of 2007-2009. As we shall see below, there was a large reduction in median wealth over this period, as well as a substantial increase in the share of homeowners whose mortgage debt was greater than their home values (so-called “underwater”). Though the rich were more heavily invested in stocks than the middle class, stocks did not constitute nearly as high a percentage of their wealth as homes did for the middle class, and the stock market meltdown of 2007-2009 did not hurt the rich as much as the home price collapse hurt the middle class.

5. Pension Wealth

Table 5 highlights trends in pension coverage over the 1983-2001 period. In this and the subsequent tables, it should be noted that the unit of observation is the household, not the individual worker. Moreover, I have focused on age group 46-64 (“middle-aged households”) since this is the age group most affected by the transformation of the pension system.³⁴

The picture that unfolds is a precipitous drop in DB coverage largely compensated by a sizeable increase in DC coverage. Moreover, while mean pension wealth gained rapidly in the 1990s, its growth slowed down considerably in the 2000s.

The share of all households with DC pension accounts skyrocketed over the years 1983 to 2001 period, from 11 to 52 percent, or by 41 percentage points. The story is very similar for the middle-aged group, with the proportion holding pension accounts advancing by 50 percentage points. Most of the gains occurred after 1989. The picture changes during the 2000s. Among all

³⁴ Data for the youngest (under 46) group are the most problematic, since estimates of both DB pension wealth and social security wealth depend on projecting future work life and, in the case of the former, future job tenure with the same employer. Data for retirees are the most secure since both pension and Social Security benefit levels are already determined. Estimates of both DB and social security wealth for the middle-aged group lie in between in terms of reliability. Individuals close to retirement have a fairly good idea of their expected age of retirement and have a high likelihood of remaining with their current employer (see Farber, 2001, for some evidence). Also, as noted above, calculations of pension and Social Security wealth were not performed for individuals under the age of 40 in the 1983 SCF. As a consequence, for 1983, I show results only for age group 47 to 64.

households, there is virtually no change in the DC coverage rate. For the middle age group, there was a slight increase of 2 percentage points.

Trends are also different for defined benefit (DB) pension wealth. The share of all households with DB pension wealth fell by 11 percentage points between 1989 and 2001. Among households in age group 47-64, the decline was about the same, 12 percentage points. However, the fall was even more precipitous -- by 24 percentage points -- from 1983 to 2001. Most of the loss in coverage again occurred after 1989. The trend moderated after 2001. Among middle age households, the share was down by another 6.5 percentage points by 2007.

The percentage of all households covered by either a DC or a DB plan increased from 56 to 66 percent between 1989 and 2001. Among the 47-64 age group, the proportion rose by 8 percentage points. However, comparing 2001 to 1983 shows a smaller rise in pension coverage among the 47-64 age group (6 percentage points). The story once again changes from 2001 to 2007. The share of households with some form of pension coverage actually declined by 1.4 percentage points. Among the middle aged, the fall was 1.8 percentage points.

As shown in Table 7, there were huge increases in the average holdings of DC pension accounts. Among all households, the average value of these accounts increased almost fourteen-fold between 1983 and 2001, to \$52,800 (all dollar figures are in 2007 dollars, unless otherwise noted.) Among age group 47-64 the gain was by a factor of 12. The rise in DC wealth slowed down from 2001 to 2007. Among all households, mean DC wealth increased by (only) 22 percent and middle-aged households saw their mean DC wealth increase by 18 percent.

Opposite trends are again evident for DB pension wealth. Among all households, the mean value rose by only 3 percent between 1989 and 2001. However, losses occurred for age group 47-64, down by 1.4 percent. The years 2001 to 2007 saw continued slow growth in DB pension wealth. Among all households, it rose by 5.5 percent, while among middle-aged households mean DB fell by 7.5 percent.

Did the spread of DC type pension plans adequately compensated for the decline in traditional DB pension coverage? Average pension wealth PW (the sum of DC and DB pensions) climbed by 80 percent among all households between 1989 and 2001 and by 76 percent among those in age group 47 to 64. The growth in pension wealth slowed down markedly from 2001 to

2007. Mean PW among all households rose by 14 percent, compared to an 80 percent gain during the 1980s. It inched up by only 6 percent among middle-aged ones.³⁵

Gains generally look stronger when DCEMP is included. In 2001, the average value of DCEMP among age group 47-64 was \$36,100, or 32 percent of DC, and \$34,300 among all households, or 55 percent of mean DC. In 1989, the corresponding ratios are greater – 0.66 and 1.79, respectively. The higher ratios in 1989 reflect the lower accumulations of DC in that year compared to 2001 (the absolute value in DCEMP is much greater in 2001 than in 1989). In 2007, the mean value of DCEMP was \$37,700 among age group 47 to 64, slightly larger than in 2001, and \$29,900 among all households, actually lower than in 2001. The change from 2001 to 2007 reflects lower contributions to DC plans by employers and, for some firms, the termination of employer contributions. By 2007, the ratio of DCEMP to DC had fallen to 28 percent among age group 47 to 64 and to 39 percent among all households.

The addition of DCEMP augmented the mean value of PW by 17 percent among middle-aged households in 2001 and by 28 percent among all households. The corresponding figures in 1989 are 11 and 28 percent, respectively. The addition of DCEMP, not surprisingly, generally enhances the growth of mean pension wealth between 1983 and 2001. The mean value of DC* (the sum of DC and DCEMP) rose by a factor of 15 between 1983 and 2001 both among age group 47-64 and among all households and by a factor of 4.4 among age group 47-64 and 3.3 among all households from 1989 to 2001. Mean PW* (the sum of DB and DC*) increased by 147 percent over the 1983-2001 period among age group 47-64 (compared to a 113 percent gain in PW) and rose by 80 percent from 1989 to 2001 among all households (compared to 80 percent in PW). The situation is different over the 2000s. In 2007, the inclusion of DCEMP enhanced the mean value of PW by 17 percent among middle-aged households, exactly the same as in 2001, and by 22 percent among all households, lower than the 28 percent in 2001. As a result, mean PW* gained 6.1 percent from 2001 to 2007 among age class 47-64, slightly lower than the growth of mean PW, and expanded 8.3 percent among all households, compared to a 14.2 percent rise in PW.

Are trends different for net (after-tax) pension wealth? It is first of note that in 2007 the average tax rate on pension wealth was 11.8 percent among all households and that on Social Security wealth was 9.4 percent. The mean tax rate on pension wealth fell from 15.5 percent in

³⁵ Median pension values are strongly affected by the share of households with pension wealth and, as a result, are not shown here.

1983 to 11.8 percent in 1989, rose a bit to 13.4 percent in 2001 and then fell off again to 11.8 percent in 2007. In contrast, the mean tax rate of Social Security wealth rose from zero in 1983 to 6.0 percent in 1989 and then to 9.8 percent in 2001 before falling slightly to 9.4 percent in 2007.

The projected future tax liability on pension wealth took a large chunk out of pension wealth. The average net value of pension wealth (that is, net of expected taxes on receipt) among all households was 80 percent of its gross average value in 1989 and 79 percent in 2007. Future tax liabilities took a smaller bite out of Social Security wealth. The average net value of retirement wealth was 87 percent of its gross average value in 1989 and 84 percent in 2007. Federal income taxes took about the same bite out of expected retirement benefits in 2007 as in 1989.

As a result, while the mean value of gross pension wealth PW* (including DCEMP) among households in age group 47 to 64 grew by 162 percent between 1983 and 2001, its net value increased by 134 percent. Among all households, the gross value of PW* gained 80 percent from 1989 to 2001, and its net value rose by 74 percent. In contrast, from 2001 to 2007 net PW* grew somewhat faster than PW*. However, as with gross pension wealth PW*, there is a marked slowdown in the growth of net pension wealth PW* between the two sub-periods, 1989-2001 and 2001-2007. The growth in mean net PW* fell off from 67 to 8 percent among age class 47-64, and from 74 to 16 percent among all households.

With the transition in the pension system, has the inequality of pension wealth increased or declined? We will see that pension inequality among DC plan holders is considerably greater than that among DB plan holders. As a result, the transition to DC plans raised overall pension inequality. This was true despite a decline in inequality in both DC wealth and DB wealth by themselves.

Table 8 records the inequality of pension wealth among *pension holders only* within age group. The inequality of holdings of DC accounts generally declined over the years from 1989 (or 1983) and 2007. This was true among all DC pension holders and middle-aged ones as well. The drop in the Gini coefficient from 1989 to 2007 was 0.022 among all households and 0.045 among middle-aged ones. Despite the reduction of inequality in DC wealth, the level of inequality in DC pension wealth was still very high in 2007. The Gini coefficient among all DC pension account holders was 0.728 in 2007. This compares to a Gini coefficient for net worth of 0.834. The inequality of DB wealth also fell over these years. The Gini coefficient for DB wealth among all

households who held DB plans fell by 0.058 points among all households from 1989 to 2007 and by 0.018 among middle-aged ones.

However, when we consider total pension wealth, we find just the opposite story despite the declines in both DC and DB wealth inequality. Pension wealth inequality overall increased by 0.020 Gini points among all pension holders from 1989 to 2007 and by 0.039 Gini points among middle-aged ones. On the surface, these results may appear rather paradoxical. However, the explanation emanates from the fact DC wealth inequality is considerably higher than DB wealth inequality. In 2007, for example, the Gini coefficient for DC wealth among all households with DC plans was 0.728, compared to only 0.549 for DB plan holders. A similar difference exists among middle-aged pension holders.

Not surprisingly, the switchover from DB pension plans to DC pension plans resulted in a rise in overall pension wealth inequality. Among middle-aged pension holders, the rise was very striking, 0.093 Gini points from 1983 to 2007. The reason is that the Gini coefficient for the sum of DB and DC wealth is equal to a weighted sum of the Gini coefficients for DC and DC individually (plus an interaction term), where the weight is equal to the share of each component in total pension wealth. The rising share of DC wealth in total pension wealth over time, from 1989 to 2007, thus led to a rise in the Gini coefficient in overall pension wealth, despite the fact that the Gini coefficient for both DC wealth and DB wealth declined over time individually.³⁶

When we extend the sample to *all* middle-aged households (including non-pension holders), the increase in PW inequality is less marked, an increase of the Gini coefficient of 0.050 from 1983 to 2007 compared to 0.093 for pension holders only. The major difference stems from the 1989-2001 period when PW inequality among all middle aged households grew appreciably less than among pension holders in this age group (the increase in the Gini coefficient was virtually the same during the 1983-1989 period). The difference for the 1989-2001 period reflects the relatively large increase in the share of middle-aged households with pension wealth (8.4 percentage points).

³⁶ This relationship can, perhaps, be seen most clearly by a decomposition of the coefficient of variation. As derived in Wolff (1987), for any variable $X = X_1 + X_2$,

$$CV^2(X) = p_1^2 CV^2(X_1) + p_2^2 CV^2(X_2) + 2CC(X_1, X_2)$$

where CV is the coefficient of variation (the ratio of the standard deviation to the mean), CC is the coefficient of covariation, defined as the ratio of the covariance to X^2 , $p_1 = X_1/X$, and $p_2 = X_2/X$. The interaction term principally reflects the correlation coefficient between DC and DB wealth. The correlation coefficient also rose over time (from 0.07 in 1989 to 0.024 in 2007 among all households). As a result, the rising interaction term also made a positive (albeit small) contribution to the growth in overall pension wealth inequality.

Among all households, the same pattern holds, with a slight decline in PW inequality over the 1989-2007 period (compared to a 0.020 increase among pension holders). This difference also reflects the large increase in the share of households with pension plans between 1989 and 2001 (a 9.6 percentage point gain).

The results are quite similar when we consider the other measures of pension wealth. It is first of interest that adding employer contributions, DCEMP, reduces overall pension wealth inequality (from a Gini coefficient of 0.783 to 0.758 among all households in 2007 and from 0.716 to 0.706 among middle-aged households). The reason is that DCEMP is distributed more equally than pension wealth PW (excluding DCEMP). The equalizing effect of DCEMP on pension wealth PW* is offset to a modest extent by the fact that the correlation of DCEMP and standard pension wealth PW is positive though quite low (0.21 among all households in 2007). Thus, the addition of DCEMP to standard pension wealth PW tends to even out the distribution of PW* among households.

However, we still find that the inequality of pension wealth PW* among middle-aged households still rose over the years 1983 to 2007 (the Gini coefficient increased by 0.050), though it was down among all households between 1989 and 2007.

Netting out the implicit taxes on pension wealth reduces measured pension wealth inequality among middle-aged households (the Gini coefficient lessens by 0.015 in 1983, 0.017 in 1989, 0.020 in 2001, and 0.021 in 2007), but the Gini coefficient for net PW* increased by 0.044 from 1983 to 2007, about the same as (gross) PW*. Among all households, the effect of netting out implicit taxes on pension wealth reduces measured inequality in 1989, 2001, and 2007. However, as with PW*, there is a reduction in net PW* inequality over the period.

Figures 1a and 1b provide further details on the change in the distribution of pension wealth among middle-aged households over the 1989-2001 and 2001-2007 periods. There were large gains in pension wealth over the 1989 to 2001 period at all percentiles, reflecting the increase in the share of households with a pension plan and the rising value of PW. However, the overall pattern is U-shaped. The percentage gain declined from 139 percent at the 40th percentile to 49 percent at the 60th percentile and then increased to 139 percent at the 99th percentile. These results illustrate that the largest growth of pension wealth occurred at both the bottom and the top of the pension wealth distribution. As a result, overall pension wealth inequality remained almost unchanged over these years. From 2001 to 2007, PW showed much more modest gains at all percentiles (from about 7 to

15 percent). These results too accord with the finding that the Gini coefficient for PW changed very little over this period.

6. Trends in Private Augmented Wealth (PAW)

How has the radical makeover of the retirement system affected trends in both the level and the inequality of private augmented wealth, PAW? Recall from Section 3 that PAW is defined as the sum of net worth, NW, and DB. It thus represents the resources available to households for retirement from private sources -- their own wealth accumulations and private (as opposed to public) pension funds. The results indicate that with the dismantling of the defined benefit pension system, private augmented wealth generally grew slower than household net worth. Moreover, inequality in the distribution of private augmented wealth increased more than that of net worth.

As noted in Section 4, there was very strong growth in net worth during the 1990s and 2000s. Mean net worth rose by 73 percent from 1983 to 2007, while the median increased by 38 percent.³⁷ When DB wealth is added to NW to obtain PAW, I find that its mean value was up by 63 percent between 1989 and 2007, lower than that of net worth, while its median value increased by 25 percent, again slower than that of net worth (see Table 9). The differences reflect the much slower growth in the value of DB plans over these years. The pattern is repeated among middle-aged households among whom mean PAW rose by 52 percent from 1983 to 2007, compared to a 60 percent increase in net worth, whereas median PAW was up by 16 percent, compared to a 27 percent gain in median net worth.

Generally speaking, households fared worse in terms of private augmented wealth than in terms of conventional net worth between 1989 and 2007. This finding indicates that the explosive growth of DC plans after 1989 did not fully compensate for the collapse of DB plans at least in terms of the growth of household wealth.

³⁷ When I exclude DC wealth to obtain NWX, I find that mean NWX rose by a lesser amount from 1989 to 2007, 54 percent, while median NWX was up by only 6 percent. It is at once clear how important DC plans were to the growth of net worth. This is not to say, of course, that households would not have accumulated wealth in alternative instruments in the absence of the existence of DC plans. However, the accumulations were likely to have been less for two reasons. First, savings in DC plans are tax-sheltered, which means that they accumulate at a higher rate in DC plans, *ceteris paribus*, than in taxable investments. Second, the value of employer provided DC plans, like 401(k)s, also incorporates the contributions made by employers. Employer contributions would not likely have occurred in alternative investments. A comparison of trends in NW with those in NWX suggests that households substituted savings in 401(k) and other DC plans for other forms of private savings. This result is in accord with the findings of Gale and of Engelhardt and Kumar (see Section 2 for a review of the pertinent literature).

The addition of DCEMP in 2007 increased the mean value of PAW by 5 percent among all households and by 4 percent among age group 47 to 64. The effect of adding DCEMP to pension wealth was smaller among middle-aged households than younger groups, since DC accumulations among older workers were already relatively high. The inclusion of DCEMP actually had a larger effect on median values than mean values. In 2007, adding DCEMP increased the median value of PAW by 17 percent among all households and by 9 percent among age group 47-64.

Adding DCEMP generally enhanced the rate of growth of the mean value of PAW between 1983 and 2007. Among middle-aged households, mean PAW* grew by 77 percent (compared to 70 percent for mean PAW) and median PAW* rose 44 percent (compared to a 32 percent gain in PAW). Among all households, mean PAW* increased by 63 percent from 1989 to 2007 (the same as for PAW) and median PAW* rose by 31 percent (compared to 25 percent for PAW). Netting out the implicit taxes on pension wealth had the opposite effect, lowering the growth of net PAW* relative to pre-tax PAW*, but the differences were relatively small.

However, all in all, the main conclusion holds that even after adding DCEMP and netting out implicit taxes, we find sharp slowdowns in the growth of both mean and median PAW between the 1990s and the 2000s. In fact, the slowdowns are even greater when employer contributions to DC plans are included in the definition of wealth. While, for example, median PAW gained 21 percent from 2001 to 2007 among all households, median PAW* (including employer contributions) advanced by only 12 percent and net PAW* by 14 percent.

Another notable finding is that median PAW grew much slower than mean PAW. While mean PAW gained 52 percent from 1983 to 2007 among age group 47 to 64, median PAW advanced by only 16 percent. Among all households, mean PAW increased by 63 percent, while median PAW rose by 25 percent. Similar discrepancies between the growth in the mean value and the median value exist for PAW* and net PAW*. Insofar as the median is more reflective of the welfare of the average household than the mean, these results suggest lower growth in welfare at the middle than indicated by mean values. They also suggest rising inequality in PAW, as we shall now see.

Indeed, the attrition of DB plans did lead to a rise in wealth inequality. The reason is that DB wealth is fairly equalizing, as was seen above, and its erosion helped fuel a rise in wealth inequality. In 2007, the Gini coefficient for net worth among all households was 0.834 while that for PAW was 0.805 (see Table 10). The higher level of inequality of net worth in comparison to

private augmented wealth reflects the fact that DB pension wealth is distributed much more equally than net worth.

It was also the case that the equalizing effect of DB pension wealth lessened with the passage of time. Whereas the Gini coefficient for net worth among all households increased by a very modest 0.002 points over the years from 1989 to 2007, the Gini coefficient for PAW advanced even more, by 0.012 points. Alternatively, adding DB wealth to NW resulted in a 0.039 decline in the Gini coefficient in 1989 but only a 0.029 decrease in 2007.

The results are even stronger for middle-aged households and over the longer time span, 1983 to 2007. For this group, the Gini coefficient for net worth increased by 0.033 points between 1983 and 2007, while that that for PAW ballooned by 0.070 points. Here we see even stronger evidence that the equalizing effect of DB pension wealth wore off over time. Adding DB wealth to NW caused the Gini coefficient to decline by 0.073 in 1983, 0.053 in 1989, 0.043 in 2001, and 0.036 in 2007.³⁸

The inclusion of DCEMP lowers the inequality of PAW (the correlation of DCEMP and NW is 0.21 among middle-aged households and 0.11 among all households in 2001) but netting out implicit taxes on pension wealth raises measured inequality. All told, the Gini coefficient for net PAW* climbed by 0.061 points over the 1983-2007 period among the middle-aged (compared to a 0.037 point increase in the Gini coefficient for net worth). Over the 1989-2001 period, the Gini index for net PAW* advanced by 0.013 among all households, compared to -0.006 points for net worth.

Figures 2a and 2b provide a closer look at the size distribution of PAW among middle-aged households in 1989, 2001, and 2007. Here it becomes quite clear that the major gains over the 1983-2001 period were made by households at the high end of the wealth distribution. Indeed, comparing the size distributions in the two years at different percentile levels, we find an almost monotonic relation between percentile level and percentage change in PAW over the period. The percentage growth in PAW ranges from -61 percent at the tenth percentile to 77 percent at the ninety-ninth percentile. Over the second period, 2001 to 2007, the percentage growth in PAW was

³⁸ The use of a higher (lower) discount rate in the calculation of DB pension wealth would have lowered (raised) the value of DB pension wealth and consequently increased (decreased) the measured inequality of PAW. Correspondingly, the use of a higher (lower) discount rate would have led to a lower (higher) increase in the Gini coefficient for PAW between 1989 (or 1983) and 2007.

positive at all percentiles but with no discernable pattern. These results are consistent with the finding of a rising Gini coefficient over the earlier period and little change over the second.

7. Social Security and Augmented Wealth

I now turn to an appraisal of what happened to augmented wealth, AW, the sum of net worth, pension wealth, and Social Security wealth. Augmented wealth is the most comprehensive measure of the full set of resources available for retirement, and so its change over time is of interest when considering trends in retirement adequacy. Moreover, an analysis of trends in AW will allow us to determine whether the basic findings with regard to private augmented wealth are altered when Social Security wealth is included in the definition of household wealth. I find that whereas there was rapid growth in augmented wealth during the 1990s, a marked slowdown occurred during the 2000s. Moreover, median AW showed slower growth over time than mean AW. Both findings are similar to those for PAW.

Before we proceed to a discussion of augmented wealth, it is useful to say a few words about trends in Social Security wealth (SSW). Mean SSW among all households rose by 46 percent between 1989 and 2001 (see Table 11). This compares to an 80 percent gain in mean PW. Mean SSW gained 56 percent among middle-aged households. The increase in median SSW was very close to that of mean SSW – a reflection of relative constancy in SSW inequality over time. Median SSW increased by 41 percent among all households and 49 percent among middle-aged ones.³⁹ The rise in SSW over this period largely reflects increasing real wages, particularly in the late 1990s, and rising longevity. This was offset, in part, by the increase in the age at which full Social Security benefits are received from 65 to 67 for persons born after 1938 and the rising share of minorities in the labor force, whose life expectancy is shorter than that of whites.

SSW averaged \$163,000 (in 2007 dollars) in 2001 for all households. This compares to a mean NW of \$445,000 and mean PW of \$163,000. Median SSW in 2001 was \$141,000 – close to that of mean SSW. This suggests a normal or close to normal distribution of SSW. Moreover, median SSW was almost double median NW (\$86,000) and more than eight times higher than median PW (\$18,000).

³⁹ A small decline in both mean and median SSW for middle-aged households can be seen in the data for the period from 1983 to 1989. This decrease in SSW might reflect the decline in average real wages over the period according to the BLS real hourly wage series.

The years 2001 to 2007 witnessed almost no growth in SSW. Indeed, mean and median SSW fell slightly among middle-age households. This turnaround is largely attributable to the wage stagnation of this decade as well as to the increasing age at which full Social Security benefits are received. Another factor is the increasing share of minorities in the workforce. Additional factors are the higher unemployment rates of the 2000s compared to the 1990s and the drop in the median retirement age compared to the 1990s. Both of these led to fewer years of employed work life. Moreover, though longevity increased over this period, the rate of increase slowed down relative to the 1990s.

The inequality of SSW is much lower than that of NW or pensions (see Table 12). In 2001, the Gini coefficient for SSW among all households was 0.34, compared to 0.83 for NW and 0.79 for PW. The inequality of SSW fell by 0.026 Gini points over the 1989-2001 period. The inequality of SSW fell about the same for middle-aged households. Trends reversed again between 2001 and 2007. Inequality in SSW rose among all households, by 0.019 Gini points, and among middle-aged households as well. This trend reflected the rising spread in (annual) earnings and by implication, the rise in lifetime earnings inequality.

As discussed above, mean net worth among all households rose by 44 percent between 1989 and 2001, while median net worth increased by 16 percent (see Table 11). If DB pension wealth is added in, then the mean value of PAW was up by 37 percent and its median value by 4 percent. If Social Security wealth SSW is now included, then the mean value of AW rose by 39 percent and its median value by 23 percent. The rapid growth of SSW over the 1990s made up, in part, for the slower growth of pension wealth in the middle of the distribution, thus explaining the more rapid increase in AW than PAW. Results are similar for middle-aged households, among whom mean AW grew by 42 percent, compared to 47 percent increase in net worth, and median AW gained 27 percent, compared to a 3 percent rise for median net worth.

The years 2001 to 2007 again look different. The growth in mean AW slowed down, registering an 14 percent gain among all households compared to a 39 percent increase in 1989-2001. Median AW advanced by only 11 percent, in comparison to a 23 percent rise in 1989-2001. Evidence of the slowdown in the growth of augmented wealth is evident for age group 47-64. Mean AW grew by only 9 percent for middle-aged households in the later period, whereas it increased by 42 percent in the 1989-2001 period, and median AW showed almost no change in the 2000s compared to a 27 percent growth in the 1990s. Results are similar for AW* and net PAW*.

I also find that median AW grew slower than mean AW. Among all households, median AW registered a 60 percent gain from 1989 to 2007, while mean AW advanced by 37 percent. Among age group 47 to 64, mean AW grew by 68 percent from 1983 to 2007 and median AW by only 33 percent. Results are similar for different sub-periods as well as for AW* and net AW*.

We saw in the last section that adding DB wealth to net worth to create PAW resulted in a modest reduction in measured inequality. Here, it will become apparent that also including SSW results in a fairly sizeable decrease in measured inequality.

In 2007 the Gini coefficient for net worth among all households was 0.834. Adding DB wealth to NW to obtain PAW resulted in a 0.030 decline of the Gini coefficient to 0.805 (see Table 12). This decrease in inequality was due to the relatively small level of inequality in DB wealth. In contrast, adding SSW to PAW caused a much more sizeable reduction in the Gini coefficient of 0.121 points, from 0.805 to 0.684. This drop in inequality reflects both the much lower level of inequality in SSW than in marketable wealth, as well as its relatively low (though positive) correlation with net worth. As a consequence, it is apparent that the main equalizing effect of retirement wealth comes from Social Security, not private pensions (as was found earlier in Wolff, 1987). Results are very similar for middle-aged households.

As we saw above, the inequality of net worth among all households was essentially unchanged over the years 1989 to 2007. In contrast, the inequality of AW showed an increase of 0.021 Gini points over these years. This is tantamount to saying that the equalizing effect of retirement wealth mitigated over the 1989-2007 period. While the addition of retirement wealth to net worth reduced the Gini coefficient by 0.169 points in 1989, the difference was only 0.150 in 2007. Thus, the inequality reducing effects of adding retirement wealth to net worth fell over the years from 1989 to 2007.⁴⁰

Among middle-aged households the Gini coefficient for net worth increased by 0.020 from 1989 to 2007 whereas that for AW advanced by 0.031 points. Indeed, over the full 1983 to 2007 period, while the Gini coefficient of net worth was up by 0.033 points that for AW gained 0.076 points. Thus, for middle-aged households, the same pattern ensued as that for all households,

⁴⁰ The use of a higher (lower) discount rate in the calculation of DB pension wealth would have lowered (raised) the value of DB pension wealth and consequently increased (decreased) the measured inequality of augmented wealth. Correspondingly, the use of a higher (lower) discount rate would have led to a lower (higher) increase in the Gini coefficient for augmented wealth between 1989 (or 1983) and 2007. A similar argument holds for the choice of the discount rate for the calculation of Social Security wealth.

namely that the inequality of augmented wealth rose more than that of net worth. Findings are very similar when AW* and net AW* are used instead of AW.

Why did the inequality of AW increase while that of net worth remained unchanged from 1989 to 2007? The main reason was that the inequality of retirement wealth increased. A secondary reason was the increased correlation between non-pension wealth and retirement wealth.

Figures 3a and 3b give a graphical depiction of changes in the distribution of AW in 1989, 2001, and 2007. Among middle-aged households, percentage changes in AW over the 1989-2001 period were all positive and formed a U-shaped pattern, bottoming out at the 30th percentile. In contrast, from 2001 to 2007, changes in AW were generally positive and small but the patterns was quite uneven.

8. Projections to 2009

In this section, I update both net worth and pension wealth to July 1, 2009 on the basis of the change in the stock market and housing prices. House prices fell by 23.5 percent in real terms,⁴¹ and the S&P 500 index was down by 40.9 percent in real terms. In 2007, 40 percent of households held stocks through one or more pension accounts and 31 percent of the value of all stocks owned directly or indirectly were held in pension funds. Moreover, 44 percent of the value of DC pension plans was invested in stocks in that year.

Not surprisingly, as shown in Table 13, DC wealth was cut down by the stock market crash of 2008-2009. The average value of DC plans fell by 17.3 percent from 2007 to the midpoint of 2009.⁴² Middle-age households had a somewhat smaller share of their pensions invested in stock (40.8 percent), and consequently took a somewhat smaller hit in the value of their pensions (a 16.6 percent decline). These results show the vulnerability of the DC pension system to stock market fluctuations.

Mean pension wealth suffered a 9.6 percent drop overall. Results were similar for middle-aged households. Mean net worth plunged by 17 percent among all households and 16 percent among middle-aged households. As a result, mean PAW tumbled by 15.5 percent overall and 14.4

⁴¹ This figure is based on the National Association of Realtors Median Sales Price of Existing Single-Family Homes for Metropolitan Areas.

⁴² This compares with the estimates of Butrica and Issa (2010), using the Federal Reserve Board's Flow of Funds, of a decline of 33.7 percent in the value of retirement accounts in real terms from the third quarter of 2007 to the first quarter of 2009, and of 14.6 percent from the third quarter of 2007 to the fourth quarter of 2009.

percent for middle-aged ones, and mean AW fell by 12 percent. Declines in overall median values were even more acute for PW (13.6 percent), NW (36.1 percent), and PAW (27.0 percent). Similar patterns exist for middle-aged households. Median AW shrank about the same as mean AW.

All in all, the decade of the 2000s (2001 to 2009) appears to be a “lost decade.” Mean pension wealth was up by only 3.3 percent overall but down by 4.2 percent among age group 47 to 64. Mean net worth and augmented wealth were basically unchanged, while median net worth dwindled by 24 percent and median augmented wealth fell by 2.3 percent. Among middle-aged households, mean net worth fell by 4.2 percent and median net worth by 8.2 percent, while mean augmented wealth AW was down by 3.3 percent and median AW by 7.7 percent.

I also estimate that from 2007 to the middle of 2009, the Gini coefficient for net worth climbed from 0.834 to 0.865. In contrast, the inequality of pension wealth remained largely unchanged. As a result, the distribution of PAW became more unequal because of the rising inequality in net worth. However, because of the rising share of SSW in retirement wealth, AW inequality stayed unchanged. There were two reasons for this. First, the declining inequality of retirement wealth offset the rising inequality of net worth. Second, retirement wealth, especially SSW, which was more equally distributed than net worth, assumed a greater share in augmented wealth. As a consequence, retirement wealth had a greater equalizing effect on augmented wealth in 2009 than in 2007, with the difference between the Gini coefficient of net worth and that of augmented wealth AW expanding from 0.150 to 0.181. Thus, the contraction of pension wealth, which was itself a consequence of the stock market slide, led to no change in the inequality of augmented wealth. Results are roughly similar for the middle-aged group.

When we consider the whole decade of the 2000s, we find that the inequality of net worth rose substantially (0.039 Gini points) and the inequality of AW also rose though by less than that of net worth (0.023 Gini points). The pattern is similar for middle-aged households. Thus, one intended consequence of the stock market crash of the late 2000s and the consequent contraction of pension wealth is that it lessened the inequality of augmented wealth.

9. Conclusion

By conventional wealth measures, the period from 1983 to 2007 was one of robust growth. Mean net worth surged by 98 percent among all households and 84 percent among middle-aged

households, while median net worth gained 48 percent among all households and 63 percent among middle-aged ones. Gains in median wealth outstripped the 16 percent increase in overall median income over this period.

However, the 1980s, 1990s, and 2000s also witnessed the devolution of the traditional defined benefit pension system in favor of defined contribution pension coverage. The share of middle-aged households covered by a DB plan fell from 69 percent in 1983 to 39 percent in 2007, and mean DB pension wealth remained unchanged over these year. Average DC pension wealth, on the other hand, skyrocketed. By 2007, 64 percent of middle-aged households held some form of DC type pension plan, compared to 12 percent in 1983. The main foci of this paper are whether households gained from this change and how inequality was affected.

The rise of DC pensions plans more than fully compensated for the loss of DB type pension plans over the 1983-2007 period in terms of average values. Mean pension wealth (the sum of DB and DC wealth) more than doubled in real terms over the period for age group 47-64. The share of these households covered by either a DB or a DC pension plan also grew over the period, from 70 to 74 percent. Moreover, mean PAW (the sum of net worth and pension wealth) climbed by 70 percent. Mean social security wealth grew at a slower rate, 36 percent over the period. All told, mean augmented wealth grew by 62 percent.

The story is not quite as robust when we look at trends in median values. The median value of PAW among middle-aged households was up by 32 percent (compared to 70 percent for the mean value) and median augmented wealth rose by 33 percent (compared to 62 percent for the mean value). Among all households, while mean net worth gained 73 percent and median net worth 38 percent from 1989 to 2001, mean augmented wealth grew 60 percent but median augmented advanced 37 percent. As a result, median augmented wealth (and median PAW) generally showed smaller gains over time than median net worth.

These robust trends over the full period, 1983 to 2007, hide important differences by sub-period. Indeed, one of the most striking findings is the marked slowdown in the growth of pension wealth, PAW, and augmented wealth in the 2001-2007 period, compared to the 1980s and 1990s. Among all households, the annual growth rate of average pension wealth fell by more than half from 2.13 percent from 1989 to 2001 to 0.96 percent between 2001 and 2007. For PW* (including DCEMP), the drop was even more precipitous, from 2.13 percent per year to 0.56 percent per year, while for net PW* the decline was from an annual rate of 2.00 to 1.09 percent. The falloff was even

steeper among middle-aged households, with the annual growth rate of pension wealth falling from 1.82 percent over the 1983 to 2001 period to 0.44 percent over the 2001 to 2007 period (and similarly for PW* and net PW*).

Mean net worth grew at about the same rate from 2001 to 2007 as it did during the 1980s and 1990s and median net worth grew faster, while Social Security wealth advanced much slower. As a result, the annual growth rate of mean augmented wealth among all households fell off from 1.20 percent per year from 1989 to 2001 to 0.98 percent between 2001 and 2007, though that of median augmented wealth remained about the same. Among middle-aged households, the annual growth rate of augmented wealth decreased from 0.95 percent over the 1983-2001 period to 0.65 percent over the 2001-2007 period, while that of median augmented wealth showed an even steeper decline from 0.64 percent to 0.15 percent. The same patterns hold for AW* (including DCEMP) and net AW*.

Projections to 2009 suggest absolute declines in pension wealth, PAW, and augmented wealth from 2007 to 2009. In particular, the average value of defined contribution plans is projected to fall by 17 percent from 2007 to the midpoint of 2009. Looking at the period from 2001 to 2009, I estimate that mean pension wealth, mean net worth, mean PAW, and mean augmented wealth were basically unchanged among all households, while median net worth dwindled by 24 percent and median augmented wealth fell by 2.3 percent. Among middle-aged households, mean pension wealth was down by 4.2 percent, mean net worth also by 4.2 percent and median net worth by 8.2 percent, while mean augmented wealth AW was down by 3.3 percent and median AW by 7.7 percent. All in all, the decade of the 2000s (from 2001 to 2009) appears to have been a “lost decade” in terms of household wealth.

Another issue considered in this paper is whether the equalizing effects of retirement wealth lessened over time. Net worth inequality remained essentially flat from 1989 to 2007 despite a rise in income inequality. Retirement wealth did have a marked effect on inequality. Adding retirement wealth to net worth substantially lowered the Gini coefficient (from 0.834 to 0.684 in 2007, for example). Most of the equalizing effect came from the addition of Social Security wealth.

Considering the period from 1989 to 2007, I found that the equalizing effect of retirement wealth diminished. While the Gini coefficient for net worth remained largely unchanged over these years, the Gini coefficient for augmented wealth rose by 0.021. The differences are more marked for middle-aged households, the group most affected by transformation of the pension system.

Among them, the Gini coefficient for net worth rose by 0.020 while that of augmented wealth advanced by 0.031. Indeed, from 1983 to 2007, the Gini coefficient for augmented wealth among this age group climbed by 0.076 while that for net worth increased by only 0.033. In other words, the addition of retirement wealth to net worth reduced the overall Gini coefficient among all households in 1989 by 0.169 but by only 0.150 in 2007. Among middle-aged households, adding retirement wealth to net worth decreased the Gini coefficient by 0.187 in 1983 but by 0.145 in 2007. When employer contributions to defined contribution pension plans (DCEMP) are added in to pension wealth and when expected future income taxes on receipt of pension benefits are netted out of both pension and social security wealth, the same pattern holds.

References

Bernheim, D.B. "The Adequacy of Personal Retirement Saving: Issues and Options," in Wise, David A., ed., *Facing the Age Wave*, Stanford CA: Hoover Institute Press, 1997.

Bloom, David E., and Richard B. Freeman, "The Fall in Private Pension Coverage in the United States," *American Economic Review Papers and Proceedings*, Vol. 82, No. 2, May 1992, pp. 539-558.

Butrica, Barbara A., and Philip Issa, "Retirement Account Balances (Updated 1/10)." Washington, DC: The Urban Institute Fact Sheet, February 1010, available at <http://www.urban.org/publications/411976.html>

Coronado, Julia Lynn, Don Fullerton, and Thomas Glass, "The Progressivity of Social Security," NBER Working Paper No. 7520, February 2000.

Engelhardt, Gary V., and Anil Kumar, "Pensions and Household Wealth Accumulation," *Journal of Human Resource*, Vol. 46, No. 1, Winter 2011, pp. 203-236.

Engen, Eric M., and William G. Gale, "Debt, Taxes, and the Effects of 401(k) Plans on Household Wealth Accumulation," mimeo, the Brookings Institution, May 1997.

Engen, Eric M., and William G. Gale, "The Effects of 401(k) Plans on Household Wealth: Differences Across Earnings Groups," mimeo, the Brookings Institution, August 2000.

Engen, E.M., W.G. Gale, and C.E. Uccello, C.E., "The Adequacy of Household Saving," *Brookings Papers on Economic Activity*, Vol. 2, 1999, pp. 65-165.

Even, William E., and David A. Macpherson, "Why Did Male Pension Coverage Decline in the 1980s?" *Industrial and Labor Relations Review* 47, No. 3, 1994, pp. 429-453.

Farber, Henry S., "Job Loss in the United States, 1981-1999," Working Paper No. 453, Princeton, New Jersey: Princeton University, Industrial Relations Section, June 2001.

Feldstein, Martin S., "Social Security and the Distribution of Wealth," *Journal of the American Statistical Association*, Vol. 71, December 1976, pp. 800-7.

Gale, William G., "The Effects of Pensions on Wealth: A Re-evaluation of Theory and Evidence," mimeo, the Brookings Institution, June 1995.

Gustman, Alan L., and Thomas L. Steinmeier, "The Stampede Toward Defined Contribution Pension Plans: Fact or Fiction?" *Industrial Relations*, Vol. 31, No. 2, 1992, pp. 361-369.

Gustman, Alan L., and Thomas L. Steinmeier, "What People Don't Know About Their Pensions and Social Security: An Analysis Using Linked Data from the Health and Retirement Study, NBER Working Paper No. 7368, September 1999.

Gustman, Alan L., Thomas L. Steinmeier, and Nahid Tabatabai, "How Do Pension Changes Affect Retirement Preparedness? The Trend to Defined Contribution Plans and the Vulnerability of the Retirement Age Population to the Stock Market Decline of 2008-2009," Ann Arbor, MI: Michigan Retirement Research Center Working Paper 2009-206, October, 2009.

Johnson, Richard W., Usha Sambamoorthi, and Stephen Crystal, "Pension Wealth at Midlife: Comparing Self-Reports with Provider Data," *Review of Income and Wealth*, Series 46, No. 1, March 2000, pp. 59-83.

Kennickell, Arthur B., Douglas A. McManus, and R. Louise Woodburn, "Weighting Design for the 1992 Survey of Consumer Finances." Federal Reserve Board of Washington, March 1996.

Kennickell, Arthur B., and R. Louise Woodburn, "Estimation of Household Net Worth Using Model-Based and Design-Based Weights: Evidence from the 1989 Survey of Consumer Finances," Federal Reserve Board of Washington, April 1992

Kennickell, Arthur B., and R. Louise Woodburn, "Consistent Weight Design for the 1989, 1992, and 1995 SCFs, and the Distribution of Wealth." *Review of Income and Wealth*, Series 45, No. 2, June 1999, pp. 193-216.

Kennickell, Arthur B., and Annika E. Sunden, "pensions, Social Security, and the Distribution of Wealth," mimeo, Federal Reserve Board of Washington, December 1999.

Kopczuk, Wojciech, and Emmanuel Saez, "Top Wealth Shares in the United States, 1916-2000: Evidence from Estate Tax Returns", NBER Working Paper No. 10399, March 2004.

Kotlikoff, Laurence J., and Daniel E. Smith, *Pensions in the American Economy*, Chicago: Chicago University Press, 1983.

Kuznets, Simon. *Shares of Upper Income Groups in Income and Savings*, New York: National Bureau of Economic Research, 1953.

Leimer, Dean R., "Historical Redistribution under the Social Security Old-Age and Survivors Insurance Program, Social Security Administration, ORES Working Paper Series No. 101, April 2003.

Leimer, Dean R., "Historical Redistribution under the Social Security Old-Age and Survivors Insurance Program, Social Security Administration, ORES Working Paper Series No. 102, February 2004.

Liebman, Jeffrey B., "Redistribution in the Current U.S. Social Security System," in Martin Feldstein and Jeffrey B. Liebman editors, *The Distributional Aspects of Social Security and Social Security Reform*, Chicago: University of Chicago Press, 2002, pp. 11-47.

McGarry, Kathleen and Andrew Davenport, "Pensions and the Distribution of Wealth," NBER Working Paper 6171, September 1997.

Modigliani, Franco, and Richard Brumberg, "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data," in K. Kurihara, ed., *Post-Keynesian Economics*, New Brunswick, N.J.: Rutgers University Press, 1954.

Moore, James F., and Olivia S. Mitchell, "Projected Retirement Wealth and Saving Adequacy," in Mitchell, O., Hammond, B., and Rappaport, A., eds., *Forecasting Retirement Needs and Retirement Wealth*, Philadelphia PA: University of Pennsylvania Press, 2000.

Munnell, Alicia H, and Pamela Perun. 2006. "An Update on Private Pensions," Boston, MA: Center for Retirement Research at Boston College, No. 50, August.

Poterba, James M., "Valuing Assets in Retirement Savings Accounts," NBER Working Paper 10395, March 2004.

Poterba, James M., Steven F. Venti and David A. Wise, "401(k) Plans and Tax-Deferred Saving," NBER Working Paper 4181, October 1992.

Poterba, James M., Steven F. Venti and David A. Wise, "Do 401(k) Contributions Crowd Out Other Personal Savings," NBER Working Paper 4391, June 1993.

Poterba, James M., Steven F. Venti and David A. Wise, "Targeted Retirement Saving and the Net Worth of Elderly Americans," *American Economic Review Papers and Proceedings*, Vol. 84, No. 2, May 1995, pp. 180-185.

Poterba, James M., Steven F. Venti and David A. Wise, "401(k) Plans and Future Patterns of Retirement Saving," *American Economic Review Papers and Proceedings*, Vol. 87, No. 2, May 1998, pp.179-184.

Poterba, James M., Steven F. Venti and David A. Wise, "The Transition to Personal Accounts and Increasing Retirement Wealth: Micro and Macro Evidence," NBER Working Paper 8610, November 2001.

Smith, Karen, Eric Toder, and Howard Iams, "Lifetime Redistribution of Social Security Retirement Benefits," mimeo, Social Security Administration, 2001.

U.S. Department of Labor, Pension and Welfare Benefits Administration, "Coverage Status of Workers Under Employer Provided Pension Plans: Findings from the Contingent Work Supplement to the February 1999 Current Population Survey," 2000, Washington DC: Department of Labor.

Wolff, Edward N., "The Effects of Pensions and Social Security on the Distribution of Wealth in the U.S.", in *International Comparisons of Household Wealth Distribution*, E. Wolff ed., Oxford University Press, 1987.

Wolff, Edward N., "Methodological Issues in the Estimation of Retirement Wealth," in Daniel J. Slottje ed., *Research in Economic Inequality*, Vol. 2, JAI Press, 1992, 31-56.

Wolff, Edward N., "The Distributional Implications of Social Security Annuities and Transfers on Household Wealth and Income," in Edward N. Wolff ed., *Research in Economic Inequality*, Vol. 4, JAI Press, 1993, 131-157.

Wolff, Edward N., "Recent Trends in Wealth Ownership, from 1983 to 1998", in Thomas M. Shapiro and Edward N. Wolff eds., *Assets for the Poor: The Benefits of Spreading Asset Ownership*, Russell Sage Press, 2001, pp. 34-73.

Wolff, Edward N., *TOP HEAVY: A Study of Increasing Inequality of Wealth in America*, Newly updated and expanded edition, New York: the New Press, 2002.

Table 1. Mean and Median Household Wealth and Income, 1983-2007
(In thousands, 2007 dollars)

| Wealth Concept | 1983 | 1989 | 2001 | 2007 | Percentage Change | | | |
|------------------------------|-------|-------|-------|-------|-------------------|-----------|-----------|-----------|
| | | | | | 1983-1989 | 1989-2001 | 2001-2007 | 1983-2007 |
| A. Net Worth (NW) | | | | | | | | |
| 1. Median | 69.5 | 74.3 | 86.1 | 102.5 | 7.0 | 15.8 | 19.1 | 47.5 |
| 2. Mean | 270.4 | 309.8 | 445.1 | 536.1 | 14.6 | 43.7 | 20.4 | 98.2 |
| B. Income^a | | | | | | | | |
| 1. Median | 43.5 | 48.3 | 49.4 | 50.2 | 11.2 | 2.3 | 1.6 | 15.5 |
| 2. Mean | 52.9 | 61.1 | 68.1 | 67.6 | 15.5 | 11.6 | -0.8 | 27.9 |

Source: own computations from the 1983, 1989, 2001, and 2007 SCF.
Wealth figures are deflated using the Consumer Price Index (CPI-U).

a. Source for household income data: U.S. Census of the Bureau, Current Populations Surveys, available at <http://www.census.gov/hhes/www/income/data/historical/household/index.html>

Table 2. The Size Distribution of Wealth and Income, 1983-2007

| Year | Gini Coefficient | Percentage Share of Wealth or Income held by: | | | | | | | | |
|------------------------|------------------|---|-----------|-----------|------------|-----------|-----------|-----------|--------------|-------|
| | | Top 1.0% | Next 4.0% | Next 5.0% | Next 10.0% | Top 20.0% | 4th 20.0% | 3rd 20.0% | Bottom 40.0% | All |
| A. Net Worth | | | | | | | | | | |
| 1983 | 0.799 | 33.8 | 22.3 | 12.1 | 13.1 | 81.3 | 12.6 | 5.2 | 0.9 | 100.0 |
| 1989 | 0.832 | 37.4 | 21.6 | 11.6 | 13.0 | 83.5 | 12.3 | 4.8 | -0.7 | 100.0 |
| 2001 | 0.826 | 33.4 | 25.8 | 12.3 | 12.9 | 84.4 | 11.3 | 3.9 | 0.3 | 100.0 |
| 2007 | 0.834 | 34.6 | 27.3 | 11.2 | 12.0 | 85.0 | 10.9 | 4.0 | 0.2 | 100.0 |
| B. Income (SCF) | | | | | | | | | | |
| 1982 | 0.480 | 12.8 | 13.3 | 10.3 | 15.5 | 51.9 | 21.6 | 14.2 | 12.3 | 100.0 |
| 1988 | 0.521 | 16.6 | 13.3 | 10.4 | 15.2 | 55.6 | 20.6 | 13.2 | 10.7 | 100.0 |
| 2000 | 0.562 | 20.0 | 15.2 | 10.0 | 13.5 | 58.6 | 19.0 | 12.3 | 10.1 | 100.0 |
| 2006 | 0.574 | 21.3 | 15.9 | 9.9 | 14.3 | 61.4 | 17.8 | 11.1 | 9.6 | 100.0 |

Source: own computations from the 1983, 1989, 2001, and 2007 SCF.
For the computation of percentile shares of net worth, households are ranked according to their net worth; and for percentile shares of income, households are ranked according to their income.

Table 3. Composition of Total Household Wealth, 1983 - 2007

(Percent of gross assets)

[4/7/11 Version]

| Wealth component | 1983 | 1989 | 2001 | 2007 |
|---|--------------|--------------|--------------|--------------|
| Principal residence (gross value) | 30.1 | 30.2 | 28.2 | 32.8 |
| Other real estate (gross value) | 14.9 | 14.0 | 9.8 | 11.3 |
| Unincorporated business equity ^a | 18.8 | 17.2 | 17.2 | 20.1 |
| Liquid assets ^b | 17.4 | 17.5 | 8.8 | 6.6 |
| Pension accounts ^c | 1.5 | 2.9 | 12.3 | 12.1 |
| Financial securities ^d | 4.2 | 3.4 | 2.3 | 1.5 |
| Corporate stock and mutual funds | 9.0 | 6.9 | 14.8 | 11.8 |
| Net equity in personal trusts | 2.6 | 3.1 | 4.8 | 2.3 |
| Miscellaneous assets ^e | 1.3 | 4.9 | 1.8 | 1.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| | | | | |
| Debt on principal residence | 6.3 | 8.6 | 9.4 | 11.4 |
| All other debt ^f | 6.8 | 6.4 | 3.1 | 3.9 |
| Total debt | 13.1 | 15.0 | 12.5 | 15.3 |

Source: own computations from the 1983, 1989, 2001, and 2007 SCF.

a. Net equity in unincorporated farm and non-farm businesses and closely-held corporations.

b. Checking accounts, savings accounts, time deposits, money market funds, certificates of deposits, and the cash surrender value of life insurance.

c. IRAs, Keogh plans, 401(k) plans, the accumulated value of defined contribution pension plans, and other retirement accounts.

d. Corporate bonds, government bonds (including savings bonds), open-market paper, and notes.

e. Gold and other precious metals, royalties, jewelry, antiques, furs, loans to friends and relatives, future contracts, and miscellaneous assets.

f. Mortgage debt on all real property except principal residence; credit card, installment, and other consumer debt.

| Asset | All Households | Top One Percent | Next 19 Percent | Middle 3 Quintiles |
|---|----------------|-----------------|-----------------|--------------------|
| Principal residence | 32.8 | 10.2 | 31.8 | 65.1 |
| Liquid assets (bank deposits, money market funds, and cash surrender value of life insurance) | 6.6 | 4.5 | 7.3 | 7.8 |
| Pension accounts | 12.1 | 5.8 | 15.9 | 12.9 |
| Corporate stock, financial securities, mutual funds, and personal trusts | 15.5 | 25.2 | 15.0 | 3.6 |
| Unincorporated business equity other real estate | 31.3 | 52.3 | 28.5 | 9.3 |
| Miscellaneous assets | 1.7 | 2.0 | 1.6 | 1.3 |
| Total assets | 100.0 | 100.0 | 100.0 | 100.0 |
| Memo (selected ratios in percent): | | | | |
| Debt / equity ratio | 18.1 | 2.8 | 12.1 | 61.1 |
| Debt / income ratio | 118.7 | 39.4 | 109.8 | 156.7 |
| <p>Source: own computations from the 2007 SCF. Households are classified into wealth class according to their net worth. Brackets for 2007 are:</p> <p>Top one percent: Net worth of \$8,232,000 or more.</p> <p>Next 19 percent: Net worth between \$473,000 and \$8,232,000.</p> <p>Quintiles 2 through 4: Net worth between \$200 and \$473,000.</p> | | | | |

| Component | Top One Percent | | Next 19 Percent | | Middle 3 Quintiles | |
|---|-----------------|--------------|-----------------|--------------|--------------------|--------------|
| | 1983 | 2007 | 1983 | 2007 | 1983 | 2007 |
| Principal residence | 8.1 | 10.2 | 29.1 | 31.8 | 61.6 | 65.1 |
| Liquid assets (bank deposits, money market funds, and cash surrender value of life insurance) | 8.5 | 4.5 | 21.4 | 7.3 | 21.4 | 7.8 |
| Pension accounts | 0.9 | 5.8 | 2.0 | 15.9 | 1.2 | 12.9 |
| Corporate stock, financial securities, mutual funds, and personal trusts | 29.5 | 25.2 | 13.0 | 15.0 | 3.1 | 3.6 |
| Unincorporated business equity other real estate | 52.0 | 52.3 | 32.8 | 28.5 | 11.4 | 9.3 |
| Miscellaneous assets | 1.0 | 2.0 | 1.6 | 1.6 | 1.3 | 1.3 |
| Total assets | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Memo: | | | | | | |
| Debt / equity ratio | 5.9 | 2.8 | 10.9 | 12.1 | 37.4 | 61.1 |
| Debt / income ratio | 86.8 | 39.4 | 72.8 | 109.8 | 66.9 | 156.7 |
| Note: own computations from the 1983 and 2007 SCF. | | | | | | |

Table 6. Percent of Households with Pension Wealth, 1983-2007

| | 1983 | 1989 | 2001 | 2007 |
|--------------------------|------|------|------|------|
| A. All Households | | | | |
| 1. DC Accounts | 11.1 | 24.0 | 52.2 | 52.6 |
| 2. DB Plans | -- | 45.6 | 34.4 | 34.0 |
| 3. Pension Wealth | -- | 56.0 | 65.6 | 64.1 |
| B. Ages 47-64 | | | | |
| 1. DC Accounts | 12.3 | 28.3 | 62.0 | 63.8 |
| 2. DB Plans | 68.5 | 56.8 | 45.3 | 38.8 |
| 3. Pension Wealth | 70.3 | 67.5 | 75.9 | 74.1 |

Note: own computations from the 1983, 1989, 2001, and 2007 SCF.
Households are classified into age groups by the age of the head of household. Key:
Pension Wealth PW = DB + DC

Table 7. Mean Household Pension Wealth (PW), 1983-2007

(In thousands, 2007 dollars)

| | 1983 | 1989 | 2001 | 2007 |
|---|-------|-------|-------|-------|
| A. All Households | | | | |
| 1. DC Accounts | 4.6 | 10.6 | 62.8 | 76.8 |
| 2. DB Plans | -- | 56.5 | 58.0 | 61.2 |
| 3. Pension Wealth PW | -- | 67.1 | 120.8 | 138.0 |
| 4. DC* (including DCEMP) | 6.4 | 29.4 | 97.1 | 106.7 |
| 5. Pension Wealth PW* | -- | 86.0 | 155.1 | 167.9 |
| 6. Post-tax Pension Wealth (net PW*) | -- | 53.8 | 93.4 | 108.5 |
| C. Ages 47-64 | | | | |
| 1. DC Accounts | 9.7 | 20.4 | 113.1 | 133.8 |
| 2. DB Plans | 90.1 | 100.3 | 98.9 | 91.4 |
| 3. Pension Wealth PW | 99.7 | 120.7 | 211.9 | 225.3 |
| 4. DC* (including DCEMP) | 10.2 | 33.9 | 149.1 | 171.6 |
| 5. Pension Wealth PW* | 100.3 | 134.3 | 248.0 | 263.0 |
| 6. Post-tax Pension Wealth (net PW*) | 74.9 | 96.8 | 161.6 | 175.6 |

Note: own computations from the 1983, 1989, 2001, and 2007 SCF.
Households are classified into age groups by the age of the head of household. Key:
Pension Wealth PW = DB + DC
DC* = DC + DCEMP
Pension Wealth PW* = DB + DC*

Table 8. Inequality of Pension Wealth among Pension Holders and All Households, 1983 - 2007
(Gini coefficients)

| | 1983 | 1989 | 2001 | 2007 |
|---|-------|-------|-------|-------|
| <u>I. All Age Groups</u> | | | | |
| <u>A. All Pension Holders</u> | | | | |
| 1. DC Accounts | -- | 0.750 | 0.741 | 0.728 |
| 2. DB Plans | -- | 0.606 | 0.582 | 0.549 |
| 3. Pension Wealth PW | -- | 0.641 | 0.676 | 0.661 |
| <u>B. All Households</u> | | | | |
| 4. Pension Wealth PW | -- | 0.799 | 0.788 | 0.783 |
| 5. Pension Wealth PW* | -- | 0.787 | 0.749 | 0.758 |
| 6. Post-tax Pension Wealth (net PW*) | -- | 0.774 | 0.733 | 0.742 |
| <u>II. Ages 47-64</u> | | | | |
| <u>A. Pension Holders: Ages 47-64</u> | | | | |
| 1. DC Accounts | 0.732 | 0.726 | 0.714 | 0.681 |
| 2. DB Plans | 0.507 | 0.537 | 0.571 | 0.519 |
| 3. Pension Wealth PW | 0.524 | 0.577 | 0.637 | 0.617 |
| <u>B. All Households in Age Group 47-64</u> | | | | |
| 4. Pension Wealth PW | 0.666 | 0.715 | 0.724 | 0.716 |
| 5. Pension Wealth PW* | 0.666 | 0.716 | 0.709 | 0.706 |
| 6. Post-tax Pension Wealth (net PW*) | 0.641 | 0.699 | 0.689 | 0.685 |
| <p>Note: own computations from the 1983, 1989, 2001, and 2007 SCF. Households are classified into age groups by the age of the head of household. Key: Pension Wealth PW = DB + DC DC* = DC + DCEMP Pension Wealth PW* = DB + DC*</p> | | | | |

**Table 9. Mean and Median Net Worth and Private Augmented Wealth (PAW),
1983 - 2007**

(In thousands, 2007 dollars)

| | 1983 | 1989 | 2001 | 2007 |
|---|-------|-------|-------|-------|
| A. All Households | | | | |
| 1. Mean Net Worth (NW) | 270.4 | 309.8 | 445.1 | 536.1 |
| 2. Mean Private Augmented Wealth PAW | -- | 366.1 | 503.2 | 597.5 |
| 3. Mean Private Augmented Wealth PAW* | -- | 384.3 | 537.5 | 627.4 |
| 4. Post-Tax Mean Private Augmented Wealth (net PAW*) | -- | 367.4 | 502.1 | 591.5 |
| 5. Median Net Worth (NW) | 69.5 | 74.3 | 86.1 | 102.5 |
| 6. Median Private Augmented Wealth PAW | -- | 114.0 | 118.3 | 142.8 |
| 7. Median Private Augmented Wealth PAW* | -- | 127.3 | 148.8 | 166.4 |
| 8. Post-Tax Median Private Augmented Wealth (net PAW*) | -- | 122.4 | 138.7 | 158.6 |
| C. Ages 47-64 | | | | |
| 1. Mean Net Worth (NW) | 437.5 | 477.0 | 700.5 | 803.2 |
| 2. Mean Private Augmented Wealth PAW | 526.3 | 577.3 | 799.4 | 894.7 |
| 3. Mean Private Augmented Wealth PAW* | 526.8 | 590.1 | 835.4 | 932.4 |
| 4. Post-Tax Mean Private Augmented Wealth (net PAW*) | 503.1 | 563.2 | 775.6 | 873.4 |
| 5. Median Net Worth (NW) | 126.8 | 156.0 | 161.1 | 206.5 |
| 6. Median Private Augmented Wealth PAW | 215.3 | 226.9 | 249.4 | 283.8 |
| 7. Median Private Augmented Wealth PAW* | 215.3 | 231.2 | 274.5 | 310.0 |
| 8. Post-Tax Median Private Augmented Wealth (net PAW*) | 202.6 | 212.1 | 253.2 | 287.3 |

Note: own computations from the 1983, 1989, 2001, and 2007 SCF.

Households are classified into age groups by the age of the head of household. Key:

Private Augmented Wealth PAW = NWX+PW.

Private Augmented Wealth PAW* = NWX+PW*.

**Table 10. Inequality of Net Worth and Private Augmented Wealth,
1983 - 2007**
(Gini coefficients)

| | 1983 | 1989 | 2001 | 2007 |
|--|-------|-------|-------|-------|
| <u>A. All Households</u> | | | | |
| 1. Net Worth (NW) | 0.799 | 0.832 | 0.826 | 0.834 |
| 2. Private Augmented Wealth PAW | -- | 0.793 | 0.796 | 0.805 |
| 3. Private Augmented Wealth PAW* | -- | 0.776 | 0.773 | 0.789 |
| 4. Post-Tax Private Augmented Wealth (net PAW*) | -- | 0.779 | 0.776 | 0.792 |
| <u>C. Ages 47-64</u> | | | | |
| 1. Net Worth (NW) | 0.761 | 0.775 | 0.798 | 0.795 |
| 2. Private Augmented Wealth PAW | 0.688 | 0.721 | 0.756 | 0.758 |
| 3. Private Augmented Wealth PAW* | 0.688 | 0.715 | 0.746 | 0.750 |
| 4. Post-Tax Private Augmented Wealth (net PAW*) | 0.692 | 0.718 | 0.750 | 0.753 |
| <p>Note: own computations from the 1983, 1989, 2001, and 2007 SCF. Households are classified into age groups by the age of the head of household. Key: Private Augmented Wealth PAW = NWX+PW. Private Augmented Wealth PAW* = NWX+PW*.</p> | | | | |

Table 11. Mean and Median Augmented Wealth, 1983-2007
(In thousands, 2007 dollars)

| | 1983 | 1989 | 2001 | 2007 |
|---|-------|-------|--------|--------|
| <u>A. All Households</u> | | | | |
| 1. Mean Net Worth (NW) | 270.4 | 309.8 | 445.1 | 536.1 |
| 2. Mean Social Security Wealth SSW | -- | 111.9 | 163.3 | 165.3 |
| 3. Mean Augmented Wealth AW | -- | 478.0 | 666.5 | 762.8 |
| 4. Mean Augmented Wealth AW* | -- | 496.2 | 700.8 | 792.7 |
| 5. Mean Post-Tax Augmented Wealth (Net AW*) | -- | 470.0 | 644.4 | 736.3 |
| 6. Median Net Worth (NW) | 69.5 | 74.3 | 86.1 | 102.5 |
| 7. Median Social Security Wealth SSW | -- | 100.5 | 141.3 | 139.1 |
| 8. Median Augmented Wealth AW | -- | 225.0 | 277.5 | 309.2 |
| 9. Median Augmented Wealth AW* | -- | 237.2 | 311.1 | 335.2 |
| 10. Median Post-Tax Augmented Wealth (Net AW*) | -- | 227.1 | 287.3 | 312.5 |
| <u>B. Ages 47-64</u> | | | | |
| 1. Mean Net Worth (NW) | 436.8 | 477.0 | 700.5 | 803.2 |
| 2. Mean Social Security Wealth SSW | 158.5 | 138.4 | 216.0 | 215.7 |
| 3. Mean Augmented Wealth AW | 684.3 | 715.7 | 1015.3 | 1110.3 |
| 4. Mean Augmented Wealth AW* | 684.8 | 728.5 | 1051.3 | 1148.1 |
| 5. Mean Post-Tax Augmented Wealth (Net AW*) | 661.6 | 688.4 | 960.7 | 1059.1 |
| 6. Median Net Worth (NW) | 126.8 | 156.0 | 161.1 | 206.5 |
| 7. Median Social Security Wealth SSW | 149.1 | 138.1 | 206.4 | 195.8 |
| 8. Median Augmented Wealth AW | 364.6 | 373.2 | 475.4 | 485.4 |
| 9. Median Augmented Wealth AW* | 365.5 | 374.7 | 500.2 | 510.7 |
| 10. Median Post-Tax Augmented Wealth (Net AW*) | 359.6 | 364.0 | 448.1 | 471.2 |

Note: own computations from the 1983, 1989, 2001, and 2007 SCF.

Households are classified into age groups by the age of the head of household. Key:

Augmented Wealth AW = NWX + PW + SSW.

Augmented Wealth AW* = NWX + PW* + SSW.

Table 12. Inequality of Augmented Wealth, 1983-2007
(Gini coefficients)

| | 1983 | 1989 | 2001 | 2007 |
|--|-------|-------|-------|-------|
| <u>A. All Households</u> | | | | |
| 1. Net Worth (NW) | 0.799 | 0.832 | 0.826 | 0.834 |
| 2. Private Augmented Wealth PAW | -- | 0.793 | 0.796 | 0.805 |
| 3. Social Security Wealth SSW | -- | 0.370 | 0.344 | 0.363 |
| 4. Augmented Wealth AW | -- | 0.663 | 0.661 | 0.684 |
| 5. Augmented Wealth AW* | -- | 0.658 | 0.650 | 0.677 |
| 6. Post-Tax Augmented Wealth (net AW*) | -- | 0.657 | 0.650 | 0.677 |
| <u>C. Ages 47-64</u> | | | | |
| 1. Net Worth (NW) | 0.761 | 0.775 | 0.798 | 0.795 |
| 2. Private Augmented Wealth PAW | 0.688 | 0.721 | 0.756 | 0.758 |
| 3. Social Security Wealth SSW | 0.297 | 0.314 | 0.297 | 0.305 |
| 4. Augmented Wealth AW | 0.574 | 0.619 | 0.637 | 0.650 |
| 5. Augmented Wealth AW* | 0.574 | 0.618 | 0.633 | 0.647 |
| 6. Post-Tax Augmented Wealth (net AW*) | 0.573 | 0.617 | 0.634 | 0.648 |

Note: own computations from the 1983, 1989, 2001, and 2007 SCF.

Households are classified into age groups by the age of the head of household. Key:

Private Augmented Wealth PAW = NWX+PW.

Augmented Wealth AW = NWX + PW + SSW.

Augmented Wealth AW* = NWX + PW* + SSW.

Table 13. Augmented Wealth, 2007 and Projections to 2009

(In thousands, 2007 dollars)

[4/7/11 Version]

| | 2007 | Projected 2009 |
|---|--------|-------------------|
| <u>I. All Households</u> | | |
| <u>A. Mean Values</u> | | |
| 1. DC Pension Wealth | 76.8 | 63.5 |
| 2. Pension Wealth (PW) | 138.0 | 124.7 |
| 3. Net Worth (NW) | 536.1 | 443.8 |
| 4. Private Augmented Wealth PAW | 597.5 | 505.0 |
| 5. Augmented Wealth (AW) | 762.8 | 670.3 |
| <u>B. Median Values</u> | | |
| 1. Pension Wealth (PW) | 19.0 | 16.4 |
| 2. Net Worth (NW) | 102.5 | 65.4 |
| 3. Private Augmented Wealth (PAW) | 142.8 | 104.2 |
| 4. Augmented Wealth (AW) | 309.2 | 271.2 |
| <u>C. Inequality (Gini Coefficients)</u> | | |
| 1. Net Worth (NW) | 0.834 | 0.865 |
| 2. Pension Wealth (PW) | 0.783 | 0.781 |
| 3. Private Augmented Wealth (PAW) | 0.805 | 0.827 |
| 4. Augmented Wealth (AW) | 0.684 | 0.684 |
| <u>II. Ages 47-64</u> | | |
| <u>A. Mean Values</u> | | |
| 1. DC Pension Wealth | 133.8 | 111.6 |
| 2. Pension Wealth (PW) | 225.3 | 203.0 |
| 3. Net Worth (NW) | 803.2 | 674.5 |
| 4. Private Augmented Wealth PAW | 894.7 | 765.9 |
| 5. Augmented Wealth (AW) | 1110.3 | 981.6 |
| <u>B. Median Values</u> | | |
| 1. Pension Wealth (PW) | 75.4 | 66.8 |
| 2. Net Worth (NW) | 206.5 | 147.9 |
| 3. Private Augmented Wealth (PAW) | 283.8 | 225.4 |
| 4. Augmented Wealth (AW) | 485.4 | 438.9 |
| <u>C. Inequality (Gini Coefficients)</u> | | |
| 1. Net Worth (NW) | 0.795 | 0.820 |
| 2. Pension Wealth (PW) | 0.716 | 0.715 |
| 3. Private Augmented Wealth (PAW) | 0.758 | 0.776 |
| 4. Augmented Wealth (AW) | 0.650 | 0.649 |

Note: own computations from the 2007 SCF.

The projections to 2009 assume that housing priced declined by 23.5 percent in real terms and stock prices declined by 40.9 percent in real terms from 2007 to July 1, 2009.

Households are classified into age groups by the age of the head of household. Key:

Private Augmented Wealth PAW = NWX+PW.

Augmented Wealth AW = NWX + PW + SSW.

Figure 1a. Pension Wealth PW in 2007 Dollars by PW Percentile, Ages 47 to 64, 1989, 2001, and 2007

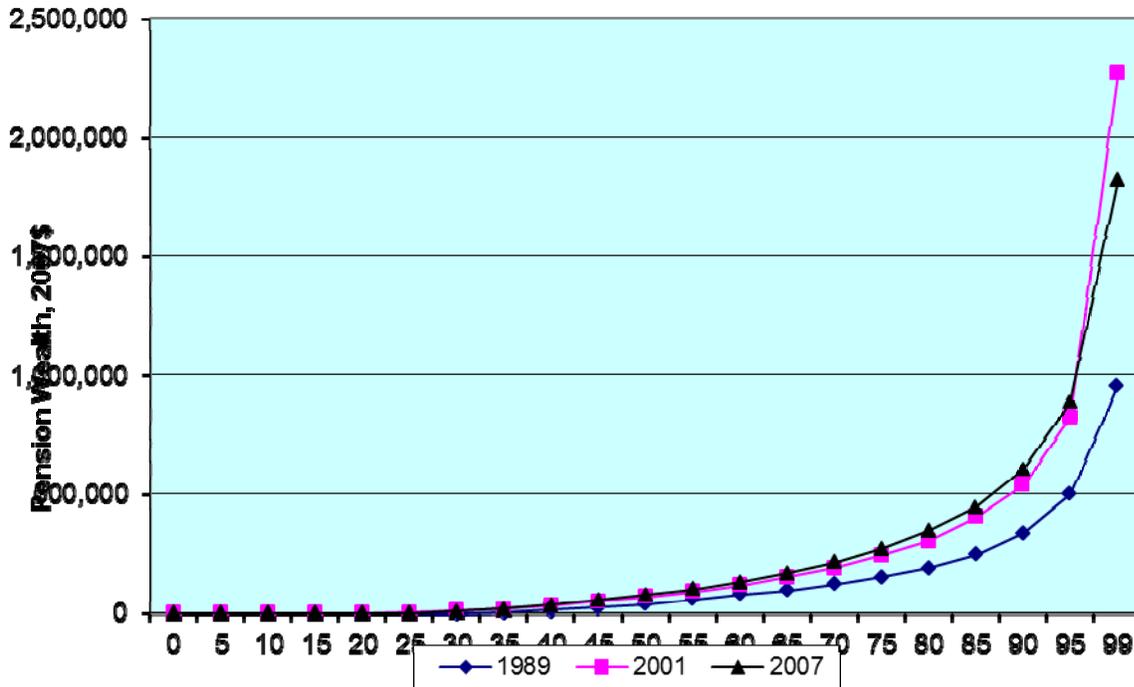


Figure 1b. Percentage Change In Pension Wealth PW in 2007 Dollars by PW Percentile, Ages 47 to 64, 1989, 2001, and 2007

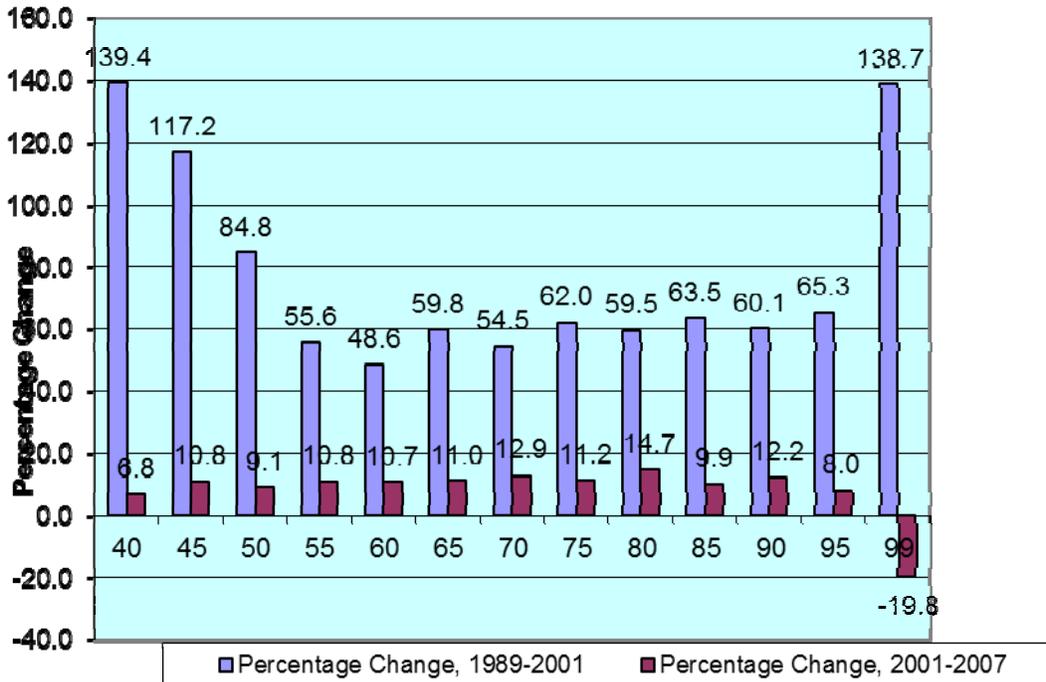


Figure 2a. Private Accumulations PA In 2007 Dollars by PA Percentile, Ages 47 to 64, 1989, 2001, and 2007

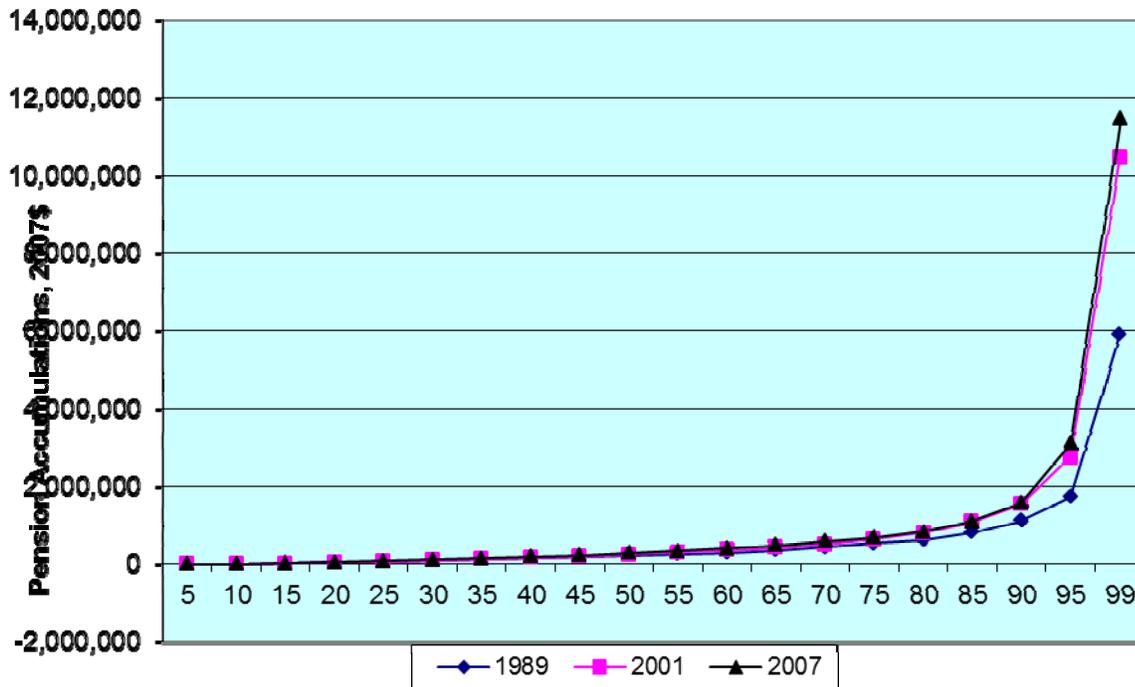


Figure 2b Percentage Change In Private Accumulations PA In 2007 Dollars by PA Percentile, Ages 47 to 64, 1989, 2001, and 2007

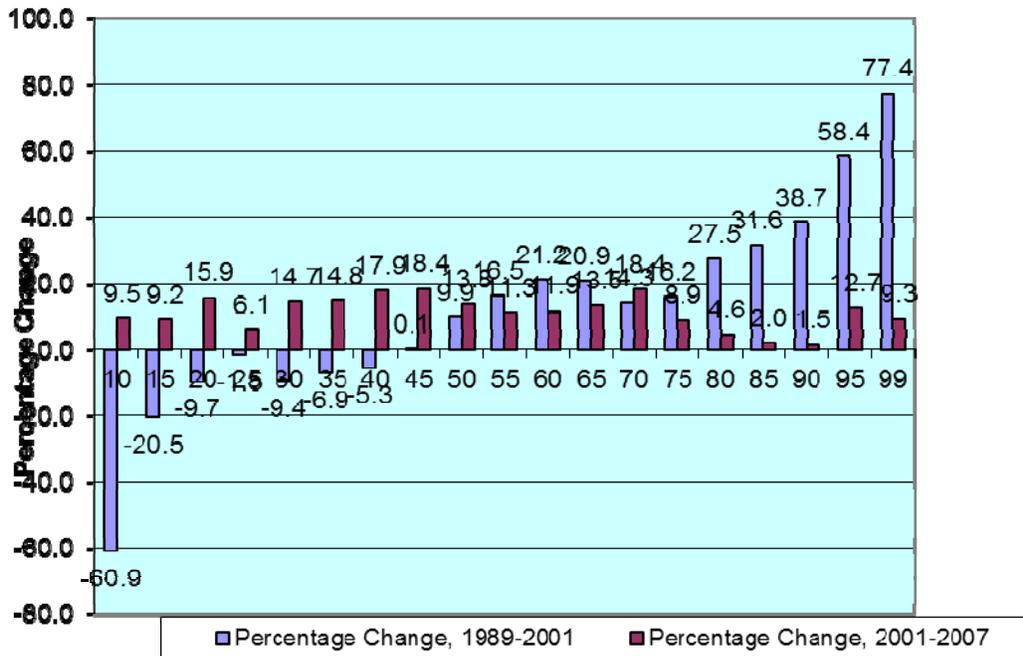


Figure 3a. Augmented Wealth AW In 2007 Dollars by AW Percentile, Ages 47 to 64, 1989, 2001, and 2007

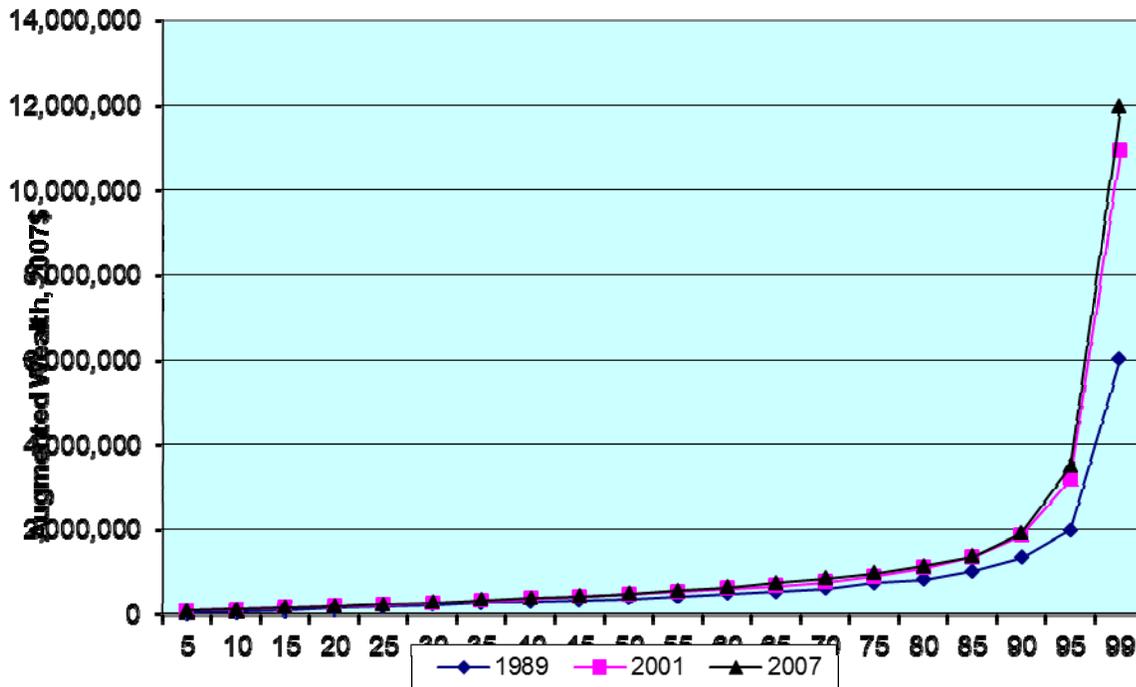
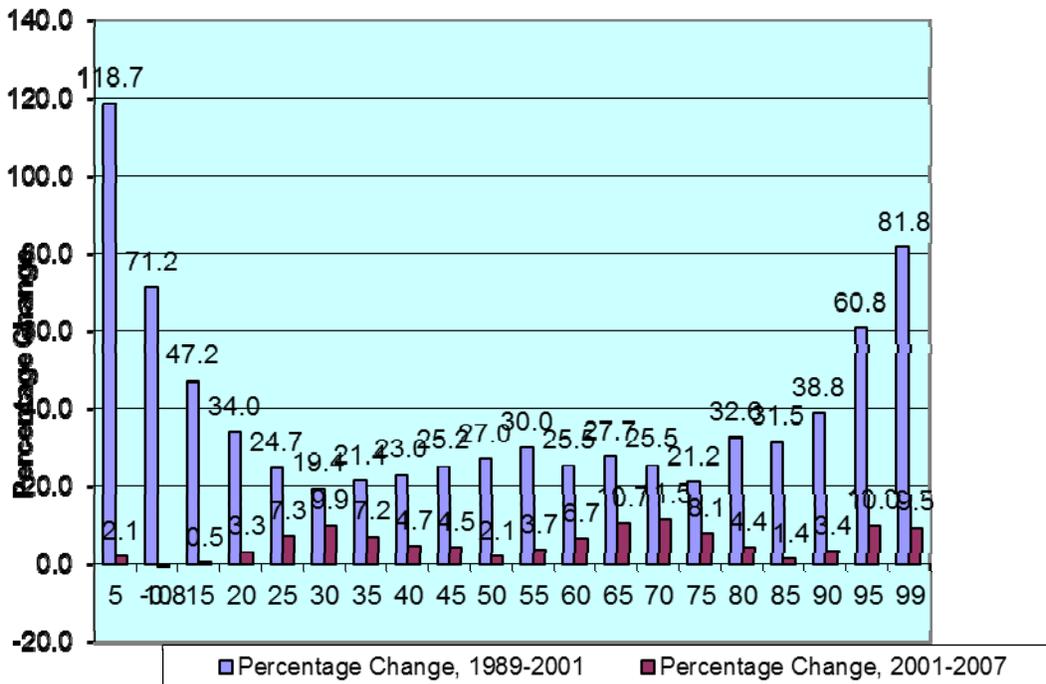


Figure 3b. Percentage Change In Augmented Wealth AW In 2007 Dollars by AW Percentile, Ages 47 to 64, 1989, 2001, and 2007



Appendix: Estimation of Pension and Social Security Wealth

I generally follow the methodology laid out in the 1983 Survey of Consumer Finances codebook. However, even though estimates of both pension and Social Security wealth are provided in the 1983 SCF, I re-estimate the values of both to be consistent with later years. The computations of retirement wealth use the following steps:

A. Defined benefit pension wealth

Defined benefit (DB) pension wealth consists of two main components.⁴³

(1) The present value of DB pensions from past jobs: The sum of the present value of past DB job pensions for head and spouse.

(2) The present value of DB pensions from current jobs: The sum of the present value of current job non-thrift benefits for head and spouse. Expectations data are used for calculations.

The procedure is as follows. Pension coverage is first ascertained for current jobs. There are five possible categories: (1) covered and vested, anticipates benefits; (2) covered but not vested yet, anticipates benefits; (3) covered but not vested yet, does not anticipate benefits; (4) not covered but anticipates will be (the age when expected to be covered is ascertained); and (5) not covered, never will be.

For those who are covered by a pension plan or expect coverage, the person is asked how many distinct pensions plans he or she is covered by. For each plan, the age at which the pension benefits are expected to be given is then asked.

The actual expected annual retirement benefit is then determined by the following steps. First, the age at which the respondent will be vested in each plan is determined. Second, the age at which the respondent could retire with full benefits is ascertained. Third, the respondent was asked the nature of the formula used to determine the retirement benefits. There are six possibilities: (1) retirement formula based on age; (2) retirement formula based on years of service.; (3) retirement formula based on meeting both age and years of service criteria; (4) retirement formula based on the sum or age and years of service; (5) retirement formula based on meeting either age or years of service criteria; and (6) other combinations or formulas.

Fourth, the age at which the respondent could retire with some benefits was asked. The same six choices of the formula used were then given. Fifth, the age at which the respondent expected benefits to start was then asked.

⁴³ A third though minor component is also provided: pensions from other non-specified sources.

Sixth, the expected retirement benefit was computed depending on the type of formula. This consists of three possibilities. (1) The annual pay in the final year of the job was computed. This variable, used in pension benefit calculations, is computed by projecting current pay to the year respondents say he/she will leave the job or retire. This projection is based on human capital earnings equations detailed in Appendix Section 4.1.3 below and a real discount rate of 2.0 percent. Wage growth is based on the historical change in the Bureau of Labor Statistics' mean hourly wages series for non-supervisory workers for the period and of hours worked per week from 1979 to 2007.⁴⁴

(2) In some cases, the respondent reported expected retirement benefits. This variable is the expected dollar retirement benefits in the first year of eligibility as answered by the respondent. For some observations the dollar amount was reported directly, but for others it was computed by multiplying reported benefits as a percentage times the calculated projected final wage. The variable is given as an annual amount except when a lump sum is expected (in which case the lump sum amount is given).

(3) In some cases, the respondent reported expected retirement benefits as a percent of final pay. This variable is the expected retirement benefits in the first year of eligibility as answered by the respondent, expressed as a percent of their projected wages in their final year of work. For some observations the percent was reported directly, but for others it was computed by dividing the reported dollar benefit by the calculated projected final wage.

Seventh, on the basis of the responses above, the present value of pension benefits from each current and past plan applicable to both head and spouse was then computed. This variable is measured assuming an annual (or lump sum) pension benefit as given above, starting in the year of first benefits. Benefits for that and each succeeding year are adjusted for the probability of death and are discounted back to the survey year. For this, I have used mortality rates by age, gender, and race in the computation of the present value of both pensions and social security wealth.⁴⁵ These are capped at 109 years. Spousal survival benefits are assumed to be opted for 75 percent the time

⁴⁴ These figures are based on the Bureau of Labor Statistics (BLS) hourly wage series. The source is Table B-47 of the Economic Report, available at <http://www.gpoaccess.gov/eop/tables09.html>. The BLS wage figures are converted to constant dollars on the basis of the Consumer Price Index (CPI-U). I use the BLS series rather than one of the alternatives to project future wages because it likely corresponds closest to changes in the Social Security wage base over time due to the cap on social Security earnings that enter the Social Security benefit formula.

⁴⁵ The source is: U.S. Bureau of the Census, *Statistical Abstract*, various years and table numbers. I use the mortality tables as of the survey year (or the one nearest to the survey year).

and are randomly assigned when appropriate. Spousal survival benefits are also adjusted for death probabilities. Benefits are discounted at a real discount rate of 2 percent.

Eighth, pension wealth was also computed for those individuals currently receiving pension benefits from past jobs. This was based on the following responses: (1) number of years receiving benefits and (2) amount of pension benefit pay received in the year preceding the survey year. For pensions already being received, the nominal value of the pension is assumed to be fixed, and is indexed to the year it started by the actual price changes observed as measured by the CPI. The present value of pension benefits from each job is then measured assuming an annual pension benefit from the survey year onward. Benefits for that and each succeeding year (adjusted for probability of survival) are discounted back to the survey year. As before, I have used mortality rates by age, gender, and race in the computation of the present value of both pensions and social security wealth. These are capped at 109 years. Spousal survival benefits are assumed to be opted for 75 percent of the time and are randomly assigned when appropriate. Spouse mortality tables are also used, and benefits are discounted a real discount rate of 2 percent.

B. Social Security wealth

The present value of social security benefits is defined as: The sum of the present value of Social Security benefits for head and spouse. Social Security formulae and current receipts are used for calculations.

Among current Social Security benefit recipients, the steps are as follows: First, it was determined the kind of Social Security benefit received. The possibilities are: (1) retirement; (2) disability; (3) both retirement and disability; and (4) other kind. Second, the respondent was asked the number of years receiving Social Security benefits. Third, both head and spouse were asked the amount received in the survey year.

Among future recipients, the steps are as follows. First, both head and spouse were asked to report the age at which they expected to receive Social Security benefits (zero if he or she does not expect benefits). Second, the number of years until the start of Social Security benefits was determined. Third, the respondent was asked the total number of years on Social Security jobs to current date. If this was not answered, then an estimate of Social Security coverage was used, summing over current and three possible past jobs. Fourth, an estimate of future years on Social Security jobs was computed from retirement years indicated by head and spouse.

Fifth, data on number of years on Social Security jobs, wage rates for each known job, estimates of retirement dates, and dates of starting benefits were used as inputs to Social Security formulae to compute benefits. Sixth, estimates of Social Security benefits were provided. A calculated value was based on current job wage. All persons were assumed to work continuously until their stated age of full-time retirement, and then part-time until their stated age of final retirement. All persons were assumed to retire no later than 72 or age plus one if currently over 72. Persons not currently working and over 50 were assumed not to work again. Wages were calculated by projecting current wages by the same method used to calculate final wages. This projection is based on human capital earnings equations detailed in Appendix Section 4.1.3 below and a real discount rate of 2.0 percent. Wage growth is based on the historical change in the Bureau of labor Statistics' mean hourly wages series for non-supervisory workers for the period and of hours worked per week from 1979 to 2007. Part-time years (if currently working full-time) were assigned wages equal to one half the projected full-time wages or the maximum amount allowable for full benefit receipt allowed by Social Security, whichever was smaller.

Seventh, the Social Security AIME (Average Indexed Monthly Earnings) used as the basis of computing the Social Security benefit base was computed. The variable is the average covered Social Security earnings per month (including zeros) for all years from 1951 or age 22 (which ever is later) to age 60. These are indexed by a Social Security wage index to the year the respondent is 60. Years after 60 can be substituted at nominal value. The five lowest years are dropped before an average AIME is computed. These procedures are mimicked using the SCF data on job earnings and future retirement plans to estimate an AIME value. Past and current job wages are projected back (and forward) to estimate earnings for each known year of work. As before, these projections are based on human capital earnings equations detailed in Appendix Section 4.1.3 below and a real discount rate of 2.0 percent. Wage changes are based on the historical change in the Bureau of labor Statistics' mean hourly wages series for non-supervisory workers for the period and of hours worked per week from 1979 to 2007. Other years of unknown jobs are filled in with terms from the closest known job to fill in the total number of Social Security covered years. Wages are then capped at the actual or projected Social Security maximum and minimum coverage amounts. The AIME was then computed using actual or projected Social Security wage indices. The variable is currently estimated for all persons projected to have future Social Security benefits.

Eighth, the Social Security PIA (Primary Insurance Amount) on an annual basis is the basis of the calculation of Social Security benefits. It is computed from the AIME. In 1982 the monthly PIA was computed as 90 percent of the first \$254 of AIME plus 32 percent of the next \$1274 plus 15 percent of the amount above that. Calculations here take account of legislatively planned changes in this formula. The PIA is currently computed for all non-receivers projected to have future Social Security benefits.

Ninth, the present value of Social Security benefits is then computed assuming an annual benefit as given by the PIA estimate and starting in the year of first benefits (or the survey year). Benefits for that and each succeeding year (adjusted for probability of receipt) are discounted back to the survey year. As before, I have used mortality rates by age, gender, and race in the computation of the present value of social security wealth. These are capped at 109 years. Benefits are discounted at a real discount rate of 2 percent.

Tenth, spousal benefits are also assumed at 50 percent of the primary benefit if a spouse is present. However, this variable will be zero if no spousal benefits are expected (such as when the individual's own benefits are larger than their spousal benefits). The age at which spousal benefits begin is estimated. Spouse mortality tables are also used for these calculations. The age at which widow's benefits first could be drawn is also estimated. It is an estimate of the age at which the individual could start to receive Social Security widow's benefits upon the death of the spouse. This variable will be zero if widow's benefits could never be drawn. An adjustment is also made if it appeared that the recipient's benefits had been reduced because of work. Benefits are discounted at a real discount rate of 2 percent.

C. Human capital earnings equations

The regression equations used to compute future and past earnings are as follows: Human capital earnings functions are estimated by gender, race, and schooling level. In particular, the sample is divided into 16 groups by the following characteristics: (i) white and Asian versus African-American and Hispanic; (ii) male and female; and (iii) less than 12 years of schooling, 12 years of schooling, 13 to 15 years of schooling, and 16 or more years. For each group, an earnings equation is estimated as follows:

$$\ln(E_i) = b_0 + b_1 \ln(H_i) + b_2 X_i + b_3 X_i^2 + b_4 SE_i + \sum_j b_j OCCUP_{ij} + b_{10} MAR_i + b_{11} AS_i + \varepsilon_i,$$

where \ln is the natural logarithm; E_i is the current earnings of individual I ; H_i is annual hours worked in the current year; X_i is years of experience at current age (estimated as age minus years of schooling minus 5); SE_i is a dummy variable indicating whether the person is self-employed or working for someone else; OCCUP is a set of five dummy variables indicating occupation of employment: (a) professional and managerial; (b) technical, sales, or administrative support; (c) service; (d) craft, and (e) other blue-collar, with farming the omitted category; MAR is a dummy variable indicating whether the person is married or not married; AS is a dummy variable indicating whether the person is Asian or not (used only for regressions on the first racial category); and ε is a stochastic error term. Future earnings are projected on the basis of the regression coefficients.⁴⁶

D. Questions on work history

Following is a sample of questions on work history drawn from the 1989 SCF codebook that is used to calculate the earnings profile of both head and spouse and to calculate the AIME for each:

1. Including any periods of self-employment, the military, and your current job, since you were 18, how many years have you worked full-time for all or most of the year?
2. Not counting your current job, have you ever had a full-time job that lasted for three years or more?
3. I want to know about the longest such job you had. Did you work for someone else, were you self-employed, or what?
4. When did you start working at that job?
5. When did you stop working at that job?
6. Since you were 18, have there been years when you only worked part-time for all or most of the year?
7. About how many years in total did you work part-time for all or most of the year?
8. Thinking now of the future, when do you expect to stop working full-time?
9. Do you expect to work part-time after that?
10. When do you expect to stop working altogether?

E. Questions on defined contributions plans

⁴⁶ This implicitly assumes that deviations from the regression line in the current year are a result of a transitory component to current income only. This procedure follows the conventions of the 1983 SCF codebook.

1. Does your employer make contributions to this [Defined Contribution] plan? Does the business make contributions to this plan?

2. What percent of pay or amount of money per month or year does your employer currently contribute?