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TAXES AND THE REVALUATION OF HOUSEHOLD WEALTH

Edward N. Wolff

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ABSTRACT

Tax deferred assets (TDAs) such as 401(k)s cannot be directly valued with other assets such as homes and stocks because TDAs carry a substantial deferred tax liability on withdrawal. I also net out implicit taxes on accrued capital gains and compare pre-tax and post-tax wealth. The empirical analysis covers 1983-2016 based on the Survey of Consumer Finances for conventional net worth, NW, and augmented wealth, AW, the sum of NW, pension wealth PW, and Social Security wealth SSW. Like TDAs, defined benefit pension and Social Security benefits are taxed on receipt. Netting out implicit taxes lowered PW by 24% in 2016. It also devalued SSW by 14%, NW by 5%, and AW by 8% but the reduction was lower in the 1980s. Subtracting implicit taxes lowered PW and SSW inequality but had no appreciable impact on NW or AW inequality. I also consider the bequest value BV of wealth, including death benefits. While TDAs are still subject to income tax at withdrawal, other assets are valued on a step-up in basis. BV was considerably greater than NW but BV inequality notably lower. When estimated estate taxes due on death are subtracted, BV was substantially reduced and its inequality sharply reduced.

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: The Toxic Asset

Poterba (2004) makes the compelling argument that the face value of 401(k)s, IRAs, and other tax deferred assets (or TDAs) cannot be directly valued together with other components of household wealth such as houses, stocks, and bonds. The rationale is that TDAs carry a substantial deferred tax liability on withdrawal. Thus, for example, an IRA valued at $1,000 can yield considerably less than a $1,000 when the asset is "cashed out." Indeed, my accountant refers to these instruments as "toxic assets" because their withdrawal value is typically much less than their face value.

As Poterba notes, "…deferred taxes … can make a dollar held inside a retirement saving account worth less at retirement than a dollar held in a similar asset outside such an account… [p. 490]". Poterba is mainly concerned with the issue of whether the (post-tax) rate of return is higher with a TDA or directly investing in stocks and bonds. Interestingly, he finds that the answer depends on factors like the income level of the investor, the time horizon, and the tax treatment of interest and dividends.

The motivation here is quite different. It is to compare time trends in wealth with and without netting out the tax liability implicit in such TDAs. That is to say, I accept the current allocation of wealth between TDAs and other assets among U.S. households as given and ask how the proper valuation of TDAs affects observed trends in mean and median wealth and wealth inequality.

Almost all studies of household wealth in the U.S. simply use the face value of TDAs when valuing household wealth and add it to the value of other assets like homes to yield "conventional" net worth (see the literature review in the next section for a couple of exceptions). The primary issue addressed in this paper is how netting out implicit taxes embedded in TDAs affects estimated trends in household wealth. I also consider how netting out income taxes due on accrued capital gains impacts wealth trends.

Four measures are used. (1) The first is the conventional definition of (pre-tax) household wealth, NW, in which assets such as TDAs are valued at their face value. (2) The second is the post-tax value. To convert TDAs to a post-tax value, it is necessary to subtract out the accumulated taxes due on these instruments. These withdrawals are taxed as ordinary income. In 2016 the top tax rate on ordinary income was 39.6 percent. Other

assets like stocks and bonds may have capital gains tax due on liquidation, so they must be adjusted accordingly. Long-term capital gains is a tax preference source of income. The capital gains tax was subject to a maximum rate of 20 percent according to 2016 (and current) tax rules.

(3) The third is the *bequest value* (BV). This is the value of an estate when it passes to its beneficiaries (the "estate value") plus the value of death benefits (see below). It is first of note that even when received in a will, TDAs are still subject to income taxes at ordinary income rates on withdrawal, and required minimum distributions (RMDs) carry over.[1] There is no escaping the tax liability (that is why my accountant calls them "toxic assets"). However, in contrast to post-tax NW, all other assets are valued on a "step-up in basis," according to current and past tax rules. This means that any accrued capital gains are "forgiven" and not subject to income tax on withdrawal. In other words, the after-tax value of these assets is their current market value at the time the estate is probated, with no reduction for the imputed capital gains tax.

(4) The fourth is the *net bequest value* (BV). This is the bequest value net of imputed estate taxes.

The empirical analysis covers the period from 1983 to 2016 based on data from the Federal Reserve Board's Survey of Consumer Finances (SCF). It will be conducted for both conventional net worth NW and augmented wealth AW -- the sum of NW, defined benefit pension wealth (DBW), and Social Security wealth (SSW). The reason for looking at augmented wealth is that both defined benefit pension benefits and Social Security benefits are taxed on receipt like TDAs. With regard to bequest value, Social Security wealth has a zero value since benefits terminate at death. Likewise, defined benefit wealth also has a zero bequest value for the same reason (unless there is an option for a lump-sum payout at death).

The empirical analysis focuses on years 1983, the first data point; 1989 and 2007, peak (or near-peak) years of the business cycle; and 2016, the last year of data. I provide results for only age groups 47-64 and 65 and over. The rationale is that incomes and

[1] The RMD is the withdrawal from a defined contribution plan required by law. Before this year (2020), holders of such plans were required to withdraw a certain amount of money, determined by an IRS formula, once they reached age 70½. The age has now been raised to 72 (as of 2020).

wealth portfolios are more firmly established for these two age groups than for those under age 47.[2]

I use actual reported income in the survey year as the basis of the tax calculation. Following Poterba, this is an *ex ante* formulation. This is not really a problem for current retirees. However, for those currently working, it might be better to use income projections to retirement (or even to age 70½ or 72 when the RMD becomes operative) in order to estimate the effective *ex post* marginal tax rate for TDAs and the capital gains tax. However, such income projections are problematic using cross-section data.[3] As a result, the tax calculation is performed using the NBER TAXSIM model[4] on the basis of current income and current tax rules.[5]

Several major questions are addressed. First and foremost, how do time trends in mean and median wealth differ between pre-tax and post-tax NW? Wealth values will, of course, be lower for the latter. Moreover, because as we shall see in Section 4, defined contribution pension wealth (DCW) has been rising sharply as a share of NW, growth in mean and median post-tax NW will be lower than that of pre-tax NW. This difference will also depend on what happens to marginal tax rates over time.

Second, how does the level and time trend in inequality differ between pre-tax and post-tax NW? We would expect a lower Gini coefficient for the latter because the rich face a higher marginal tax rate than the poor or middle class and thus the after-tax wealth of the rich is devalued more than these other two groups. However, counteracting this effect is the fact that DCW constitutes a much smaller share of the assets of the top one percent of wealth holders (though a higher share of the next 19 percent) than the middle class. I will determine what is the trade-off between these two effects.

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[2] A secondary consideration is that data on defined benefit pension and Social Security benefits are not available for those under age 47 in 1983.

[3] It might be feasible to project labor earnings to age 65 on the basis of a human capital earnings function but projecting future capital income is not really feasible.

[4] Available at http://users.nber.org/~taxsim/ . See Feenberg and Coutts (1993) for a description of TAXSIM.

[5] It is likely that the *ex post* marginal tax rate at the time of withdrawal will be lower because post-retirement income is generally lower than pre-retirement income. However, it is not possible to predict how the tax schedule will change in the future.

Third, how do times trends in mean and median wealth and wealth inequality differ between NW and BV? We might expect that the cleavage between NW and BV will rise over time because of the growing importance of DCW in overall assets. We might also expect that BV is less unequal than NW since death benefits tend to be concentrated among middle wealth households.

Fourth, a similar set of issues arises with regard to augmented wealth, AW. How do levels and time trends in mean and median value and Gini coefficient differ between pre-tax and post-tax AW?

Fifth, how do wealth gaps differ by demographic characteristics and income and wealth class? Of particular interest is whether the racial wealth gap and that between younger and older households is lessened when post-tax NW is used instead of standard net worth.

The rest of the paper is organized as follows. Section 2 provides a review of pertinent literature. Section 3 offers details on data sources and methods. Section 4 provides results on basic wealth trends in standard net worth. Section 5 shows similar time trends for augmented wealth. Section 6 first spells out details on the calculation of post-tax NW and post-tax AW. It then compares levels and trends between pre-tax and post-tax NW and AW. Section 7 introduces the concept of bequest value (BV) and makes comparisons between BV (and net BV) and NW. Section 8 provides details on the four measures by demographic characteristics and income and wealth class. A summary and concluding remarks are provided in Section 9.

2. Literature Review

Several studies document a surge in wealth inequality from the 1980s through the 2010s. Pfeffer et. al. (2013) make use of the Panel Study of Income Dynamics (PSID) and SCF data to analyze trends in wealth inequality over the Great Recession from 2007 to 2011. They find that all socioeconomic groups experienced declines in wealth following the recession, with higher wealth families experiencing larger absolute declines. However, in percentage terms the losses were greater for less advantaged groups as measured by minority status, education, and pre-recession income and wealth, leading to a substantial rise in wealth inequality in just a few years.

Saez and Zucman (2016), rather than relying on actual wealth survey data, convert income flows to stocks by taking the reciprocal of the rate of return and multiplying the flow (the so-called "capitalization method.") With this method, they use federal income tax data to reconstruct the U.S. wealth distribution from 1913 to 2013. One of their most important findings is the sharp rise of the share of total household wealth owned by the top 0.1% from the beginning of the 1990s from about 10% to about 15% at the end of the 1990s. Subsequently, the top 0.1% wealth share climbed even more strongly to about 23% in 2013.

This finding appears to be sensitive to the method and data used. Smith et al. (2019), for example, use the capitalization method but account for heterogeneity of rates of return within asset classes. This leads to a much smaller wealth share of the top 0.1% in 2013 of about 15%. Bricker et al. (2015 and 2016b) use directly surveyed wealth data from the SCF augmented by the Forbes list of the 400 wealthiest Americans. They match some results of Saez and Zucman (2016), but their estimated share of the top 0.1% for 2013 is about 6 percentage points lower. The trajectory of the top 0.1% wealth share in Bricker et al. (2015) more closely matches the series presented in Smith et al. (2019) than in Saez and Zucman. Bricker et al. (2016a and 2016b) reconcile estimates from the capitalization method and the SCF, showing that the deviations in estimates are driven by differences in variable definitions and differences in the unit of analysis.

Kopczuk (2015) compares estimates from the capitalization method with those from the mortality multiplier method that builds on estate tax data. A striking finding is that, until the early 1990s, both the capitalization and mortality multiplier estimates for the top 0.1% wealth share tracked each other very closely, but after this point the capitalization estimates climbed sharply while the mortality multiplier estimates remained flat. Kopczuk raises several issues why the methods arrive at different estimates. First, the unit of analysis differs, as the mortality multiplier estimates relate to individuals while the capitalization estimates relate to tax units. Second, personal debt is incorporated in the estate tax records but not in capital income. Third, assets that do not generate a positive return like state and local government bonds and debt must be imputed in the capitalization technique. For the top 10% wealth share, Kopczuk (2015) documents a rise from the early 2000s, which is captured in both capitalization estimates

and direct estimates from the SCF. Accordingly, the data seem to support a broad upward trend in wealth concentration. However, more finely grained analyses of the top 1% or the top 0.1% lead to diverging estimates across datasets and methods.

Other methods and other inequality indices offer evidence in support of the rising trend in wealth inequality. Wolff (2017) uses data from the SCF to show the evolution of the Gini index of net worth over time and finds a marked increase in the Gini from 2007 to 2010. He also finds an upward trend of the top 1% wealth share from 2001 onward. Bricker et al. (2019) pursue imputation and augmentation techniques for the SCF, in particular a Pareto imputation of the top-tail and the augmentation by the Forbes 400 list. Both techniques increase the top 1% wealth share by about 1.5 percentage points; for example from 39% to 40% in 2016. Bricker et al. (2019) also find the same upward trend in the top 1% share found by Wolff (2017). All these analyses are based on standard before- tax net worth. Of particular interest here is whether the same time trend pattern will hold up for after-tax net worth.

Besides Poterba (2004), there are only two papers that I am aware of that have been written on the topic of estimating after-tax wealth. The first is Wolff (2011) in which defined contribution pension wealth, defined benefit pension wealth, and Social Security wealth are valued net of federal income taxes due on withdrawal. The empirical analysis is conducted for years 1983 to 2007 using the SCF. Household income is projected to year of retirement and income taxes due on withdrawal are computed for defined contribution, defined benefit, and Social Security benefits.[6] Taxes on accrued capital gains and estate taxes were not included in the calculation. The analysis compares pre-tax and post-tax augmented wealth. The results show that post-tax augmented wealth grew slower over this period than pre-tax augmented wealth but the difference is relatively small – 57 versus 60 percent for mean values and 35 versus 37 percent for median values. However, netting out implicit taxes on pension and Social Security wealth barely affects the measured inequality of AW. As a result, inequality trends in augmented

[6] For households whose members were currently working, an 80 percent replacement rate is used to project income at retirement.

wealth between 1989 and 2007 remain almost unchanged after subtracting implicit taxes from retirement wealth.

Looney and Moore (2015) perform a similar analysis, also using the SCF. They look at the period from 1989 to 2013. Their tax analysis is based on current household income. They also include imputed capital gains taxes on accrued capital gains. They base their analysis only on household net worth (not augmented wealth). However, their results are quite similar. They find almost no difference in the growth rate of mean after-tax net worth compared to mean before-tax net worth – both gained about 60 percent between 1989 to 2013. They also report little effect of moving from a pre-tax to a post-tax basis on measured net worth inequality.

This paper adds to the existing literature in several ways. First, in comparison to Wolff (2011) and Looney and Moore (2015), results are updated to 2016.[7] Second, empirical analysis begins in 1983 instead of 1989. This is important because this preceds the huge run-up in defined contribution pension accumulations. Moreover, federal tax rates were higher in 1983 than 1989. Third, I separate out the effects of taxes on TDAs from those on accrued capital gains. Fourth, there is an important difference in basic methodology between this paper and Looney and Moore (2015) to compute post-tax wealth, as detailed below in footnote 16. Fifth, I limit the analysis to age groups 47-64 and 65 and over. Those under 47 have not accumulated much wealth. Moreover, workers tend to start saving for retirement when they reach their forties. Since DCW, DBW, and SSW are components of retirement wealth, it is more meaningful to limit analysis to those who are retired and those near retirement than to young people. Indeed, estimates of DBW and SSW are not very reliable for persons under age 45 or so.

Sixth, I extend the concept of TDAs to include annuities and life insurance. Seventh, in comparison Looney and Moore (2015), I add an analysis of post-tax augmented wealth. Eighth, I develop the concept of bequest value, BV. Ninth, in this regard, I extend the tax analysis to include estate taxes. Tenth, I provide a demographic breakdown of the impact of taxes on net worth components. The key categories are (a)

[7] There were only minor changes in tax rules between 2013 and 2016. First, the top federal income tax rate stayed at 39.6 percent for ordinary income and 20 percent for long term capital gains. Second, the estate tax threshold was raised from $5,250,000 to $5,450,000 for singles but the top estate tax rate was maintained at 40 percent.

age class, (b) education, (c) race, and (d) family type. I also provide a disaggregation by (e) income class, (f) wealth class, and (g) homeowner status.[8]

My results show more pronounced differences between before- and after-tax wealth (even from 1989 onward) and particularly in growth rates over time than Looney and Moore (2015). One implication is that conventional (pre-tax) figures have been overstating NW (and AW) growth. However, like them, I find little effect on NW inequality levels or trends (though more effect on AW inequality).

3. Data sources and methods

The primary data sources used for this study are the 1983, 1989, 2001, 2007, 2010, and 2016 Survey of Consumer Finances (SCF) conducted by the Federal Reserve Board.[9] Each survey consists of a core representative sample combined with a high-income supplement. Starting in 1989, the high income supplement is selected as a list sample derived from tax data by the Statistics of Income Division of the Internal Revenue Service (SOI). This second sample is designed to disproportionately select families that were likely to be relatively wealthy. Typically, about two thirds of the cases come from the representative sample and one third from the high-income supplement.

The basic wealth concept used here is standard (pre-tax) wealth (or net worth) NW, 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) housing; (2) other real estate; (3) bank deposits, certificates of deposit, and money market accounts; (4) financial securities; (5) the cash surrender value of life insurance; (6) defined contribution pension plans, including IRAs, Keogh, and 401(k) plans; (7) corporate stock and mutual funds; (8) unincorporated businesses; and (9) trust funds. Total liabilities are the sum of: (1) mortgage debt, (2) consumer debt and (3) other debt such as educational loans. These values are based on face value as is conventional in almost all analyses of household wealth.

[8] There are also a couple of minor differences in methodology between my analysis and that of Looney and Moore (2015). First, their measure of unrealized capital gains does not include the primary residence, whereas mine does. Second, they include state income tax in their calculations because they have data on residence (the internal SCF file has state identifiers whereas the public use sample, which I use, does not).

[9] The years were selected for the following reasons: 1983 is the first year of data available; 1989, 2001, and 2007 are peak or near-peak years of the business cycle; 2010 was the end of the "Great Recession"; and 2016 is the latest data available.

This measure reflects wealth as a store of value and therefore a source of potential consumption. I believe that this is the concept that best reflects the level of well-being associated with a family's holdings. Thus, only assets that can be readily converted to cash (that is, "fungible" ones) are included. As a result, consumer durables such as automobiles are excluded here since these items are not easily marketed, with the possible exception of vehicles, or their resale value typically far understates the value of their consumption services to the household. Another justification for their exclusion is that this treatment is consistent with the national accounts, where purchase of vehicles is counted as expenditures, not savings. As a result, my estimates of household wealth will differ from those provided by the Federal Reserve Board, which includes the value of vehicles in their standard wealth definition (see, for example, Bricker et. al., 2015).

Also excluded in the concept of net worth is the value of future Social Security benefits the family may receive upon retirement ("Social Security wealth"), as well as the value of retirement benefits from private pension plans ("pension wealth"). Even though these funds are a source of future income, they are not in their direct control and cannot be marketed. The value of these two components will be included in a measure of augmented wealth (see Section 4).

4. Basic Wealth Trends for Standard Net Worth, 1983-2016

I begin with descriptive statistics. This will establish a baseline for the rest of the analysis. Table 1 documents a robust growth in wealth from 1983 to 2007 (also see Figure 1). Median wealth increased at an annual rate of 1.13 percent from 1983 to 1989, a little faster at 1.22 percent from 1989 to 2001, and then much faster at 2.91 percent from 2001 to 2007.[10] Then between 2007 and 2010, median wealth plunged by a staggering 43.9 percent. The primary reasons were the collapse in the housing market and the high leverage of middle class families. Median wealth then rebounded by 17.4 percent from 2010 to 2016, though it was still 34.2 percent below its peak in 2007 (and even below its value in 1983).

[Table 1 and Figure 1 about here]

[10] Unless otherwise indicated, all dollar figures are in 2016 dollars.

As shown in row 3, the percentage of households with zero or negative net worth increased from 15.5 percent in 1983 to 17.9 percent in 1989 and then 18.6 percent in 2007 (also see Figure 2). This was followed by a sharp rise to 21.8 percent in 2010. Interestingly, there was only a very small drop off in 2016 (to 21.2 percent) despite the recovery in the economy.

[Figure 2 about here]

Mean net worth also grew vigorously from 1983 to 1989 at 2.27 percent per year, about double the growth rate of median wealth (Row 2). Over years 1989 to 2001, the growth rate was 3.02 percent per year, even higher than in the preceding periods. Its annual growth rate then reached 3.10 percent between years 2001 and 2007, largely due to the rapid (19 percent) increase in housing prices. Mean wealth in 2007 was almost double its value in 1983 and about three quarters larger than in 1989. Another point of note is that mean wealth grew more about twice as fast as the median between 1983 and 2007, indicating widening inequality of wealth over these years.

The Great Recession saw an absolute decline in mean household wealth. However, whereas median wealth plunged by 43.9 percent between 2007 and 2010, mean wealth fell by (only) 16.0 percent. The main causes were falling housing and stock prices. However, here, too, the relatively faster growth in mean wealth than median wealth (that is, the latter's more moderate decline) was coincident with rising wealth inequality. Years 2010 to 2016 did finally see a full recovery in mean wealth, with it rising by 28.2 percent, 7.6 percent above its previous 2007 peak.

The figures in Row 4 show that wealth inequality increased from 1983 to 1989 (by 0.029 Gini points) and then remained virtually unchanged from 1989 to 2007, at least according to the Gini coefficient (also see Figure 3). The years 2007 to 2010 then saw a sharp elevation in wealth inequality, with the Gini coefficient rising from 0.834 to 0.866. From 2010 to 2016 there was a small rise in the Gini coefficient, from 0.866 to 0.877.

[Figure 3 about here].

Table 2 shows changes in the portfolio composition of total household wealth (also see Figure 4). In 2016, owner-occupied housing was the most important household asset in the average portfolio breakdown for all households, accounting for 25 percent of total assets. However, net home equity -- the value of the house minus any outstanding

mortgage -- amounted to only 17 percent. Real estate, other than homes comprised 10 percent, and business equity another 20 percent.

[Table 2 and Figure 4 about here]

Demand deposits, time deposits, money market funds, CDs, and the cash surrender value of life insurance (collectively, "liquid assets") made up 6.7 percent and pension accounts, notably, 15.6 percent. Bonds and other financial securities amounted to 1.3 percent; corporate stock, including mutual funds, to 16.1 percent; and trust fund equity to 3.4 percent. Debt as a proportion of gross assets was 12.5 percent, and the debt to net worth ratio was 0.14.

There were some significant changes in the composition of household wealth over years 1983 to 2016. First, the share of housing wealth in total assets, after fluctuating between 28 and 30 percent from 1983 to 2001, jumped to 32.8 percent in 2007 but then receded to 25.1 percent in 2016. Two factors explain this movement. The first is the trend in the homeownership rate, which rose from 63.4 percent in 1983 to 68.6 percent in 2007 and then fell off to 63.7 percent in 2016.[11] The second is that the median house price for existing one-family homes rose by 39.1 percent between 2001 and 2007 and then plunged by 19.4 percent from 2007 to 2013, though it did recover by 18.4 percent from 2013 to 2016.

A second and related trend is that net home equity, after falling almost continuously from 23.8 percent of total assets in 1983 to 18.2 percent in 1998, picked up to 21.8 percent in 2004 but then fell again to 16.5 percent in 2016. The difference between the two series (gross versus net housing values) is attributable to the changing magnitude of mortgage debt on homeowner's property, which increased from 20.9 percent in 1983 to 39.3 percent in 2013, but then fell off to 34.4 percent in 2016.

Third, overall relative indebtedness first increased, with the debt to net worth ratio climbing from 15.1 percent in 1983 to 17.9 percent in 2013 and then falling to 14.3 percent in 2016. The debt-income ratio surged almost continuously over time from 68.4 percent in 1983 to 127.0 percent in 2010 but then dropped off sharply to 95.1 percent in 2016. If mortgage debt on principal residence is excluded, then the ratio of other debt to total assets actually fell off over time from 6.8 percent in 1983 to 3.9 percent in 2016.

[1111] According to the SCF, the homeownership rate peaked at 69.1 percent in 2004.

A fourth change is that pension accounts rose from 1.5 in 1983 to 15.6 percent in 2016. This increase largely offset the decline in the share of liquid assets in total assets, from 17.4 percent in 1983 to 6.7 percent on 2016, so that it is reasonable to infer that to a large extent households substituted tax-deferred pension accounts for taxable savings deposits.

Fifth, stocks and mutual funds rose from 9.0 to 16.1 percent of gross assets over these years. Its year to year trend mainly reflected fluctuations in the stock market. 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 11.3 percent in 1983 to a peak of 24.5 percent in 2001, and then fell to 22.4 percent in 2016. 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 sluggish stock market as well as a drop in stock ownership. The increase from 2010 to 2016 reflected the recovery of the stock market.

The tabulation in Table 2 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. As shown in Table 3, the richest one percent of households (as ranked by wealth) invested 80.4 percent of their savings in investment real estate, businesses, corporate stock, and financial securities in 2016 (also see Figure 5). Corporate stocks, either directly owned by the households or indirectly owned through mutual funds, trust accounts, or pension accounts, comprised 25.5 percent by themselves. Housing accounted for only 7.6 percent of their wealth (and net home equity 6.4 percent), liquid assets for 4.6 percent, and pension accounts for another 6.0 percent. Their debt- net worth ratio was only 2.4 percent, their debt- income ratio was 35.0 percent, and the ratio of mortgage debt to house value was 15.4 percent.

[Table 3 and Figure 5 about here]

Among the next richest 19 percent of U.S. households, housing comprised 25.6 percent of their total assets (and net home equity 18.8 percent), liquid assets 7.7 percent, and pension assets another 22.4 percent. Investment assets -- real estate, business equity, stocks, and bonds – made up 43.1 percent and 24.5 percent was in the form of stocks

directly or indirectly owned. Debt amounted to 10.1 percent of their net worth and 88.9 percent of their income, and the ratio of mortgage debt to house value was 26.5 percent.

In contrast, over three-fifths of the assets of the middle three wealth quintiles of households was invested in their own home in 2016. However, home equity amounted to only a third of total assets, a reflection of their large mortgage debt. Another quarter went into monetary savings of one form or another and pension accounts. Together housing, liquid assets, and pension assets accounted for 87.0 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 9.7 percent of their total assets. The ratio of debt to net worth was 58.9 percent, substantially higher than for the richest 20 percent, and their ratio of debt to income was 120.4 percent, also much higher than that of the top quintile. Finally, their mortgage debt amounted to 46.1 percent of the value of their principal residences.

Almost all households among the top 20 percent of wealth holders owned their own home, in comparison to 67.0 percent of households in the middle three quintiles. Three-quarters of households in the top percentile owned some other form of real estate, compared to 46.7 percent of those in the next 19 percent of the distribution and only 11.7 percent of households in the middle 60 percent. Over 90 percent of the top group had a pension account, compared to 83.8 percent of the next 19 percent and 48.9 percent of the middle. A stunning two thirds of the top group reported owning their own business. The comparable figures were 28.7 percent among the next 19 percent and only 7.8 percent of the middle class.

Among the top group, 89.2 percent held corporate stock, mutual funds, financial securities or a trust fund, in comparison to 61.6 percent of the next 19 percent and only 15.3 percent of the middle group. Ninety-four percent of the top percentile reported owning stock either directly or indirectly, compared to 86.2 percent of the next 19 percent and 45.0 percent of the middle. If we exclude small holdings of stock, then the ownership rates dropped off sharply among the middle three quintiles, from 45.0 percent to 33.9 percent for stocks worth $5,000 or more and to 28.3 percent for stocks worth $10,000 or more.

4. Trends in Augmented Wealth, 1989-2016

I next add in defined benefit pension wealth (DBW) and Social Security wealth (SSW) to the household portfolio. How does the inclusion of these two components affect trends in mean and median wealth over time? How does it affect inequality movements? 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.

The imputation of both DBW and SSW involves a large number of steps. These are summarized in Appendix 1. As with the concept of household net worth, there are alternative formulations of both DBW and SSW and none is necessarily the "correct" measure (see Wolff, 1992, for further discussion of this point). I have elected to use the standard gross measure, since it is the conventional formulation. It should also be noted that this definition of DBW and SSW is based on the conventional "on-going concern" treatment. It is assumed that employees continue to work at their place of employment until their expected date of retirement.

I define "non-pension wealth" NWX be as marketable household wealth (NW) minus defined contribution wealth (DCW):

(1) $NWX = NW - DCW.$

Total pension wealth, PW, is given by:

(2) $PW = DCW + DBW.$

Private augmented wealth PAW is then defined as:

(3) $PAW = NWX + PW.$

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. Retirement wealth is defined as the sum of pension and Social Security wealth:

(4) $RW = PW + SSW$

and augmented household wealth, AW, is given by

(5) $AW = NWX + PW + SSW.$

I begin the empirical analysis by looking at pension wealth for *all* households in Table 4. I show results for the first year of the period, 1989, the last year, 2016, and 2007 since it is a critical turning point.[12] One of the most dramatic changes in the retirement income system over the last three decades or so has been the replacement of many traditional DB plans with DC pensions. The first focus of this part is to analyze the effects of the changeover in the pension system on the growth of pension wealth from 1989 to 2016. The picture that unfolds is a precipitous drop in DB coverage among all households more than compensated by a sizeable increase in DC coverage, at least until 2007. Moreover, while mean pension wealth gained rapidly from 1989 to 2007, it grew more slowly from 2007 to 2016.

[Table 4 about here]

Among all households, mean DCW surged by a factor of 7.3 between 1989 and 2007. Opposite trends are evident for DBW. The mean rose by only 8.3 percent between 1989 and 2007. Overall, average PW climbed by 105.7 percent from 1989 to 2007. Mean DCW continued to expand over the Great Recession and by 2016 was up to $119,100, 33.9 percent above its 2007 level. Mean DBW was down from 2007 to 2010 but then shot up to $82,700 in 2017, a gain of 16.7 percent over 2007. Overall mean PW was up by 26.3 percent from 2007, to $201,800 in 2016. Over the whole period, 1989 to 2016, mean PW advanced 159.8 percent. This compares to a 86.2 percent gain in mean net worth. The growth in PW was led by DCW, which climbed almost ten-fold, while DBW rose by 26.3 percent.

Mean SSW among all households advanced by 72.0 percent from 1989 to 2016, about half as fast as mean PW. Median SSW grew a bit slower, 62.4 percent. Mean retirement wealth (RW) more than doubled, while median RW saw only a 68.4 percent gain.

Mean NW among all households advanced by 86.2 percent from 1989 to 2016, to $667,900 (line 6). Mean PAW (net worth plus DBW) grew a bit more slowly, 77.0 percent, because of the relatively smaller gains in DB pension wealth. All told, mean AW rose 75.8 percent over these years to $973,400 in 2016. This increase was somewhat lower than that of

[12] Figures on DBW and SSW cannot be estimated for households under age 47 in 1983 and, correspondingly, for all households as well. As a consequence, I show results for the period from 1989 to 2016 only.

net worth. For all three components, there were robust gains from 1989 to 2007, followed by much smaller gains over years 2007 to 2016 (from 8 to 10 percent).

Median values display quite a different pattern. Over the full time span, 1989 to 2016, median NW showed an absolute loss of 9.3 percent, down to $78,100 in 2016. Median PAW also dropped by 9.9 percent. However, because median SSW was up, median AW showed a positive gain of 27.0 percent. For all three components, the maximum value was reached in 2007. This was followed by a drop-off from 2007 to 2016, though it was much less severe for median AW, -7.6 percent, than for median NW, -34.2 percent, or median PAW, -28.0 percent.

Panel C of Table 4 shows inequality trends. The Gini coefficient for PW among all households remained steady over time and was almost exactly the same in 2016 as in 1989 (0.798). The Gini coefficient for SSW was much lower than that for PW and actually dropped a bit over these years, to 0.354 in 2016. The inequality of RW is essentially a weighted average of that of PW and SSW.[13] In 2016, its Gini coefficient was 0.531 However, the inequality of RW rose over these years, by 0.046 Gini points, because of the relative increase in higher inequality PW than lower inequality SSW. The Gini coefficient for NW rose by 0.049 over these years, from 0.828 in 1989 to 0.877 in 2016.

The addition of DBW to NW to create PAW lowers the Gini coefficient by 0.031, to 0.846 in 2016, since DB wealth tends to be concentrated among the middle class (see Table 12). However, the increase in inequality is strengthened, to 0.054 Gini points, because of the gradual diminution of DBW after 1989. Adding SSW to PAW to create AW has an even bigger effect on lowering measured inequality – in this case by 0.135 points to 0.711. Thus the major equalizing effect from retirement wealth comes from SSW, not PW. In addition, adding SSW to PAW lessens the rise of wealth inequality from 0.054 to 0.048 Gini points.

5. Trends in Post-Tax Net Worth

So far a pre-tax valuation has been applied to pension wealth. However, contributions to DC plans are tax sheltered or tax deferred when they are made but

[13] There is also an interaction terms in the decomposition of RW into a PW and a SSW term.

subject to income tax on withdrawal.[14] As a result, their post-tax value is lower (and usually quite a bit lower) than their pre-tax market value. Moreover, the sale of other assets may be subject to a capital gains tax. Likewise, DB pension benefits (and lump-sum distributions) and Social Security benefits are fully taxable on receipt, so that their post-tax value will be lower than the pre-tax value.

As noted above, it would be preferable to project a family's income to the date at which pension and Social Security benefits are withdrawn but it is not feasible to do this on the basis of cross-section survey data. As a result, I use the family's current income to calculate marginal tax rates. I first calculate tax rates for each individual SCF household based on their income, family structure, deductions, and other characteristics for the year prior to the survey year using NBER TAXSIM.[15] This program is based on the federal income tax code as of the year preceding the survey year and provides estimates of tax rates for each SCF household. The initial baseline estimate excludes any realizations of capital gains or withdrawals from retirement accounts beyond those reported in the SCF questions about prior year sources of income. This leads to an estimation of the marginal tax rate, MTR, on all components of income except Social Security income.[16] I also treat the taxation of social security benefits according to the tax code current at the time of the survey.[17] I can then compute the marginal tax rate on Social Security income, SSMTR.

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[14] The exception is Roth IRAs, which are not subject to income taxes on withdrawal. The SCF allows one to separate out Roth IRAs from other types.

[15] See Argento and Moore (2013) for an analysis of how the tax data generated using the SCF data and TAXSIM compare to published IRS estimates. SAS versions of the programs that convert the public SCF data into TAXSIM ready variables are available at http://users.nber.org/~taxsim/to-taxsim/scf/.

[16] I essentially follow Poterba (2004) and Wolff (2011) in using the MTR to compute after-tax wealth. In contrast, Looney and Moore (2015) estimate each household's tax liabilities under the assumption that all assets are liquidated and any resulting realizations of capital gains or retirement income is taxed in the year prior to the SCF survey year. The difference between this new tax liability and the baseline tax liability is computed for each household and subtracted from pre-tax net worth to yield after-tax net worth. However, their scenario seems highly unlikely because it assumes that a household fully liquidates its assets in one calendar year. It is much more likely that it sells only a portion (probably, a small portion) of its assets over a calendar year.

[17] In 1989, 2001, 2007, and 2016, 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.

Defined contribution wealth, DCW, consists of all IRAs, Keogh accounts, 401(k) and other tax deferred retirement accounts. Following Poterba (2004), let us define TDA as total tax deferred assets. As noted in footnote 12 above, Roth IRAs ("ROTH") are not subject to income taxes on withdrawal. Rather, the funds invested in these instruments are deposited on an after-tax basis.[18]

Annuities are not included in DCW. They are of two types. First, some annuities pay out a steady stream of income over the (remaining) life of the beneficiary but the value of the annuity goes to zero at the death of the beneficiary. I ignore this type of annuity in my calculation of TDA.[19] Second, other annuities function like an investment account where the money that is put in accumulates over time. This money can be invested in stocks, bonds, and other assets. Typically, money invested in these accounts is in whole or in part tax deferred like an IRA, with tax-deferred accumulations followed by a RMD at retirement. The SCF data does not indicate what portion of the second type of annuity is taxable on withdrawal. For simplicity, I assume that half the value of this type of annuity ("ANNUITY") is subject to taxes on withdrawal.[20]

Life insurance is also of two types. The first is whole life insurance. This has both a savings component and a death benefit. The second is term life insurance which provides only a death benefit. Only the savings portion of whole life insurance is included as a part of net worth. However, like annuities, money invested in these accounts is in whole or in part tax deferred, with tax-free accumulations until withdrawal, which is treated as ordinary income for income tax purposes. Once again, it is not possible to determine what share of the accumulation is principal and what portion is taxable on withdrawal. For convenience, I again assume that half the value of this type of asset ("CASHLI") is subject to income taxes on withdrawal. Then:

(6) TDA = DCW – ROTH + .5ANNUITY + .5CASHLI.

Post-TDA tax wealth is then given by:

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[18] In 2016, Roth IRAs constituted 7.5 percent of DCW.

[19] Some annuities of this type do allow a cash withdrawal subject to penalties before death. I also ignore this component here.

[20] In the 1983 and 1989 SCF annuities are included with managed accounts in a single category and cannot be separated.

(7) PTNW = NW – MTR·TDA

which shows the net value of net worth after payment of taxes on withdrawals from TDAs.[21]

We are now part way to computing post-tax net worth. Most assets are subject to a capital gains tax on the sale of the asset, so that this tax liability should also be netted out from the value of an asset to obtain a post-tax value. The SCF does provide a calculation of the *accrued* capital gains on housing and other real estate, stocks, bonds, mutual funds, and businesses.[22] Correspondingly, I can estimate the accrued capital gains tax on these assets, CGTAX, as follows: First, let non-home wealth, NHW = NW – HOME, where HOME is the value of the principal residence only. Let CGNHW be the realized capital gains on the sale of non-home wealth and CGHOME be the realized capital gains on the sale of the principal residence. Then

CGTAX1 = min(MTR,MaxRate) x CGNHW

where MaxRate is the maximum tax rate on capital gains set by law in a particular year.[23]

Capital gains on the primary home is subject to special rules. In 2007 and 2016, the exclusion (EXCLUSION) on the capital gains from the sale of the principal residence was $250,000 for a single and $500,000 for a married couple. In 1983 and 1989, the exclusion equaled $125,000 if the age of the seller was over 55 and zero otherwise.[24] Then,

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[21] It is also assumed that no penalty is incurred on early retirement account withdrawals. This measure is closer to an *ex ante* concept of wealth than to an *ex post* concept, to use Poterba's terminology. An *ex post* measure would be based on the actual tax rates faced by the household at time of withdrawal from the TDA, which is not knowable based on current information. The *ex ante* measure is based on the tax laws current at the time of the survey as well as the family income at the time of survey. Another point is that I assume that withdrawals from TDAs are small enough so that the MTR is unchanged. Large withdrawals may raise the taxable income of the household enough to shift it into a higher tax bracket.

[22] The 1983 SCF includes accrued capital gains only for stocks, bonds, and real estate but there is no separate entry for the primary residence.

[23] The top marginal tax rates on capital gains are as follow: 1983 – 20 percent; 1989 – 28 percent; 2007 – 15 percent; and 2016 – 20 percent. These rates apply only to long-term capital gains, not short-term gains. For simplicity, I assume that all capital gains are long-term (which would be the case if the asset was held for at least one year in most tax years). Capital losses are treated symmetrically with capital gains since the tax liability can be used to offset other (positive) taxable income.

[24] Another consideration is that before 1997 if a new home was purchased within two years of the sale of the old house and the sales price of the new home was greater than or equal to the sale price of the old home, then the capital gains on the sale of the old house would be excluded from taxable income.

CGTAX2 = min(MTR,MaxRate) x (CGHOME – EXCLUSION)

CGTAX2 could be negative if there is a loss on the home sale (a "short sale," for example). Then,

CGTAX = CGTAX1 + CGTAX2

Neither defined contribution nor defined benefit pension wealth are saleable so that a capital gains tax would not apply to these assets.[25] Then, post-tax (p) NW is given by:

(8) $NW_p = NW – MTR \cdot TDA – CGTAX.$

Analogous measures can be derived for augmented wealth: Post-TDA tax augmented wealth is given by:

(9) PTAW = NW – MTR·TDA – MTR·DBW – SSMTR·SSW

and after-tax augmented wealth by:

(10) $AW_p = AW – MTR \cdot TDA – MTR \cdot DBW – SSMTR \cdot SSW – CGTAX.$

How much difference do these adjustments to the value of pension wealth actually make? Projected future tax liability took a large chunk out of pension wealth. As shown in Table 5, in 2016, the percentage difference between mean pre-tax DCW and mean post-tax DCW (after the subtraction of taxes due on withdrawals from pension wealth accounts) was 23.6 percent among age group 47-64. That is to say, DCW was devalued by almost a quarter when implicit taxes were deducted. DBW was reduced by 19.5 percent and overall PW by 22.2 percent. Median PW was devalued by a smaller amount – 14.1 percent among account holders only and 9.1 percent among all households in the age group – because the median household faces a lower marginal income tax rate than the overall average. Results are quite similar for age group 65 and over.[26]

Unfortunately, it is not possible to ascertain from the SCF data whether a new home was purchased within two year. The sources are as follows: https://www.everycrsreport.com/reports/RS20250.html; https://www.thebalance.com/taxes-when-selling-a-house-3973990; and https://www.ntanet.org/wp-content/uploads/proceedings/2009/012-auten-the-exclusion-capital-2009-nta-proceedings.pdf.

[25] As in the case of the sale of a TDA, I assume that realized capital gains are small enough so that the MTR is unchanged. Large capital gains may raise the taxable income of the household enough to shift it into a higher tax bracket. For most assets, this is probably a reasonable assumption. However, selling a home is a lumpy transaction so that if the sales price is high enough, the realized capital gains may shift the household into a higher tax bracket.

[26] It is of interest that the arithmetic average tax rate on DCW paid by households in age group 47-64 in 2016 was only 11.4 percent, compared to a weighted average of 23.6 percent. The explanation is that DCW is concentrated among higher income households who face a higher marginal tax rate than the average household in the age group (see Table 12).

[Table 5 about here]

Percentage differences between gross and net pension wealth generally fell off over time between 1983 and 2016. The reduction in DCW was particularly high in 1983 (38.8 percent) reflecting the high income tax rates of that year. After the passage of the Tax Reform Act of 1986 (TRA-86), income tax rates, particularly the top marginal tax rate, fell dramatically. As a result, mean net DCW and DBW grew faster from 1983 to 2016 than the corresponding gross values among both middle-aged and senior households. However, because of the shiftover from defined benefit to defined contribution wealth, documented in Table 4, and the fact that DCW is more heavily concentrated among high wealth households and therefore subject to higher marginal tax rates than DBW, after-tax PW grew at about the same rate as before-tax PW (see Figure 6).[27]

[Figure 6 about here]

As speculated in the Introduction, netting out taxes reduces measured inequality in pension wealth (see Table 6). In 2016, the Gini coefficient of DCW among holders only in age group 47-64 was reduced by 0.024, that of DBW by 0.20, that of PW by 0.025, and that of PW among all households in age group 47-64 by 0.017. The explanation is straightforward: richer households hold more pension wealth in aggregate (see Table 12) and face higher marginal tax rates.

[Table 6 about here]

Among middle-aged households, the equalizing effect was strongest in 1983, when income tax rates were highest, fell between 1983 and 1989 as TRA-86 kicked in, and then increased from 1989 to 2016 as income tax rates picked up (the top marginal tax rate went up from 28.0 to 39.6 percent). The pattern is different among the elderly. In 1983, the Gini coefficient for net DCW was actually higher than that for gross DCW. However, in that year, only 2.1 percent of senior households held a DC account. The results reflect the fact that DC asset ownership in that year was skewed toward lower

[27] In 2016, for example, the top one percent as ranked by net worth owned 15.4 percent of total DCW wealth; the top five percent, 50.7 percent; the top 10 percent, 70.5 percent; and the top 20 percent held 88.0 percent (see Table 12). DBW was much less concentrated, with the top five percent of wealth holders accounting for 14.2 percent of total DBW wealth, the top ten percent for 29.9 percent, and the top 20 percent for 50.7 percent. The concentration of PW fell between these two extremes, with the top one percent of wealth holders holding 10.2 percent of total PW, the top five percent 35.4 percent; the top ten percent 53.4 percent, and the top 20 percent 72.3 percent.

income households in that age group. As DC holdings spread, from 1989 onward, the equalizing effect of TDA taxation rose from a Gini differential of 0.021 in 1989 to 0.025 in 2016. For DBW and PW (of which DBW constituted 97 percent), on the other hand, the greatest differential between the pre-tax and post-tax Gini coefficient occurred in 1983. However, unlike middle-age households, there was a steady reduction in the spread in Gini coefficients between pre-tax and post-tax inequality for DBW and PW between 1983 and 2016, despite rising tax rates, reflecting the spread of these assets toward lower and middle income households.

Future tax liabilities on withdrawals took a smaller bite out of Social Security wealth than pension wealth (see Table 7). In 2016, the average net value of SSW for ages 47-64 was 85.9 percent of its gross average value, compared to 77.8 percent for PW.[28] The differential between gross and net SSW expanded over time from 0.0 percent in 1983 (when there were not federal income taxes paid on Social Security income) to 14.1 percent in 2016. The same pattern holds for median SSW, as well as mean and median SSW among senior households. All told, the percentage gap between gross and net mean RW among middle-aged households grew from 9.5 percent in 1983 to 18.2 percent in 2016. This is mainly a reflection of the time pattern for SSW. The differential in median RW likewise widened over these years. Similar results are found for mean and median RW among households age 65 and over.

[Table 7 about here]

As a consequence, net SSW and RW grew slower than their corresponding gross values over years 1983 to 2016. The differentials were quite pronounced. While mean before-tax SSW gained 48.6 percent among age group 47-64, mean after-tax SSW advanced by only 27.7 percent (see Figure 7). Among seniors, the respective figures were 54.7 and 35.6 percent. Similar results hold for median SSW. Likewise, mean net RW gained 69.0 percent compared to an 87.0 percent advance in gross RW among the middle-aged and 103.1 percent among the oldest group compared to 129.1 percent in net RW (see Figure 8). The differentials are similar for median values.

[28] The arithmetic average implicit marginal tax rate of SS benefits was 10.1 percent, compared to 11.4 percent for PW. The difference between the weighted average and arithmetic average was substantially smaller for SSW than PW because SSW is more concentrated in the middle of the wealth distribution than DCW (see Table 12).

[Figure 7 Figure 8 and about here]

In 2016, implicit taxes on TDA withdrawals lowered mean NW by 5.0 percent among middle-aged households (see Table 8). The differential is much smaller than for PW, RW, and even SSW. The reason for the relatively small effect is that DCW made up only 15.6 percent of household gross assets in 2016 (see Table 2)[29] and the average tax rate on DCW was 23.6 percent. Over time, the differential between (gross) NW and PTNW grew from 1.2 percent in 1983 to 5.0 percent in 2016, reflecting mainly the rising share of DCW in NW (from 1.5 to 15.6 percent). The gap between gross and net median NW also increased, from 0.3 to 3.2 percent. Time trends are quite similar for the elderly age group, though in this case the percentage gap was 4.3 percent in mean NW and 2.3 percent in median NW in 2016.

[Table 8 about here]

Netting out implicit income taxes on TDAs lowered the estimated growth rate of NW. While mean gross NW among the middle-aged gained 91.2 percent from 1983 to 2016, mean PTNW increased by only 83.8 percent.[30] Moving from gross NW to PTNW therefore knocked off 0.12 percent per year in household mean wealth growth. A similar result holds for the oldest group for whom subtracting implicit taxes cut the annual percentage growth rate by 0.012 as well. The effect on median wealth was a bit smaller. The difference in the annual percentage growth rate of median NW and median PTNW was 0.09 among the younger group and 0.06 among the older one.

Adding DBW and SSW to create AW further enlarges the gap between gross and net values, since, as indicated above, DB benefits and SS benefits are also subject to income tax (at least after 1983 for the latter). In 2016, the percentage disparity between the two was 7.6 percent for mean values among the younger age group and 7.0 percent among the older group, and 8.8 and 6.1 percent for median values. Once again, the divergence between the two rose over time for both mean and median values. Consequently, mean PTAW grew slower than mean AW from 1983 to 2016 – a percentage increase of 62.0 percent versus 69.3 percent for ages 47-64 and of 84.9 versus

[29] The share of TDA in total assets was a little higher, 16.5 percent.

[30] The growth rates of NW for middle-aged households and seniors reported here differ from that reported in Table 1 which is computed for *all* households. A similar discrepancy in growth rates exists for AW as well.

94.5 percent for ages 65 and over. The same relationship holds for median values. In terms of annual percentage growth rates, it was 0.13 lower for mean PTAW for the first group and 0.15 smaller for the second. The disparity in annual growth rates was somewhat higher for median AW – 0.22 for the younger and 0.15 for the older age group.

When imputed taxes on accrued capital gains are next subtracted out to obtain NW_p, the gap between before-tax and after-tax mean net worth exactly doubled from 5.0 to 10.0 percent among middle-aged households in 2016 and from 4.3 to 8.6 percent among the elderly (see Panel B). The change in the gap in median values was much smaller since the rich are by far the main recipients of non-home capital gains. The percentage difference between mean NW and NW_p ballooned from 1.3 in 1983 to 10.0 in 2016 among the younger age group and from 0.4 to 8.6 for the older group, while that in median values went from 0.6 to 3.4 among the former and from 0.0 to 2.7 among the latter. As a result, NW_p grew considerably slower than NW over these years. While mean NW among the middle-aged group gained 91.2 percent from 1983 to 2016, mean NW_p was up 74.4 percent (see Figure 9). Among the elderly, the respective figures were 107.4 percent versus 90.4 percent. The differential in annual percentage growth rates was 0.028 for the younger group and 0.026 for the older one. The difference was smaller for median values, with the difference in annual percentage growth rates of 0.09 and 0.08, respectively. [31]

[Figure 9 about here]

Results are similar for augmented wealth. Subtracting imputed taxes on capital gains to obtain AW_p raises the gap between mean pre-tax and post-tax AW in 2016 from 7.6 percent to 11.2 percent among middle-aged households and from 7.0 to 10.1 percent among seniors in 2016. The change in the differential in median values was virtually

[31] There are three factors to consider when analyzing the time trend in differences between PTNW and NW_p. The first is the total value of accrued capital gains relative to net worth. If we ignore 1983 because the data are incomplete, then the ratio rose from 0.397 in 1989 to 0.435 in 2007 and then fell to 0.309 in 2016. The second is the effective tax rate on accrued capital gains, which rose from 11.0 percent in 1989 to 15.2 percent in 2016 among the middle-aged and from 5.6 to 12.7 percent among seniors (see Memo, Line 1). The third is the split in capital gains between homes, taxed at a lower rate, and non-home capital gains. The ratio of accrued home capital gains to accrued total capital gains fell off from 0.454 in 1989 to 0.374 in 2007 and then to 0.268 in 2016. As a result of these factors, the ratio of total taxes due on accrued capital gains to net worth rose from 1.2 percentage points in 1989 to 5.0 percentage points in 2016 among middle aged households and from 0.7 to 4.3 percent among the older group (see Memo, Line 2). This latter trend accounts for the growing cleavage between PTNW and NW_p.

zero. There was a growing wedge between AW and AW_p, as there was between NW and NW_p. The difference between mean AW and AW_p grew from 3.4 percent in 1983 to 11.2 percent in 2016 among the middle age group and from 2.2 to 10.1 percent among seniors, while that in median values grew from 2.0 to 9.1 percent among the former and from 1.3 to 6.0 among the latter. As a result, AW_p rose considerably slower than AW over time. Whereas mean AW rose by 69.3 percent among middle-aged households, AW_p increased by only 55.8 percent (see Figure 10). Among the older group, the respective figures were 94.5 percent versus 90.4 percent. The differential in annual percentage growth rates was 0.025 for both groups. The gap was again smaller for median values, with the difference in annual percentage growth rates of 0.23 for the younger and 0.15 for the older group.

[Figure 10 about here]

How does the use of net (after-tax) values affect trends in inequality? Table 6 shows that inequality was higher for gross PW than net PW. Results for SSW are similar and for a similar reason -- because higher income households hold more Social Security wealth and face a higher marginal tax rate than lower income ones (see Table 12). In 2016, the differential in the Gini coefficient between gross and net SSW was 0.024 among middle-aged households, almost exactly the same as that for PW, and 0.014 for the aged, lower than that in PW. Over time, the gap increased sharply for the first group and more moderately for the second, from 0.0 in 1983 (when there were no income taxes on Social Security in that year) to 0.24 and 0.14, respectively.

[Table 9 about here]

Netting out future income tax liabilities has a larger effect on retirement wealth RW inequality than PW inequality. The Gini coefficient for RW was lessened by 0.040 in 2016 for ages 47-64 and by 0.030 for ages 65 and over. The greater reduction of the Gini coefficient for total retirement wealth than pension wealth alone reflects the fact that the implicit tax rates on Social Security benefits are notably higher for high earners and netting out taxes from Social Security wealth is strongly redistributive.[32] The redistributive effect of TDA, DB benefit, and SSW benefit taxation increased somewhat over time, with the difference between the pre-tax and post-tax Gini coefficient rising

[32] As noted above, no taxes are paid on social Security benefits if Social Security benefits if AGI is greater than $32,000 for a married couple filing jointly and $25,000 for singles or couples filing separately.

from 0.033 in 1983 to 0.040 in 2016 for the middle age group and from 0.017 to 0.030 for the older group.

Net worth inequality is considered next. Panel A shows the consequences of netting out taxes paid on withdrawals from TDAs only. There are three effects involved in how removing implicit taxes affects NW: (1) the tax effect, (2) the portfolio composition effect, and (3) the magnitude effect. The tax effect should lower measured inequality since richer households face higher marginal tax rates and the percentage reduction in the value of their TDAs is greater than for poorer households. The portfolio effect should have the opposite impact since poorer households generally hold a higher percentage of their wealth in TDAs than richer ones and the resultant percentage reduction in wealth should be greater for poorer households.[33] The magnitude effect is the total value of TDAs as a share of NW. If this is greater, then the percentage reduction in inequality should rise since, as we saw, gross DCW is more unequal than net DCW (which made up 94.3 percent of TDAs in 2016). This factor is particularly relevant to time trends in the inequality gap. The results indicate that the first two effects basically cancel out since there is only a trivial difference in Gini coefficients between gross NW and PTNW for the four years and the two age groups. The reason, as noted, is that higher income households face higher tax rates than poorer ones but have a smaller concentration of their wealth in TDAs. There are no notable time trends for either age group.

With regard to the effect of taxes on AW inequality, the same three effects are relevant: (1) the tax effect, (2) the portfolio composition effect, and (3) the magnitude effect. The tax effect should lower measured inequality since richer households face higher tax rates and the percentage reduction in their retirement wealth holdings (DCW, DBW, and SSW) should be greater than for poorer households. The portfolio effect should have the opposite impact since poorer households hold a higher percentage of their wealth in PW and SSW than richer ones and the resultant percentage reduction in wealth should be greater for poorer households. The magnitude effect in this case is the total value of PW and SSW as a share of AW. If this is greater, then the percentage

[33] As noted above (and in Table 3), the share of DCW in gross assets was highest for the p80-p99 group (percentiles 80 to 99) at 22.4 percent in 2016, second highest for the middle three wealth quintiles at 16.6 percent, and lowest for the top one percent at 6.0 percent.

reduction in inequality should also be larger since gross RW is more unequal than net RW. The results indicate that the first two effects once again cancel out since there is only a small difference in Gini coefficients between gross AW and PTAW. The reason here too is that higher income households face higher tax rates than poorer ones but have a smaller concentration of their wealth in PW and SSW. Netting out implicit taxes on pension and Social Security wealth barely affects the measured inequality of AW. As a result, inequality trends in AW between 1983 and 2016 remains almost unchanged after subtracting implicit taxes from retirement wealth.

Does the picture change when imputed taxes on accrued capital gains are also netted out? As shown in Panel B, there is very little impact. The difference in Gini coefficients between NW and NW_p in 2016 was 0.003 for the younger age group, compared to a -0.002 differential between NW and PTNW, and 0.007 for the older group, compared to 0.001. The reason is that even though capital gains (particularly non-home capital gains) are concentrated among the rich, the effective tax rate is statutorily capped, so that the difference in marginal tax rates paid by high and low wealth families is relatively small. There is again no notable time trend. The gap between AW and AW_p in 2016 was 0.007 for the younger group and 0.011 for the older group, in comparison to almost no difference between Gini coefficients for AW and PTAW. However, in this case, the differential in Gini values between AW and AW_p rose slightly over time for the two age groups from virtually zero in 1983. This is mainly due to the rising share of accrued capital gains, particularly non-home capital gains, in net worth discussed in footnote 31.[34]

6. Bequest Value (BV) or "You are Worth More Dead than Alive"

As discussed in the Introduction, the bequest value (BV) is the value of the estate when it passes to its beneficiaries. Why is this a useful concept? Many older Americans are as much interested in the value of the estate they will pass down to their heirs as in their current net worth. While net worth is a useful gauge of potential consumption, many of the richer older Americans may be more interested in how much wealth they will pass down to their children than in their own consumption possibilities. Indeed, a whole estate planning industry has developed to focus on exactly this concern. As a result, the bequest

[34] In 1983, as noted above, there is incomplete information on accrued capital gains.

value of wealth may be another focus of concern along with current net worth. Maximizing BV involves a different calculus than maximizing (current) wealth. Many rich people try to maximize BV rather than current NW. One piece of evidence is the high level of life insurance death benefits (see below).

I first consider the gross bequest value (BV). The most notable difference between BV and net worth is that term and cash value life insurance death benefits are included in the calculation of BV. These are distributed to the beneficiaries of the policy on the death of the individual. This component differs from accumulations included in whole life insurance which are considered part of the net worth of the individual (decedent). The total death benefit of life insurance, TDB, is given by:

(11) TDB = TERMLI + FACECASHLI - CASHLI

where TERMLI is the death benefit from term life insurance, FACECASHLI is the face value of whole life insurance, and CASHLI is the cash surrender value of whole life insurance. Then

(12) BV = NW + TDB

where BV is valued on the basis of current net worth.[35]

BV also differs from AW in another regard because Social Security benefits terminate when an individual dies, as do defined benefit pension benefits.[36] As a result, it is not meaningful to compare BV with augmented wealth.

In 2016 average BV was 27.3 percent higher than average NW among the younger group (see Table 10). Indeed, the mean death benefit that year was $264,700. The gap between median BV and median NW was even greater, at 67.9 percent. This reflects the fact that middle class households hold life insurance policies with even greater death benefits relative to net worth (see Table 12). In the same year average BV

[35] In the case of a single individual, BV is valued as of the time of the person's death. In the case of a married couple, BV is implicitly valued at the death of the surviving spouse. This leads to a couple of complications. First, I assume that the full estate passes to the surviving spouse at the death of the first spouse. Second, I also assume that the death benefits at the death of the first spouse pass directly to the surviving spouse (I cannot identify the actual beneficiary from the SCF data).

[36] The exception are lump-sum distributions from DB plans, which is a relatively small amount – only 2.7 percent of total DB wealth in 2016, for example. It is also the case that at the death of a parent, some children may be eligible to receive Social Security benefits. I implicitly ignore this component of Social Security wealth.

was only 7.2 percent higher than average NW among the older group and median BV only 8.4 percent greater than median NW. Mean death benefits were much smaller among the elderly than the middle-aged – only $75,200. The reason is that there is less need for older people to provide for supporting survivors than for younger adults. The latter rely mostly on earned income while alive and typically have children to provide for, while the former can rely on guaranteed retirement benefits like Social Security for the surviving spouse and typically do not have other dependents to support.

[Table 10 about here]

One of the features of the tax code is that TDAs in estates are still subject to income taxes at ordinary income rates on withdrawal, and required minimum distributions (RMDs) carry over, while capital gains are not. In other words, for the computation of post-tax BV, DCW is still valued on a post-TDA tax basis. However, in contrast, all other assets (except TDAs) are valued on a step-up in basis according to current tax rules. This means that any accrued capital gains are "forgiven" and not subject to income tax on withdrawal. In other words, these assets are valued at current market value, without any subtraction of income taxes due on accrued capital gains.
Then,

(13) PTBV = PTNW + TDB

where PTBV is the bequest value net of imputed tax payments due on withdrawals from TDAs. As a result,

(14) PTBV = NW_p + CGTAX + TDB

It is more appropriate to compare PTBV with NW_p than NW since the first two show values after subtraction of imputed taxes to TDAs and imputed capital gains tax (which is zero in the case of BV). In 2016 average PTBV was 35.8 percent higher than average NW_p among age group 47-64. About a sixth of the discrepancy between PTBV and NW_p was due to the capital gains tax (which is excluded from BV) but the lion's share, about five sixths, was due to death benefits (which are included in BV). The gap between median PTBV and median NW_p was even greater, at 89.1 percent. Among the older group in the same year average NTBV was just 12.6 percent higher than average NW_p and median PTBV just 14.7 percent greater than median NW_p. In this case, about

three-fifths of the difference between PTBV and NW_p was due to death benefits and the other two fifths to capital gains taxation.

There was generally a growing cleavage over time between PTBV and NW_p. The percentage difference between the mean values of the two climbed from 19.8 percent in 1983 to 35.8 percent in 2016 among middle aged households and that in median values from 37.8 to 89.1 percent. Both rises in capital gains taxes relative to NW_p and death benefits relative to NW_p played a role. With regard to the latter, the ratio increased from 19.7 percent in 1983 to 30.3 percent in 2016 among middle aged households. Among households aged 65 and over, the percentage difference between mean PTBV and NW_p increased from 3.2 to 11.2 percent and that between median values from 4.8 to 12.8 percent. Again, rises in both capital gains tax and death benefits relative to net worth played a role. With regard to the latter, the ratio increased from 3.2 percent to 7.9 percent (with a spike in 1989) among the elderly.[37]

6.1 Estate Taxes

To put BV on a comparable footing to NW_p, it is necessary to net out expected future federal estate taxes. As with NW and NW_p, I value the components of wealth as of the current survey year and use the estate tax law as of that year to determine what the current tax liability is. The tax calculations are based on the IRS "Instructions to Form 706" in each of the four years.[38] Estate tax liability would apply to almost all asset components of net worth, including defined contribution wealth such as 401(k) plans and

[37] The percentage difference between both mean and median BV and CWV among the elderly shows a substantial spike in 1989. This "anomaly" can be traced to especially high death benefits in life insurance policies of that year, particularly among middle income older families. Perhaps this group was particularly risk adverse that year.

[38] The sources are as follows: 1983 and 1989 - https://www.irs.gov/pub/irs-prior/i706--1993.pdf; 2007 - https://www.irs.gov/pub/irs-prior/i706--2007.pdf; 2016 - https://www.irs.gov/pub/irs-prior/i706--2016.pdf . For 2016, the exemption is $5,450,000 for singles and $10,900,000 for couples. Marginal tax rates run from 18% for zero net worth (after the exemption) to 40% on more than $1,000,000 (after the exemption). It is assumed that at the death of the first spouse, the full marital deduction is claimed by the surviving spouse, so that widows and widowers are eligible for the full exemption of $10,900,000. In 2007, the exemption is $2,000,000 for both singles and couples (no distinction is drawn between the two). Marginal tax rates run from 18% for zero net worth (after the exemption) to 45% on more than $2,000,000 (after the exemption). It is assumed that in the case of a couple the exemption is claimed at the death of the second spouse. For 1983 and 1989, the exemption is $600,000 for both singles and couples (no distinction is drawn between the two). Marginal tax rates run from 18% for zero net worth (after the exemption) to 55% on more than $3,000,000 (after the exemption).

IRAs. The latter are valued at face value, not discounted for future income tax liability. [39] On the other hand, life insurance death benefits are excluded from taxable assets unless death benefit goes directly to the estate of the deceased or the deceased is the owner of the life insurance policy.[40] However, it is not possible to identify the beneficiary of the death benefit from the SCF data, so it is assumed that all death benefits go to other beneficiaries and therefore exclude such death benefits from the taxable estate. Then, define post-tax (p) bequest value as:

$$(15)\ BV_p = BV - ET$$

where ET is the estimated estate tax due on death.

There is generally a marital deduction in the case of married couples, so that there is no estate tax due on the death of the first spouse as long as the estate is passed to the surviving spouse. Certain trusts are included and others excluded from taxable estate. In particular revocable trusts funds are considered part of the assets of the individual or household and are generally included in the taxable estate. In contrast, assets in irrevocable trusts are not considered to be owned by the person or family and are not subject to estate taxes. This is not an issue because the SCF excludes irrevocable trusts from net worth.[41] There are, of course, many other technical issues involved with the

[39] The source is: https://www.google.com/search?ei=qhrxXYPmCvHO5gLF5JegDw&q=are+IRAs+excluded+from+the+federal+estate+tax+base&oq=are+IRAs+excluded+from+the+federal+estate+tax+base&gs_l=psy-ab.3...95795.103327..106573...0.2..0.80.1035.16.....0....1..gws-wiz.....0i71.7GY1nL6H1ho&ved=0ahUKEwiD4_yog67mAhVxp1kKHUXyBfQQ4dUDCAs&uact=5

[40] The exact wording of the rule is as follows: "First, if the death benefit is paid to the estate of the insured, then the whole amount of the death benefit is included in the estate and subject to estate tax. Second, if the deceased insured owned the policy on the date of death, the whole amount of the death benefit is included in the estate and subject to estate tax." The source is: https://www.thebalance.com/are-life-insurance-death-benefits-subject-to-estate-tax-4012617.

[41] The SCF questionnaire instructs the respondent not to include funds in irrevocable trusts where the respondent has rights to neither income nor any of the assets. However, it does instruct the respondent to include charitable remainder trusts where the respondent has lifetime income rights (p. 396 of the 2016 SCF Codebook). Of course, there are other trusts that are more complex such as Qualified Terminal Interest Property trusts (QTIPs), generation-skipping trusts (GSTs), and the like. I assume that these are similar to irrevocable trusts and not subject to estate taxes and not included by SCF.

valuation of an estate for estate tax purposes, which I am not able to address with the data available in the SCF files.[42]

The results shown in Table 10 indicate that estate taxes have a sizeable effect on the bequest value. In 2016 estimated estate taxes reduced mean PTBV by 8.6 percent for age group 47-64 and by 9.8 percent for age group 65 and over (see "memo"). The differences were actually considerably greater in 1983, 1989, and 2007 (a range of 14.7 to 17.3 percent for the younger group and 17.3 to 19.6 percent for the older one) when the exemption was lower and the top marginal tax rate higher.[43] As a result, BV_p grew faster than PTBV. While mean PTBV gained 97.7 percent or 2.07 percent per year from 1983 to 2016 among middle-aged households, mean BV_p was up by 112.0 percent or 2.28 percent per year. Likewise, among households aged 65 and over, whereas mean PTBV increased 107.6 percent or 2.21 percent per year, BV_p advanced by 127.3 percent or 2.49 percent per year.

BV_p is most comparable to NW_p since they both exclude all implicit taxes. Among middle-aged households in 2016, the percentage gap fell from 26.4 percent between mean NW_p and mean PTBV to 19.4 percent between mean BV_p and mean NW_p, a decline of 6.9 percentage points, while among elderly households, it dropped from 11.2 percent to 1.6 percent, a reduction of 9.6 percentage points (see Figure 11). The gap was much greater in earlier years. In 1983, the differential was 14.4 percentage points among the former and 20.7 percentage points among the latter. In 1989, the respective

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[42] These include the following issues: (a) Funeral expenses and charitable donations (or bequests) from the estate, which are deductible for estate tax purposes, cannot be estimated for living individuals. (b) Information on Qualified Domestic Trust Election (QDOT) is also not available. A special QDOT must be used to obtain an unlimited marital deduction for otherwise disqualified spouses. (c) The actual tax is based on a unified estate and gift tax. Gifts are subject to a deduction which varies from year to year. It is not possible to obtain detailed information on gifts given by year. (d) Beginning in 2005, state level (including the District of Columbia) estate and inheritance taxes are deductible from the federal estate tax. The SCF does not provide state identifiers for residence. (e) There are some properties excluded from the spousal deduction, which cannot be identified in the SCF. (f) U.S. citizens with a noncitizen spouse do not benefit from the same marital deduction as those with a U.S. citizen spouse. I cannot identify citizenship in the SCF data. (g) A generation-skipping transfer tax is also payable by the estate. The GST tax is payable by certain trusts that are includible in the gross estate. The GST tax is imposed only on direct skips occurring at death. These cannot be identified in the SCF. Source: https://en.wikipedia.org/wiki/Estate-tax-in_the_United_States

[43] There is virtually no difference between median NTBV and median BV_p, since middle class households are not generally subject to the estate tax.

differences were 17.3 and 16.9 percentage points and in 2007 they were 14.1 and 21.9 percentage points. That is to say, imputed estate taxes reduced the bequest value much more in the 1980s through 2007 because the exemption was much smaller and the marginal tax rates higher for the top wealth tiers. Indeed, in 1983 and 2007, mean BV_p was actually lower than mean NW_p among the elderly.

[Figure 11 about here]

As a result, while mean NW_p gained 74.4 percent or 1.68 percent per year from 1983 to 2016 among middle-aged households, mean BV_p was up by 112.0 percent or 2.28 percent per year (see Figure 12). Likewise, among households aged 65 and over, whereas mean NW_p advanced 94.4 percent or 1.95 percent per year, BV_p increased by 127.3 percent or 2.49 percent per year. It is also of note that for 1983, 1989, and 2007, imputed estate taxes led to a greater percentage reduction in bequest wealth than the combined effect of income taxes on TDAs and the capital gains tax did to net worth. Netting out estate taxes reduced mean PTBV by 14.7 percent among middle-aged households in 1983, while netting out the taxes due on TDAs and the capital gains tax lowered mean net worth by only 1.3 percent in that year. For 1989, the respective figures were 2.5 percent and 17.3 percent and for 2007 they were 8.6 percent and 16.1 percent. For 2016, in contrast, netting out estate taxes lessened mean PTBV by 8.6 percent, compared to a 10.0 percent decrease in mean net worth from excluding TDA and capital gains taxes. Among older households, the pattern is the same for 1983, 1989, and 2007. In 2016, cutting out estate taxes lowered mean BV by 9.8 percent while netting out TDA and capital gains taxes decreased mean NW by 8.6 percent.

[Figure 12 about here]

How does BV stack up relative to NW_p in terms of inequality? On the one hand, the subtraction of capital gains taxes from NW to obtain NW_p should lower measured inequality since the rich pay a higher share of their income and presumably wealth in capital gains taxes. Since capital gains taxes are excluded from BV, this should raise measured inequality in BV relative to NW_p. On the other hand, death benefits are more concentrated among middle income and hence middle wealth families relative to the rich (see Table 12). Their inclusion in BV should thus lower measured inequality. As shown in Table 10, the dominant effect comes from the inclusion of death benefits. In 2016 the

Gini coefficient for NW_p among middle aged households was 0.759 and that for BV was 0.728, a difference of 0.039. Similar differences exist for 1983 and 2007. In 1989, the gap was much higher – 0.085 – due to life insurance policies with very high death benefits among middle class families. Differences are much smaller among the elderly for years 1983, 2007, and 2016, a result of policies with much lower death benefits. Once again, 1989 is an outlier, with a difference of 0.076, and once again due to policies providing very high death benefits.

Netting out imputed estate taxes also substantially reduces measured BV inequality. However, the estate tax effect on inequality, like that on the wealth level, attenuated over the years. Among middle-aged households in 2016, netting out estate taxes lowered the Gini coefficient for BV by 0.017. The effect was much stronger in earlier years, with decreases of 0.044 in 1983, 0.060 in 1989, and 0.042 on 2007. The explanation, as noted above, is that the exemption level was much lower in these years, and the top marginal tax rate was higher. Among the older group, the pattern is very similar, with declines in the Gini coefficient of 0.048 in 1983, 0.059 in 1989, and 0.050 in 2007 but only 0.022 in 2016. Netting out estate taxes had a much greater redistributional effect on BV than subtracting TDA and capital gains taxes did on NW.

When estate taxes are netted out from PTBV, the gap in Gini coefficients between NW_p and BV_p widens considerably (see Figure 13). The difference in Gini coefficients between the two now ranges from a low of 0.056 in 2016 to a high of 0.145 in 1989 among the younger group and from a low of 0.033 in 2016 to a high of 0.135 in 1989 among the older one.

[Figure 13 about here]

6.2 Demographic Breakdown

I next provide a demographic breakdown of the impact of taxes on net worth, augmented wealth, and bequest value components. The key categories are (a) age class, (b) education, (c) race, and (d) family type. I also provide a disaggregation by (e) income class, (f) wealth class, and (g) homeowner status. Since the impact of excluding taxes on wealth is large for people who have high incomes and low for those with low income, I expect to see substantial variation in inequality effects. Key issues are as follow: First, does the exclusion of taxes lower or raise the racial wealth gap? Second, do younger or

older households benefit more when taxes are netted out (I expect that younger households do better since income and hence tax rates are lower for them)? Third, do higher income and wealth households fare worse when comparing gross and net wealth? Here, the answer is likely to depend mainly on the portfolio mix of richer versus poorer households. Fourth, do renters do better than homeowners in these comparisons (I expect so since the former generally have lower income)?

As shown in Table 11, the percentage difference between net DCW and DCW, as expected, rose monotonically with income class and with wealth class in 2016, except for the lowest wealth group. The effect of excluding income taxes on TDAs was greater for white households than African-American ones, thus raising slightly the racial ratio in DCW from 0.17 to 0.18. There was little variation in the effect between white, Hispanic, and the other racial group.[44] There was also little variation in the effect of excluding taxes on DCW by age class. The percentage difference between net DCW and DCW was greatest for college graduates and smallest for high school graduates, thus lowering the ratio of DCW between the two from 7.07 to 6.36. The effect was of similar magnitude for couples and single males but lower among single females, so that the DCW ratio between couples and single females fell from 5.06 to 4.80. The effect was also of similar size for homeowners and renters. As shown in Table 12, the distribution of DCW across income, wealth, and demographic groups in 2016 was very similar to that of net worth NW with the exception that the top one percent in terms of both income and wealth held a much smaller share of DCW than NW.

[Table 11 and Table 12 about here]

Results are quite similar for DBW and PW as for DCW in terms of the percentage difference between net and gross values (Table 11). However, DBW was much more concentrated among middle income and wealth households, black families, age group 65-74, high school graduates and those with some college, single male and single female households, and renters than either DCW or NW (Table 12). Whereas the top 10 percent

[44] It might seem surprising that the effect was about the same for Hispanics as for whites since Hispanics as a group have lower incomes than whites. However, what is germane here is the income of holders of DCW, which is closer among whites and Hispanics who have DC accounts than among those without a DC account. In 2016, the ratio between the income of all Hispanics age 47 and over and all whites age 47 and over was 0.460, compared to a corresponding ratio of 0.672 among holders of DC accounts only. This point is also relevant for other demographic breakdowns, where the effect depends on the income of the holders of the asset, not on the overall mean income of the group.

of income recipients held 55.4 percent of DCW and 66.8 percent of NW, they accounted for only 27.7 percent of DBW. Likewise, the top 10 percent in terms of wealth held 70.5 percent of total DCW and 81.1 percent of NW but only 29.9 percent of total DBW. The racial ratio in DBW was actually quite a bit higher than that of DCW -- 0.58 compared to 0.17. Excluding imputed taxes on TDAs and DBW raised the black-white ratio from 0.58 to 0.61. It also lowered the DBW ratio between college and high school graduates from 3.08 to 2.73. PW, the sum of DCW and DBW, was more concentrated among upper income and wealth groups, white families, younger age groups, college graduates, couples, and homeowners than DBW but less concentrated than DCW. Excluding imputed taxes on TDAs and DBW raised the black-white ratio in PW from 0.33 to 0.36. It also reduced the PW ratio between college and high school graduates from 4.80 to 4.26 and that between homeowners and renters from 4.33 to 3.80.

The effect of excluding taxes on TDAs on NW, as noted in the previous section, depends on both the income level of the family (greater for higher income ones) and the share of its portfolio held in TDAs (greater the higher the share held in TDAs). The percentage difference rose with both income and wealth until the P90-95 bracket and then declined. This pattern, as indicated above, is the reason why the TDA tax effect on NW inequality is relatively weak. The effect was greatest for the Asian and other group, but the same for whites and blacks and lowest for Hispanics. It was about the same for the three youngest age groups and lowest for age group 75 and over. The effect was largest for college graduates, larger for couples and single males than single females, and larger for renters than homeowners (Table 10). Net worth was heavily concentrated among white families, college graduates, couples, and homeowners.

Percentage differences between net SSW and SSW advanced almost monotonically with income and wealth class. Because it is highly correlated with income, it was also greater for whites and Asians than blacks and Hispanics, declined somewhat across age groups, was higher for college graduates than other educational groups, higher for couples and single males than single females, and greater for homeowners than renters (Table 11). SSW like DBW was much more concentrated among middle and low income and wealth households than DCW or NW (Table 12). A little over ten percent of SSW was held by African-American households, compared to 2.4 percent of net worth.

The black-white ratio in mean SSW was 0.65, much higher than that of DCW or NW. Reducing SSW by future taxes on Social Security benefits raised the racial ratio in SSW from 0.65 to 0.69. SSW was also more heavily concentrated among the three lower educational groups compared to college graduates. Single female households held 16.1 percent of SSW, compared to 9.1 percent of NW, while renters accounted for 16.8 percent of SSW, compared to 3.4 percent of NW. Netting out taxes on SSW also reduced the SSW ratio between college and high school graduates from 1.71 to 1.50 and that between couples and female householders from 2.42 to 2.26

The percentage difference between net RW and gross RW is a mixture of effects from its three components. It increased monotonically with income and almost monotonically with wealth, was considerably higher for whites and Asians than the other two minority groups, showed little variation across age class, rose with education, was higher for couples and single males than single females, and was quite a bit greater for homeowners than renters. RW was more concentrated among middle income and wealth households than NW. African-Americans held a much higher share of RW than of NW, as did less educated households and renters. Netting out future taxes on TDAs, DBW, and SSW raised the racial RW ratio from 0.48 to 0.51 and reduced the ratio from 2.87 to 2.48 between college and high school graduates.

Similar to the effect of netting out TDA taxes on net worth, the percentage difference between gross and net AW from reducing AW by taxes on TDAs, DBW, and SSW rose monotonically from the lowest income class to P90-95, where it peaked, and then fell off sharply. The pattern was very similar by wealth class from the second wealth class onward. There was surprisingly little variation of the effect by race/ethnicity because of the high concentration of DBW and SSW among blacks and Hispanics (the effect is actually greater among blacks than whites). Percentage differences were similar among the youngest three age classes but substantially smaller for the oldest group – a reflection of differences in portfolio composition. The effect was somewhat greater for college graduates than high school graduates and high school dropouts, for couples than single males and single females but about the same for homeowners and renters. However, on net, this adjustment had relatively little effect on the racial disparity or that between other demographic groups.

When we next net out both taxes on TDAs and imputed capital gains tax on future sales of the disposable assets, the resulting percentage differences between NW_p and NW, like those between PTNW and NW, also showed a steady rise by income class until P90-95 and then a slight tail off after that. The reason is that capital gains taxes are concentrated among the very high income households. A similar pattern is evident by wealth class. There was little variation by race or age class. The effect was somewhat stronger for college graduates than high school graduates, lowering the ratio between the two groups from 6.94 to 6.71, and for couples than single females, reducing the ratio from 4.62 to 4.47. Results are similar with regard to the percentage difference between AW_p and AW.

The tax effect of reducing BV by expected estate taxes is, not surprisingly, heavily concentrated at the top of the income and, especially, wealth distribution. The impactwas greater for whites than the other racial groups, for college graduates than those less educated, for couples and single males than single females, and for homeowners than renters. Subtracting out future estate taxes raised the black-white BV ratio from 0.17 to 0.18 and lowered the BV ratio from 6.20 to 5.80 between college and high school graduates, from 4.80 to 4.53 between couples and female householders, and from 7.36 to 6.91 between homeowners and renters.

A comparison of net BV_p and NW_p is also instructive. The percentage difference rose with income level until P90-95 and then fell off sharply – indeed, negative for the top income class (NW_p is greater than BV_p). The percentage difference declined sharply with wealth level and also turned negative for the top wealth class. The percentage difference was lowest for whites compared to the other racial groups; highest for the youngest age group and then dropped sharply with age (the estates of older householders provided much lower death benefits than younger ones – see Table 12); was lowest for college graduates; in this case, it was lowest for single males (they do not need to provide much in the way of death benefits since they do not have a wife); and was three times as great for renters as homeowners. Indeed, as shown in Table 12, total death benefits (TDB) were highly concentrated in the fourth quintile of both the income and wealth distributions and among the two younger age groups (47-54 and 55-64).

7. Summary and Concluding Remarks

The differential between gross and net (after taxes paid on TDAs and DBW) DCW, DBW, and PW generally declined from 1983 to 1989, as personal income tax rates came down, and then rose from 1989 to 2016 as tax rates picked up. Over the whole 1983-2016 period, the gap between gross and net values generally declined, so that net pension wealth grew faster than gross pension wealth. The gap between gross and net SSW climbed over time, starting from a zero tax rate on Social Security benefits in 1983. As a result, net SSW grew slower than gross SSW between 1983 and 2016. Paralleling SSW, the gap between gross and net RW also gained over time, so that net RW advanced slower than gross RW.

The gap between gross NW and PTNW (after taxes on TDAs) was relatively small in 2016, less than 5.0 percent for mean values and less than 4.0 percent for median values. However, the differential widened over time between 1983 and 2016, so that PTNW grew slower than gross NW. The differential between gross AW and PTAW (after taxes on DTAs and defined benefit pension and Social Security benefits) was greater – between 6.0 and 9.0 percent – because both DB and Social Security benefits are subject to income tax (at least after 1983 for the latter). As a result, PTAW grew slower over time from 1983 to 2016 than gross AW. When imputed taxes on accrued capital gains are next netted out to create NW_p, the cleavage between gross and net values widened to about 9 to 10 percent for mean values in 2016. The gap rose over time and, as a result, mean NW_p grew considerably slower than mean NW between 1983 and 2016 (the difference for median values was much smaller since non-home capital gains are concentrated among the rich). Likewise, the disparity in mean values between AW and AW_p was 10 to 11 percent in 2016. It also advanced over time, so that AW_p also advanced considerably less than AW from 1983 to 2016.

The inequality of net (after taxes on TDAs and DB pay-outs) DCW, DBW, and PW was lower than that of the corresponding gross values (except for one instance). Differences in Gini coefficients ranged from about 0.020 to 0.030 in 2016. The reason is that richer households face higher marginal tax rates than poorer ones. However, the gap narrowed over the years from 1983 to 2016 as pension ownership (particularly of DCW) grew more widespread. However, despite this, netting out taxes on TDAs basically leaves net worth inequality unchanged. The reason is that while richer households face higher

marginal tax rates, poorer households hold on average a higher percentage of their wealth in TDAs than richer ones. Even netting out the imputed taxes on accrued capital gains to create NW_p makes very little difference in the measured inequality of net worth. The rationale is that while aggregate capital gains are concentrated among the rich, the ratio of capital gains to NW is relatively flat along the wealth distribution. Moreover, because of the statutory cap on the capital gains tax, the effective tax rate on capital gains is relatively constant across the wealth distribution.

The inequality of net SSW is also lower than that of gross SSW. The reason in this case is that richer households face higher marginal taxes than poorer ones – indeed, the marginal tax rate for the latter is zero until the legislated threshold is reached. Despite this, the inequality of PTAW (net of taxes on TDAs, DBW, and SSW) is almost the same as that of gross AW. Reasons are similar to those for net worth: While richer households face higher marginal tax rates, retirement wealth makes up a larger slice of the wealth of poorer households than richer ones. Likewise, subtracting imputed taxes on accrued capital gains to create AW_p has very little effect on measured inequality for the same reasons as cited above for NW.

BVp is the measure of bequest value most comparable to NWp since both are on a post-tax basis. A comparison of the two indicates that the former is considerably greater in value, particularly among middle-aged households. In 2016 mean BV_p was 19.4 percent greater than mean NW_p and median BV 47.1 percent greater than median NW_p among this age group. The predominant reason is the inclusion of death benefits in valuing net bequest value, with the exclusion of imputed taxes on accrued capital gains playing a secondary role. BV_p inequality is also notably lower than that of NW_p because death benefits tend to be concentrated in the middle of the wealth distribution.

When estimated estate taxes due on death are subtracted from BV to produce BV_p mean bequest wealth was reduced by 9 to 10 percent in 2016. The percentage reduction was even greater in earlier years (15 to 20 percent) when the estate tax exemption was lower and marginal tax rates higher. Because the percentage reduction went down over time, mean BV_p grew faster than mean BV from 1983 to 2016. Netting out imputed estate taxes also substantially reduces measured wealth inequality. However, the estate tax effect on inequality, like that on the wealth level, diminished over time.

Netting out taxes is an equalizing factor with regard to intergroup differences in wealth, especially pension and Social Security wealth. While the racial gap in net worth, augmented wealth, DCW, and bequest value was only somewhat reduced when after-tax values are used instead of before-tax values, the black-white ratio in DBW rose from 0.58 to 0.61 in 2016, that in PW from 0.33 to 0.36, and that in SSW from 0.65 to 0.69. The wealth ratio between college and high school graduates was likewise diminished, as was that between married couples and single females. Netting out taxes lowered the ratio of DCW between college and high school graduates from 7.07 to 6.36, the DBW ratio from 3.08 to 2.73, the PW ratio from 4.80 to 4.26, the SSW ratio from 1.71 to 1.50, the RW ratio from 2.87 to 2.48, and the BV ratio from 6.20 to 5.80. Likewise, netting out taxes reduced the DCW ratio between couples and single females from 5.06 to 4.80, the SSW ratio from 2.42 to 2.26, and the BV ratio from 4.80 to 4.53.

The upshot is that if we follow Poterba's reasoning, then gross NW (and gross AW) are misleading concepts. In Poterba's case, it was because he argued that TDAs carry a tax liability and should not be combined with other components of net worth (he did not include the capital gains tax in his analysis). Here I include a tax liability to other wealth components such as stocks in the form of imputed capital gains tax. Still, their gross values should not be combined either. There are two reasons. First, for assets such as stocks, only the capital gains portion is subject to tax. The other portion is not. Second, TDAs are subject to different tax rules than other assets. While ordinary tax rules apply to TDAs on withdrawal, capital gains are a tax preference item.

The preferred concepts are after-tax NW and after-tax AW. As a result, almost all researchers on the subject have been mismeasuring wealth. The correct measure of net worth is NW_p, not NW, and AW_p, not AW. It is likewise the case for the various components of wealth such as DCW, DBW, and SSW. As a result, researchers have been overstating both the level of these components and its rate of growth over time. In some cases, the biases are quite large. While mean NW among the middle-aged group gained 91.2 percent from 1983 to 2016, mean NW_p was up 74.4 percent – a 18.5 percent difference. Whereas mean AW rose by 69.3 percent among middle-aged households, AW_p increased by only 55.8 percent – a 19.5 percent difference. Percentage differences are even greater for Social Security wealth and overall retirement wealth. On the other

hand, the use of pre-tax values relative to post-tax values has led to an overstatement in the degree of retirement wealth inequality (a Gini difference of 0.040 for middle-aged households in 2016, for example).

The paper also illustrates two notable asymmetries in the U.S. federal income tax law. The first is the treatment of TDA withdrawals as ordinary income versus the sale of other assets as a tax preference item. The second is the use of a step-up in basis in valuing other assets for estate tax purposes versus the failure to do so for TDAs.

The mismeasurement effects on net worth and augmented wealth have still been relatively modest as of 2016. However, the bias in estimating both the level and growth rate of net worth and augmented wealth will likely get more serious over time as the share of DCW in household wealth continues to rise, as it has already from 1.5 percenet in 1983 to 15.6 percent in 2016.

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Table 1: Basic Trends in Net Worth (NW), 1983-2016

(In thousands, 2016 dollars)

Variable	1983	1989	2001	2007	2010	2016	Percentage or Actual Change[a] 1983-1989	1989-2001	2001-2007	2007-2010	2010-2016	1983-2016
1. Median	80.4	86.1	99.6	118.6	66.5	78.1	7.0	15.8	19.1	-43.9	17.4	-2.9
2. Mean	313.0	358.6	515.2	620.5	521.0	667.6	14.6	43.7	20.4	-16.0	28.2	113.3
3. Percentage with non-positive net worth	15.5	17.9	17.6	18.6	21.8	21.2	2.4	-0.3	1.0	3.1	-0.6	5.7
4. Gini coefficient	0.799	0.828	0.826	0.834	0.866	0.877	0.029	-0.001	0.008	0.032	0.011	0.078

Source: author's computations from the 1983, 1989, 2001, 2007, 2010, and 2016 SCF.

Results are based on asset face value.

Wealth figures are deflated using the Consumer Price Index (CPI-U).

a. Percentage change for lines 1 and 2; actual change for lines 3 and 4.

Table 2. Composition of Total Household Wealth, 1983 - 2016

(Percent of gross assets)

Wealth component	1983	1989	2001	2007	2010	2016
Principal residence	30.1	30.2	28.2	32.8	30.7	25.1
Other real estate	14.9	14.0	9.8	11.3	11.6	10.4
Unincorporated business equity	18.8	17.2	17.2	20.1	17.7	20.1
Liquid assets[a]	17.4	17.5	8.8	6.6	7.7	6.7
Pension accounts[b]	1.5	2.9	12.3	12.1	15.1	15.6
Bonds and Financial securities	4.2	3.4	2.3	1.5	1.8	1.3
Corporate stock & mutual funds	9.0	6.9	14.8	11.8	11.2	16.1
Net equity in personal trusts	2.6	3.1	4.8	2.3	2.4	3.4
Miscellaneous assets[c]	1.3	4.9	1.8	1.7	1.7	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Debt on principal residence	6.3	8.6	9.4	11.4	12.7	8.6
All other debt[d]	6.8	6.4	3.1	3.9	4.4	3.9
Total debt	13.1	15.0	12.5	15.3	17.1	12.5
Selected ratios in percent:						
Debt / net worth ratio	15.1	17.6	14.3	18.1	20.6	14.3
Debt / income ratio	68.4	87.6	81.1	118.7	127.0	95.1
Net home equity / total assets[e]	23.8	21.6	18.8	21.4	18.1	16.5
Principal residence debt as ratio to house value	20.9	28.6	33.4	34.9	41.2	34.4
Stocks, directly or indirectly owned as a ratio to total assets[f]	11.3	10.2	24.5	16.8	17.5	22.4

Source: author's computations from the 1983, 1989, 2001, 2007, 2010, and 2016 SCF.

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

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

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

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

e. Gross value of principal residence less mortgage debt on principal residence.

f. Includes direct ownership of stock shares and indirect ownership through mutual funds, trusts, and IRAs, Keogh plans, 401(k) plans, and other retirement accounts

Table 3. Composition of Household Wealth by Wealth Class, 2016
(Percent of gross assets)

Asset	All Households	Top One Percent	Next 19 Percent	Middle 3 Quintiles
Principal residence	25.1	7.6	25.6	61.9
Liquid assets (bank deposits, money market funds, and cash surrender value of life insurance)	6.7	4.6	7.7	8.5
Pension accounts	15.6	6.0	22.4	16.6
Corporate stock, financial securities, mutual funds, and personal trusts	20.8	31.4	18.6	3.9
Unincorporated business equity other real estate	30.5	49.0	24.5	7.9
Miscellaneous assets	1.3	1.4	1.2	1.2
Total assets	100.0	100.0	100.0	100.0
Memo (selected ratios in percent):				
Debt / net worth ratio	14.3	2.4	10.1	58.9
Debt / income ratio	95.1	35.0	88.9	120.4
Net home equity / total assets[a]	16.5	6.4	18.8	33.3
Principal residence debt / house value	34.4	15.4	26.5	46.1
All stocks / total assets[b]	22.4	25.5	24.5	9.7
Ownership Rates (Percent)				
Principal residence	63.7	94.1	94.6	67.0
Other real estate	17.4	74.7	46.7	11.7
Pension assets	52.1	91.3	83.8	48.9
Unincorporated business	11.4	66.1	28.7	7.8
Corporate stock, financial securities, mutual funds, and personal trusts	22.8	89.2	61.6	15.3
Stocks, directly or indirectly owned[b]	49.3	94.0	86.2	45.0
(1) $5,000 or more	39.3	94.0	84.4	33.9
(2) $10,000 or more	34.9	93.8	82.7	28.3

Source: author's computations from the 2016 SCF. Households are classified into wealth class according to their net worth. Brackets for 2016 are:

Top one percent: Net worth of $10,257,000 or more.
Next 19 percent: Net worth between $471,600 and $10,257,000.
Quintiles 2 through 4: Net worth between $0 and $471,600.

Also, see Notes to Table 2.
a. Ratio of gross value of principal residence less mortgage debt on principal residence to total assets.
b. Includes direct ownership of stock shares and indirect ownership through mutual funds, trusts, and IRAs, Keogh plans, 401(k) plans, and other retirement accounts

Table 4. Retirement and Augmented Wealth, All Households, 1989 - 2016
(In thousands, 2016 dollars)

				Percentage or Actual Change[a]		
	1989	2007	2016	1989-07	2007-16	1989-16
A. Mean Values						
1. DC Pension Wealth DCW	12.2	88.9	119.1	626.5	33.9	872.7
2. DB Pension Wealth DBW	65.4	70.8	82.7	8.3	16.7	26.3
3. Pension Wealth PW	77.7	159.8	201.8	105.7	26.3	159.8
4. Social Security Wealth SSW	129.6	191.4	222.9	47.7	16.4	72.0
5. Retirement Wealth RW	207.3	351.2	424.6	69.5	20.9	104.9
6. Net Worth NW	358.8	620.8	667.9	73.0	7.6	86.2
7. Private Augmented Wealth PAW	424.0	691.9	750.6	63.2	8.5	77.0
8. Augmented Wealth AW	553.6	883.3	973.4	59.6	10.2	75.8
B. Median Values						
1. Social Security Wealth SSW	116.3	161.1	188.9	38.5	17.2	62.4
2. Retirement Wealth RW	146.0	217.3	245.8	48.9	13.1	68.4
3. Net Worth NW	87.8	118.7	78.1	35.2	-34.2	-11.0
4. Private Augmented Wealth PAW	132.1	165.3	119.0	25.2	-28.0	-9.9
5. Augmented Wealth AW	260.6	358.1	330.9	37.4	-7.6	27.0
C. Gini Coefficients						
1. Pension Wealth PW	0.799	0.783	0.798	-0.016	0.015	-0.002
2. Social Security Wealth SSW	0.370	0.363	0.354	-0.007	-0.009	-0.015
3. Retirement Wealth RW	0.485	0.514	0.531	0.029	0.017	0.046
4. Net Worth NW	0.828	0.834	0.877	0.006	0.043	0.049
5. Private Augmented Wealth PAW	0.793	0.805	0.846	0.012	0.042	0.054
6. Augmented Wealth AW	0.663	0.684	0.711	0.021	0.027	0.048

Note: author's computations from the 1989, 2007, and 2016 SCF. Key:
Pension Wealth PW = DBW + DCW
Retirement Wealth RW = PW + SSW
Private Augmented Wealth PAW = NWX + PW
Augmented Wealth AW = NWX+PW+SSW
a. Actual change for Gini coefficients.

Table 5. Before Tax and After Tax Pension Wealth: Percentage Difference, 1983 – 2016

	1983	1989	2007	2016
A. Ages 47-64				
1. Mean DC Pension Wealth (DCW)	38.8	26.7	23.3	23.6
2. Mean DB Pension Wealth (DBW)	23.4	18.5	19.3	19.5
3. Mean Pension Wealth (PW)	24.9	19.8	21.7	22.2
4. Median Pension Wealth (PW) Among Holders Only	16.1	12.2	14.6	14.1
5. Median Pension Wealth (PW) Among All HHs in Age Group	16.6	16.1	13.3	9.4
B. Ages 65 and over				
1. Mean DC Pension Wealth (DCW)	28.9	30.2	23.6	24.1
2. Mean DB Pension Wealth (DBW)	20.3	17.9	17.6	19.9
3. Mean Pension Wealth (PW)	20.6	18.3	20.5	22.0
4. Median Pension Wealth (PW) Among Holders Only	13.9	9.3	7.8	11.6
5. Median Pension Wealth (PW) Among All HHs in Age Group	7.3	0.7	5.7	10.4

Note: author's computations from the 1983, 1989, 2007, and 2016 SCF.
Households are classified into age groups by the age of the head of household.
The results show the percentage difference between before-tax PW and PW net of taxes due on withdrawals from DC accounts and pay-outs from DB accounts. Key:
Pension Wealth PW = DBW + DCW

Table 6. Inequality of Before Tax and After Tax Pension Wealth: Difference in Gini Coefficients, 1983 – 2016

	1983	1989	2007	2016
A. Pension Holders Only: Ages 47-64				
1. DC Pension Wealth (DCW)	0.028	0.019	0.022	0.024
2. DB Pension Wealth (DBW)	0.028	0.018	0.020	0.020
3. Pension Wealth (PW)	0.036	0.020	0.024	0.025
Memo: PW among all households in age group	0.025	0.014	0.018	0.017
B. Pension Holders Only: Ages 65 and over				
1. DC Pension Wealth (DCW)	-0.016	0.021	0.026	0.025
2. DB Pension Wealth (DBW)	0.048	0.038	0.028	0.024
3. Pension Wealth (PW)	0.048	0.038	0.032	0.029
Memo: PW among all households in age group	0.033	0.020	0.022	0.021

Note: author's computations from the 1983, 1989, 2007, and 2016 SCF.
Households are classified into age groups by the age of the head of household.
The results show the Gini point difference between before-tax PW and PW net of taxes due on withdrawals from DC accounts and pay-outs from DB accounts. Key:
Pension Wealth PW = DBW + DCW

Table 7. Before Tax and After Tax Wealth Retirement Wealth: Percentage Difference, 1983 - 2016

	1983	1989	2007	2016
I. Ages 47-64				
1. Mean Social Security Wealth SSW vs. net SSW	0.0	9.6	13.9	14.1
2. Mean Retirement Wealth RW vs. net RW	9.5	14.4	17.9	18.2
3. Median Social Security Wealth SSW	0.0	9.6	13.4	12.4
4. Median Retirement Wealth RW	4.7	9.9	13.4	10.4
II. Ages 65 and over				
1. Mean Social Security Wealth SSW	0.0	5.6	10.2	12.4
2. Mean Retirement Wealth RW	7.2	10.7	15.4	17.8
3. Median Social Security Wealth SSW	0.0	4.4	8.8	11.0
4. Median Retirement Wealth RW	4.7	5.1	4.6	11.0

Note: author's computations from the 1983, 1989, 2007, and 2016 SCF.
Households are classified into age groups by the age of the head of household.
Results show the percentage difference between the before-tax value and the value net of taxes due on withdrawals from TDAs and pay-outs from DB accounts and Social Security. Key:
Retirement Wealth RW = PW + SSW

Table 8. Before Tax and After Tax Net Worth and Augmented Wealth: Percentage Difference, 1983 - 2016

	1983	1989	2007	2016
I. Ages 47-64				
A. Before-tax versus net after tax payments on TDA withdrawals and DB and SS payouts.				
1. Mean Net Worth (NW) vs. PTNW	1.2	1.2	4.3	5.0
2. Mean Augmented Wealth (AW) vs. PTAW	3.4	5.2	7.1	7.6
3. Median Net Worth (NW) vs. PTNW	0.3	1.9	3.8	3.2
4. Median Augmented Wealth (AW) vs. PTAW	2.0	2.5	8.5	8.8
B. Before-tax versus After-tax Value.				
1. Mean Net Worth (NW) vs. NW_p	1.3	2.5	8.6	10.0
2. Mean Augmented Wealth (AW) vs. AW_p	3.4	6.0	10.2	11.2
3. Median Net Worth (NW) vs. NW_p	0.6	3.6	3.9	3.4
4. Median Augmented Wealth (AW) vs. AW_p	2.0	5.8	8.5	9.1
Memo:				
1. Mean effective tax rate on capital gains (percent)	19.8	11.0	8.7	15.2
2. Ratio of imputed capital gains tax to mean NW (percent)	0.1	1.2	4.3	5.0
II. Ages 65 and over				
A. Before-tax versus net after tax payments on TDA withdrawals and DB and SS payouts.				
1. Mean Net Worth (NW) with PTNW	0.3	0.2	2.9	4.3
2. Mean Augmented Wealth (AW) with PTAW	2.2	3.4	5.0	7.0
3. Median Net Worth (NW) with PTNW	0.0	0.0	1.4	2.3
4. Median Augmented Wealth (AW) with PTAW	1.3	2.2	2.8	6.1
B. Before-tax versus After-tax Value.				
1. Mean Net Worth (NW) vs. NW_p	0.4	0.9	7.2	8.6
2. Mean Augmented Wealth (AW) vs. AW_p	2.2	3.9	8.2	10.1
3. Median Net Worth (NW) vs. NW_p	0.0	2.2	1.5	2.7
4. Median Augmented Wealth (AW) vs. AW_p	1.3	2.8	3.3	6.0
Memo:				
1. Mean effective tax rate on capital gains (percent)	19.8	5.6	7.9	12.7
2. Ratio of imputed capital gains tax to mean NW (percent)	0.1	0.7	4.2	4.3

Note: author's computations from the 1983, 1989, 2007, and 2016 SCF.
Households are classified into age groups by the age of the head of household.
Panel A shows the percentage difference between the before-tax value and the value net of taxes due on withdrawals from TDAs and pay-outs from DB accounts and Social Security.
Panel B shows the percentage difference between the before-tax value and the value net of taxes due on withdrawals from TDAs, DB and Social Security pay-outs and accrued capital gains. Key:
Augmented Wealth AW = NW+DBW+SSW

Table 9. Inequality of Gross (Before Tax) and Net (After-Tax) Wealth: Difference in Gini Coefficients, 1983 – 2016

	1983	1989	2007	2016
I. Ages 47-64				
A. Before-tax versus net after tax payments on TDA withdrawals and DB and SS payouts				
1. Social Security Wealth SSW vs. Net SSW	0.000	0.007	0.018	0.024
2. Retirement Wealth RW vs. net RW	0.033	0.029	0.037	0.040
3. Net Worth (NW) vs. PTNW	0.002	0.001	-0.002	-0.002
4. Augmented Wealth (AW) vs. PTAW	0.001	0.000	-0.003	-0.002
B. Before-tax versus After-tax Value.				
1. Net Worth (NW) vs. NW_p	0.002	-0.009	0.005	0.003
2. Augmented Wealth (AW) vs. AW_p	0.001	-0.004	0.007	0.007
II. Ages 65 and over				
A. Before-tax versus net after tax payments on TDA withdrawals and DB and SS payouts				
1. Social Security Wealth SSW vs. Net SSW	0.000	0.005	0.014	0.014
2. Retirement Wealth RW vs. net RW	0.017	0.026	0.038	0.030
3. Net Worth (NW) vs. PTNW	0.007	0.000	0.002	0.001
4. Augmented Wealth (AW) vs. PTAW	-0.001	0.004	0.003	0.001
B. Before-tax versus After-tax Value.				
1. Net Worth (NW) vs. NW_p	0.007	-0.003	0.009	0.007
2. Augmented Wealth (AW) vs. AW_p	-0.001	0.003	0.012	0.011

Note: author's computations from the 1983, 1989, 2007, and 2016 SCF.
Households are classified into age groups by the age of the head of household.
Panel A shows the Gini difference between the before-tax value and the value net of taxes due on withdrawals from TDAs and pay-outs from DB accounts and Social Security.
Panel B shows the Gini difference between the before-tax value and the value net of taxes due on withdrawals from TDAs, DB and Social Security pay-outs and accrued capital gains. Key:
Retirement Wealth RW = PW + SSW
Augmented Wealth AW = NW+DBW+SSW

Table 10. Comparison of Bequest Value (BV) with Post-Tax Net Worth Percentage Difference, 1983 - 2016

	1983	1989	2007	2016
I. Ages 47-64				
1. Mean (Gross) BV versus Mean NW	19.4	19.2	28.6	27.3
2. Median (Gross) BV versus Mean NW	37.2	55.2	49.2	67.9
3. Mean PTBV versus Mean NW_p	19.8	21.0	36.0	35.8
4. Median PTBV versus Median NW_p	37.8	60.3	61.8	89.1
5. Mean BVp versus Mean NWp	2.1	0.1	12.3	19.4
6. Median BVp versus Median NWp	27.4	37.6	38.0	47.1
Memo: Ratio of Estate Taxes to PTBV	14.7	17.3	16.1	8.6
II. Ages 65 and over				
1. Mean (Gross) BV versus Mean NW	3.2	22.9	6.2	7.2
2. Median (Gross) BV versus Mean NW	4.8	59.3	4.7	8.4
3. Mean PTBV versus Mean NW_p	3.3	23.7	11.2	12.6
4. Median PTBV versus Median NW_p	5.0	61.6	8.6	14.7
5. Mean Net BV versus Mean CWV	-17.5	2.3	-11.8	1.6
6. Median Net BV versus Median CWV	4.8	38.1	7.9	12.8
Memo: Ratio of Estate Taxes to PTBV	17.6	17.3	19.6	9.8
Memo: Difference in Gini Coefficients				
I. Ages 47-64				
1. Difference between PTBV and NW_p	-0.030	-0.085	-0.034	-0.039
2. Difference between PTBV and BV_p	0.044	0.060	0.042	0.017
3. Difference between BVp and NWp	-0.075	-0.145	-0.077	-0.056
II. Ages 65 and over				
1. Difference between PTBV and NW_p	-0.006	-0.076	-0.002	-0.011
2. Difference between PTBV and BV_p	0.048	0.059	0.050	0.022
3. Difference between BVp and NWp	-0.054	-0.135	-0.051	-0.033

Note: author's computations from the 1983, 1989, 2007, and 2016 SCF.
Households are classified into age groups by the age of the head of household.
BV_p is defined as PTBV minus imputed estate taxes.

Table 11. Wealth by Component, Income and Wealth Class, and Demographic Characteristic, 2016
(Percentage difference of mean values)

Category	% Diff[c] Net DCW/ DCW	% Diff[c] Net DBW/ DBW	% Diff[c] Net PW/ PW	% Diff[c] PTNW/ NW	% Diff[c] Net SSW/ SSW	% Diff[c] Net RW/ RW	% Diff[c] PTAW/ AW	% Diff[d] NW_p/ NW	% Diff[d] AW_p/ AW	% Diff[e] BV_p/ BV	% Diff BV_p[e] / NW_p[d]
All, Age 47 and over	23.8	19.7	22.1	4.7	13.4	18.0	7.3	9.3	10.7	9.1	12.3
A. Income level											
Bottom 20 percent	0.4	0.7	0.5	0.0	0.0	0.1	0.0	0.1	0.0	7.6	9.1
Second quintile	5.3	6.4	6.0	0.8	0.6	2.1	1.3	1.7	1.7	0.7	16.1
Middle quintile	9.3	10.2	9.8	2.6	5.3	7.1	4.6	4.1	5.3	0.2	18.4
Fourth quintile	14.6	16.8	15.8	4.8	14.1	14.9	9.3	7.0	10.5	0.1	25.5
P80-90	20.7	22.2	21.4	6.3	20.5	21.1	11.6	9.6	13.6	1.8	23.1
P90-95	24.7	25.8	25.1	7.0	25.7	25.3	11.8	11.3	14.9	2.5	20.4
P95-99	30.2	32.8	30.8	6.4	32.3	31.2	9.1	11.2	13.3	7.0	13.2
Top 1%	38.0	39.6	38.2	3.2	39.6	38.5	3.9	10.5	11.0	22.2	-5.7
B. Wealth level											
Bottom 20 percent	15.2	15.0	15.0	--[f]	6.0	8.0	8.9	--[f]	8.9	0.0	144.6
Second quintile	10.5	12.0	11.9	3.7	3.6	5.3	5.1	4.0	5.1	0.0	78.8
Middle quintile	12.0	13.7	13.4	2.5	6.8	8.8	7.3	3.0	7.4	0.0	51.3
Fourth quintile	13.3	16.8	15.6	3.7	10.6	12.8	8.8	4.2	9.1	0.0	30.7
P80-90	17.1	19.3	18.1	5.7	15.8	17.1	10.0	7.1	10.8	0.0	23.1
P90-95	21.5	23.5	22.2	7.3	22.1	22.2	11.2	9.9	13.0	0.0	19.7
P95-99	27.9	30.2	28.4	6.8	28.4	28.4	9.0	10.8	12.5	0.8	15.7
Top 1%	33.0	37.4	33.5	2.5	35.1	33.8	3.0	9.8	10.1	22.8	-9.6
C. Race											
Non-Hispanic whites	23.9	20.2	22.4	4.7	14.2	18.8	7.2	9.4	10.7	9.6	10.9
Non-Hispanic African-Americans	18.4	16.9	17.4	4.4	8.9	12.2	8.5	8.4	10.0	3.1	32.5
Hispanics[a]	22.7	15.5	18.9	3.9	7.8	11.6	6.2	8.0	8.4	4.0	25.2

Asians and others	**25.1**	**20.3**	**23.8**	**6.4**	**16.2**	**20.3**	**9.0**	**9.6**	**11.4**	**4.6**	**17.2**
D. Age class[b]											
47-54	**23.2**	**19.8**	**22.3**	**4.9**	**14.7**	**18.0**	**7.5**	**10.5**	**11.6**	**7.6**	**28.9**
55-64	**23.8**	**19.4**	**22.1**	**5.1**	**13.6**	**18.3**	**7.6**	**9.7**	**10.9**	**9.2**	**13.8**
65-74	**24.1**	**20.1**	**21.9**	**4.7**	**12.7**	**17.8**	**8.0**	**8.4**	**10.5**	**9.9**	**2.9**
75 & over	**23.9**	**19.4**	**22.1**	**3.8**	**11.7**	**17.7**	**5.4**	**8.7**	**9.4**	**9.6**	**-0.1**
E. Education[b]											
Less than 12 years	**21.2**	**16.0**	**18.8**	**4.3**	**5.2**	**9.0**	**5.4**	**8.0**	**7.2**	**3.3**	**18.4**
12 years	**17.2**	**13.0**	**14.8**	**3.3**	**7.7**	**10.4**	**5.7**	**6.8**	**7.7**	**4.5**	**21.5**
13-15 years	**19.0**	**17.2**	**18.0**	**4.2**	**10.7**	**14.2**	**7.4**	**8.5**	**10.0**	**5.3**	**20.5**
16 years or more	**25.6**	**22.7**	**24.5**	**5.0**	**19.1**	**22.5**	**7.7**	**9.8**	**11.5**	**10.6**	**9.1**
F. Family type											
Couples	**24.1**	**19.8**	**22.4**	**4.8**	**14.7**	**18.9**	**7.5**	**9.7**	**11.1**	**9.4**	**13.3**
Single Males	**24.6**	**21.4**	**23.1**	**4.6**	**10.6**	**17.5**	**6.9**	**8.8**	**10.0**	**11.0**	**3.5**
Single Females	**19.8**	**17.9**	**18.8**	**3.8**	**8.6**	**13.0**	**6.4**	**6.6**	**8.1**	**4.0**	**12.0**
G. Homeowner status											
Homeowner	**23.8**	**19.9**	**22.2**	**4.6**	**14.7**	**18.9**	**7.3**	**9.3**	**10.8**	**9.3**	**11.3**
Renter	**22.3**	**17.9**	**19.9**	**6.6**	**7.0**	**11.1**	**8.0**	**10.0**	**9.3**	**3.5**	**33.8**

Note: author's computations from the 2016 SCF for households aged 47 and over.

a. Hispanics can be of any race.

b. Households are classified according to the age and education of the head of household.

c. Percentage difference between the before-tax value and the value net of taxes due on withdrawals from TDAs and pay-outs from DB accounts and Social Security.

d. Percentage difference between the before-tax value and the value net of taxes due on withdrawals from TDAs, DB and Social Security pay-outs and accrued capital gains.

e. Percentage difference between the before-tax value and the value net of imputed estate taxes.

f. Mean net worth is negative for the bottom 20 percent.

Retirement Wealth RW = PW + SSW

Private Augmented Wealth PAW = NW + DBW

Augmented Wealth AW = NW+DBW+SSW

Table 12. Distribution of Wealth by Component by income and Wealth class and Demographic Characteristic, 2016
(Percentage Distribution)

Category	DCW	DBW	PW	NW	SSW	RW	AW	NW_p	AW_p	BV	TDB
All age 47 and over	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
A. Income level											
Bottom 20 percent	1.2	1.5	1.3	2.9	10.6	5.7	4.2	3.2	4.7	3.0	3.0
Second quintile	2.6	7.3	4.6	3.7	13.9	9.0	5.9	4.0	6.5	3.8	3.7
Middle quintile	6.7	13.9	9.7	5.3	17.7	13.5	8.4	5.6	8.9	5.5	5.8
Fourth quintile	16.0	26.1	20.3	10.1	22.5	21.3	13.9	10.3	13.9	11.1	16.3
P80-90	18.0	23.4	20.3	11.3	15.2	17.9	13.2	11.3	12.7	12.0	16.1
P90-95	15.3	14.0	14.7	10.5	9.0	12.1	10.5	10.3	10.0	10.6	12.2
P95-99	26.8	11.4	20.4	25.2	8.7	14.9	20.8	24.7	20.2	24.4	22.5
Top 1%	13.3	2.3	8.7	31.0	2.5	5.8	23.0	30.7	22.9	29.7	20.4
B. Wealth level											
Bottom 20 percent	0.2	3.8	1.7	-0.2	6.8	4.1	1.5	-0.2	1.5	0.4	3.7
Second quintile	0.2	5.3	2.4	0.1	10.8	6.3	2.6	0.2	2.8	0.6	2.8
Middle quintile	1.7	13.2	6.6	1.7	16.9	11.4	5.6	1.8	5.8	2.9	9.2
Fourth quintile	9.9	26.9	17.0	7.0	25.5	21.0	12.3	7.4	12.5	8.5	16.0
P80-90	17.5	20.8	18.9	10.3	17.2	18.1	12.6	10.6	12.5	11.0	14.9
P90-95	19.8	15.6	18.0	11.5	10.5	14.5	11.7	11.4	11.4	11.3	12.2
P95-99	35.3	11.6	25.3	28.3	9.8	18.1	23.3	27.9	22.8	26.6	20.7
Top 1%	15.4	2.6	10.1	41.3	2.6	6.6	30.5	41.1	30.6	38.7	20.5
C. Race											
Non-Hispanic whites	89.4	84.1	87.2	91.1	79.6	83.6	88.3	91.0	88.2	90.2	85.2
Non-Hispanic African-Americans	2.9	9.6	5.7	2.4	10.2	7.8	4.6	2.5	4.6	3.0	5.9
Hispanics[a]	2.2	3.3	2.7	2.5	6.0	4.2	3.2	2.5	3.3	2.8	4.3
Asians and others	5.5	3.0	4.4	4.0	4.3	4.3	4.0	4.0	3.9	4.1	4.6
D. Age class[b]											
47-54	19.7	10.2	15.7	18.6	23.0	19.1	18.7	18.3	18.5	22.2	41.5

55-64	41.2	35.2	38.7	36.9	36.3	37.6	36.7	36.8	36.5	37.5	41.0
65-74	24.2	40.2	31.0	24.8	28.5	29.8	26.9	25.0	26.9	22.8	12.6
75 & over	14.9	14.3	14.6	19.7	12.1	13.5	17.8	19.9	18.1	17.5	4.9
E. Education[b]											
Less than 12 years	3.0	3.6	3.3	2.9	9.5	6.2	4.2	2.9	4.4	2.9	3.3
12 years	8.4	15.3	11.3	8.8	21.6	16.1	11.8	9.0	12.2	9.6	13.1
13-15 years	14.6	22.8	18.0	13.0	23.3	20.5	15.8	13.1	16.0	13.9	18.2
16 years or more	74.0	58.3	67.4	75.4	45.6	57.2	68.2	75.0	67.5	73.6	65.4
F. Family type											
Couples	82.9	76.6	80.2	81.5	75.3	77.9	79.9	81.2	79.5	82.4	87.4
Single Males	8.7	10.2	9.3	9.4	8.6	9.0	9.3	9.4	9.4	8.7	5.5
Single Females	8.5	13.2	10.5	9.1	16.1	13.1	10.8	9.4	11.1	8.9	7.1
G. Homeowner status											
Homeowner	94.7	91.0	93.1	96.6	83.2	88.5	93.6	96.7	93.5	95.8	91.3
Renter	5.3	9.0	6.9	3.4	16.8	11.5	6.4	3.3	6.5	4.2	8.7

Note: author's computations from the 2016 SCF for households aged 47 and over.

a. Hispanics can be of any race.

b. Households are classified according to the age and education of the head of household.

Retirement Wealth RW = PW + SSW

Private Augmented Wealth PAW = NW + DBW

Augmented Wealth AW = NW+DBW+SSW

Note: TDB is total death benefits

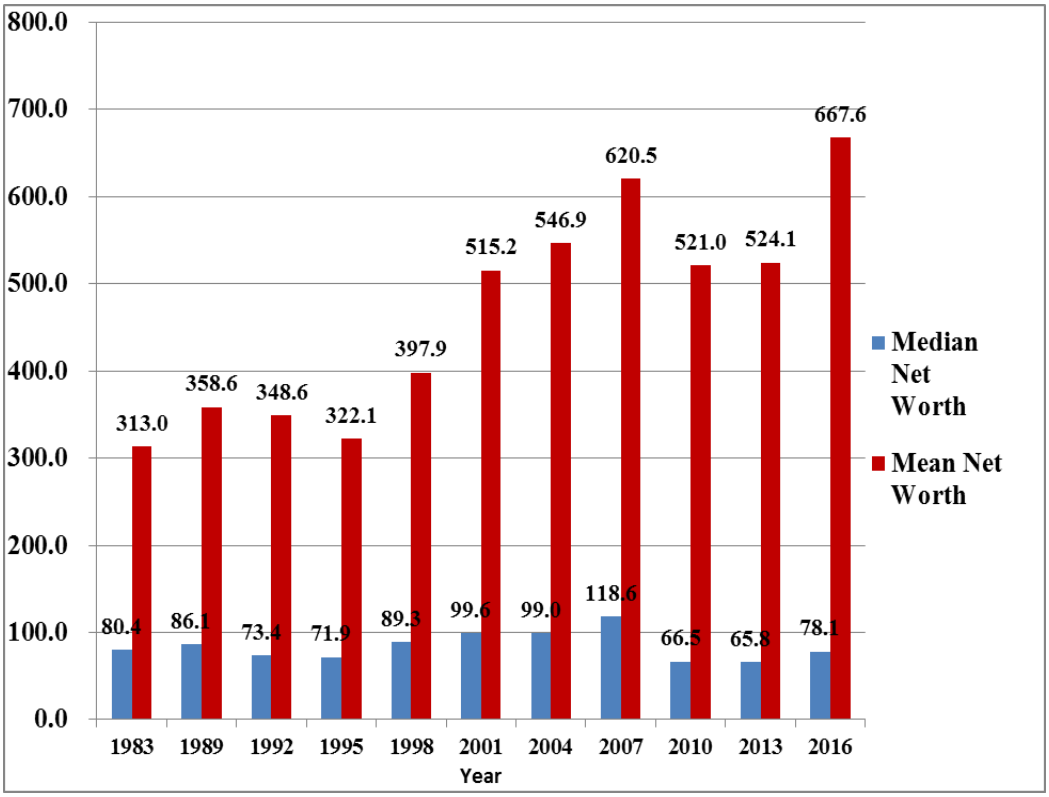

Figure 1. Mean and Median Net Worth (NW), 1983-2016 (in thousands, 2016 dollars)

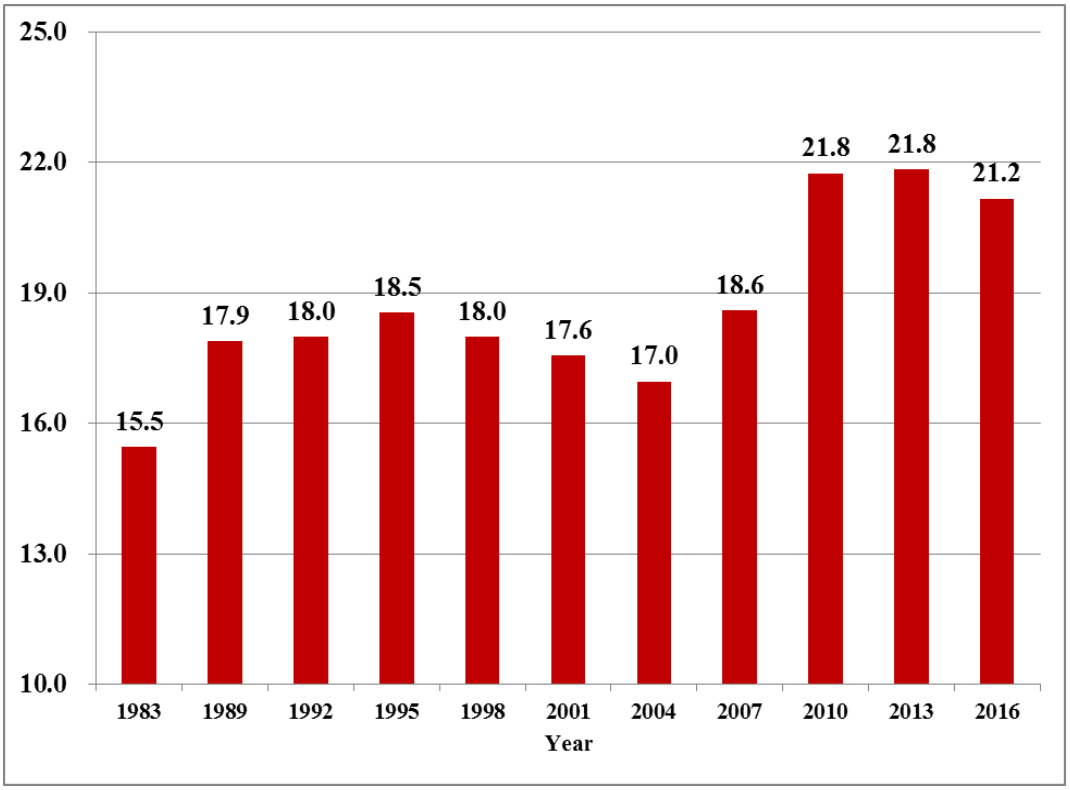

Figure 2. Percentage of Households with Zero or Negative Net Worth, 1983-2016

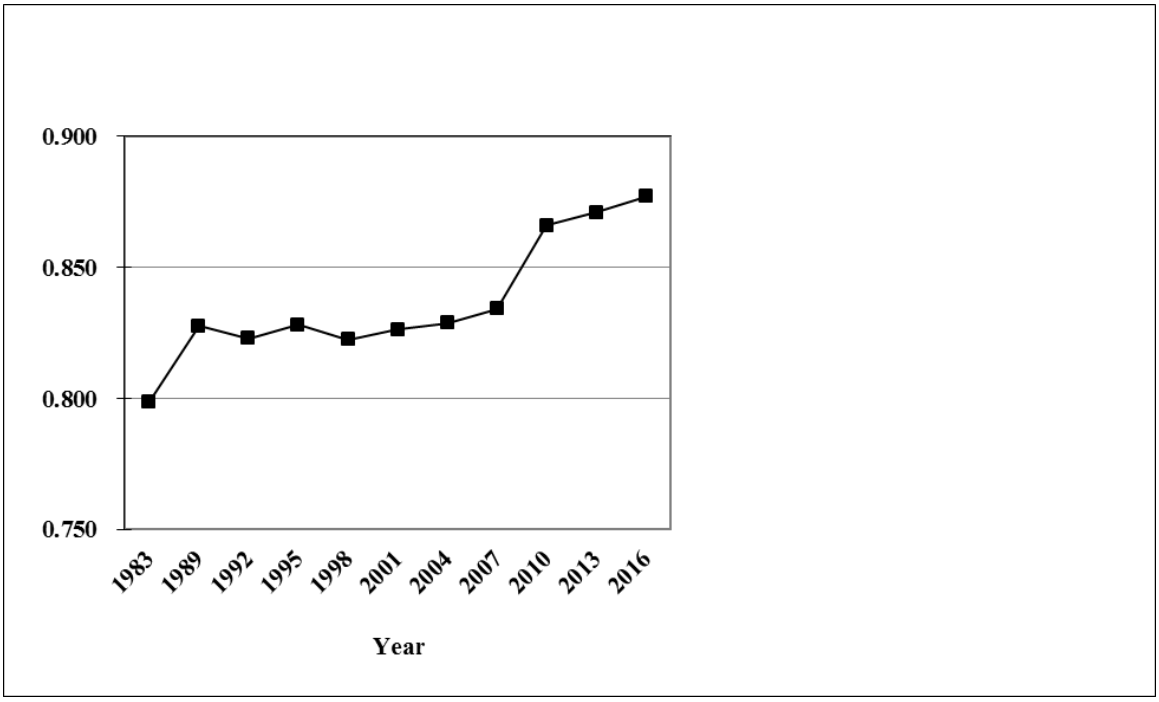

Figure 3. Net Worth (NW) Inequality, 1983-2016 (Gini coefficients)

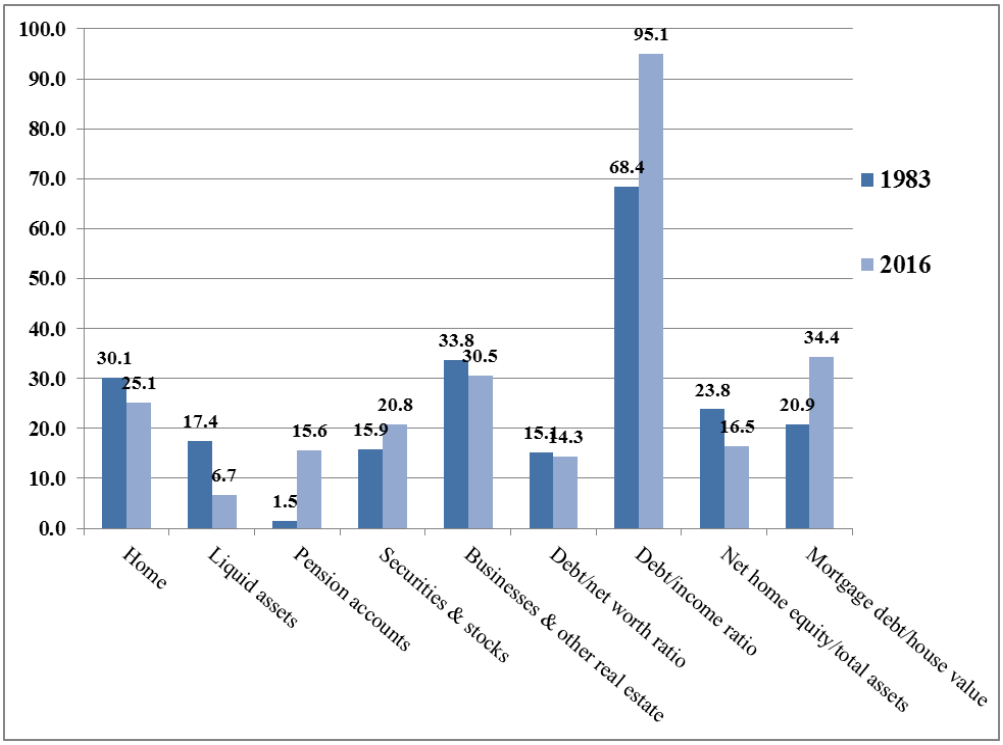

Figure 4. Composition of Household Wealth, 1983 and 2016 (percent of gross assets)

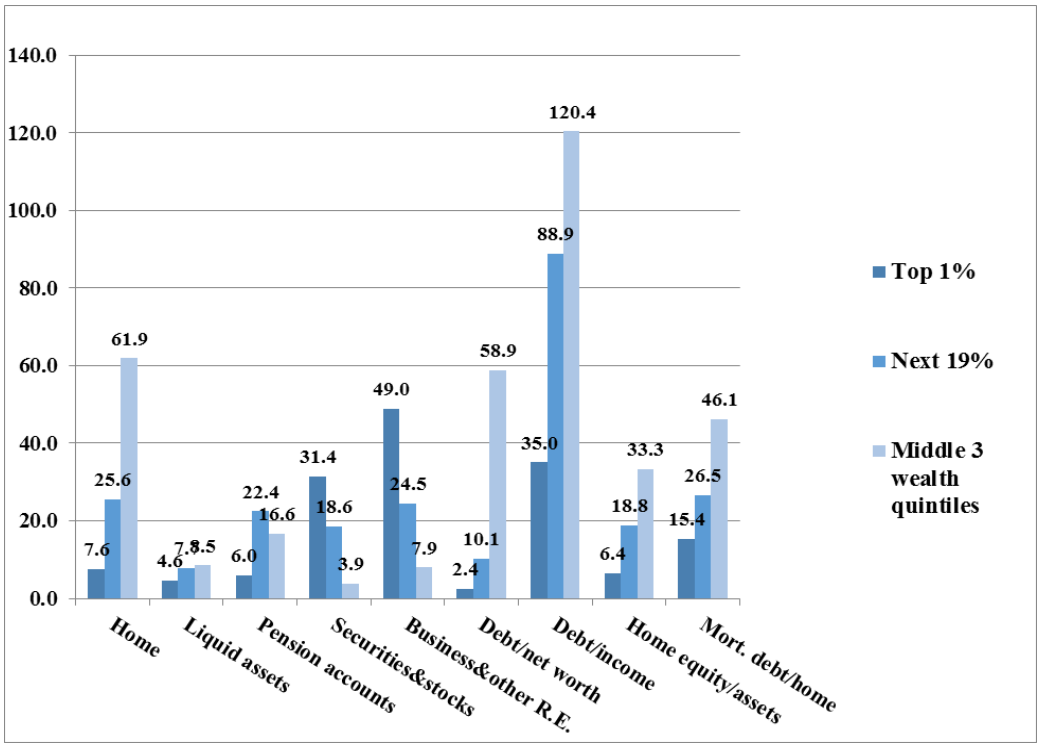

Figure 5. Composition of Household Wealth by Wealth Class, 2016 (percent of gross assets)

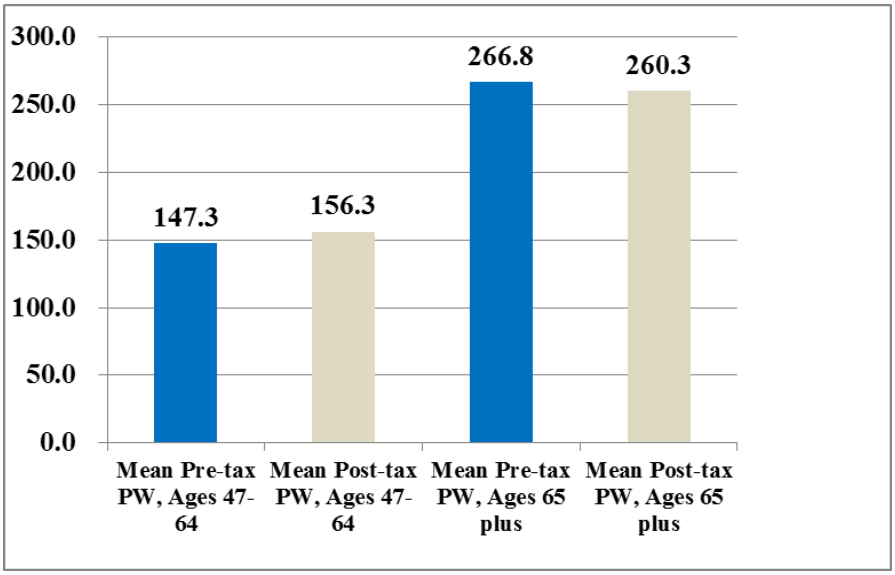

Figure 6. Mean Pre-tax and Post-tax Pension Wealth, Percentage Change, 1983-2016

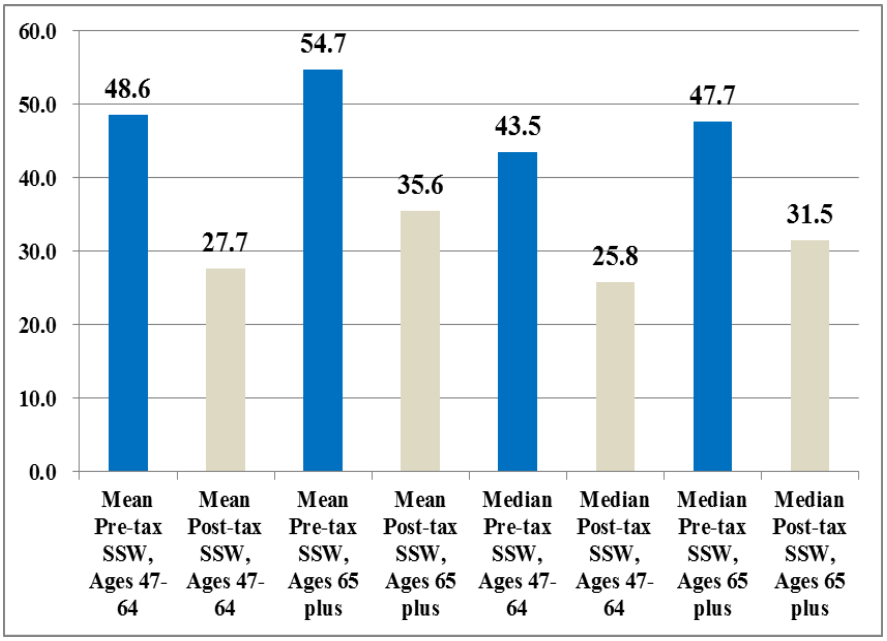

Figure 7. Pre-tax and Post-tax Social Security Wealth, Percentage Change, 1983-2016

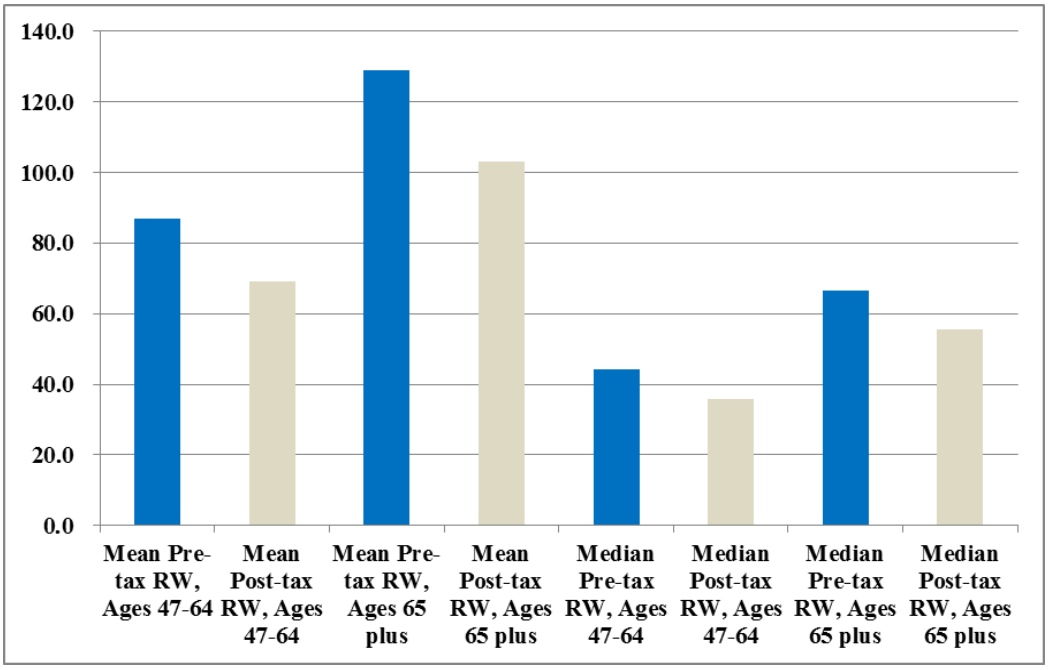

Figure 8. Pre-tax and Post-tax Retirement Wealth, Percentage Change, 1983-2016

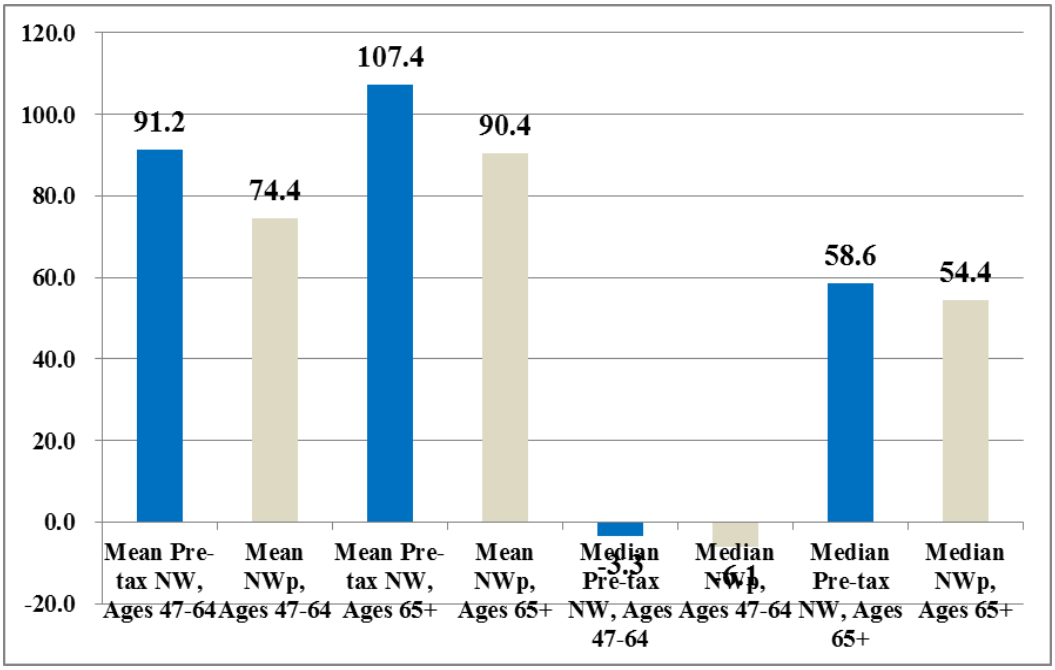

Figure 9. Pre-tax NW and Post-tax Net Worth (NW_p), Percentage Change, 1983-2016

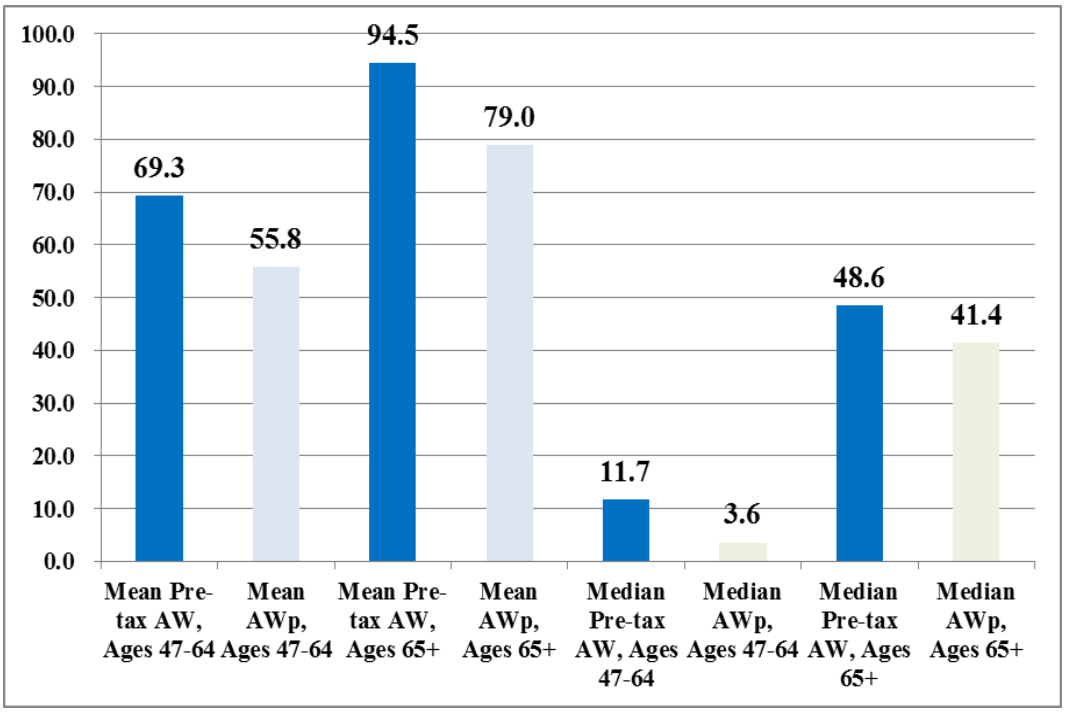

Figure 10. Pre-tax and Post-tax Augmented Wealth (AW_p), Percentage Change, 1983-2016

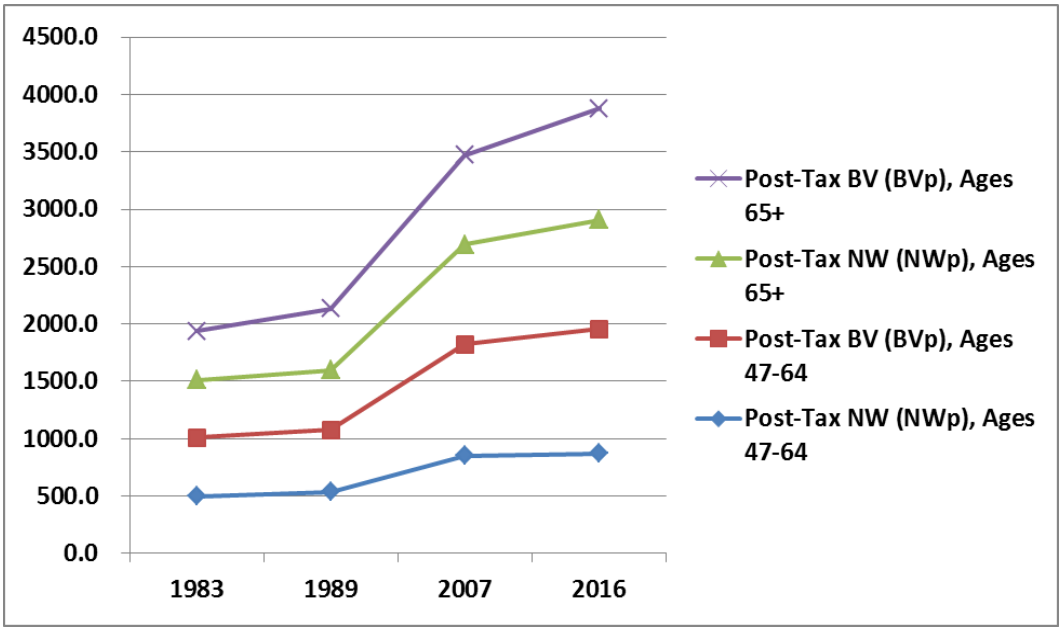

Figure 11. Post-tax Bequest Value (BV_p) and Net Worth (NWp), 1983-2016 [in 1000s, 2006$]

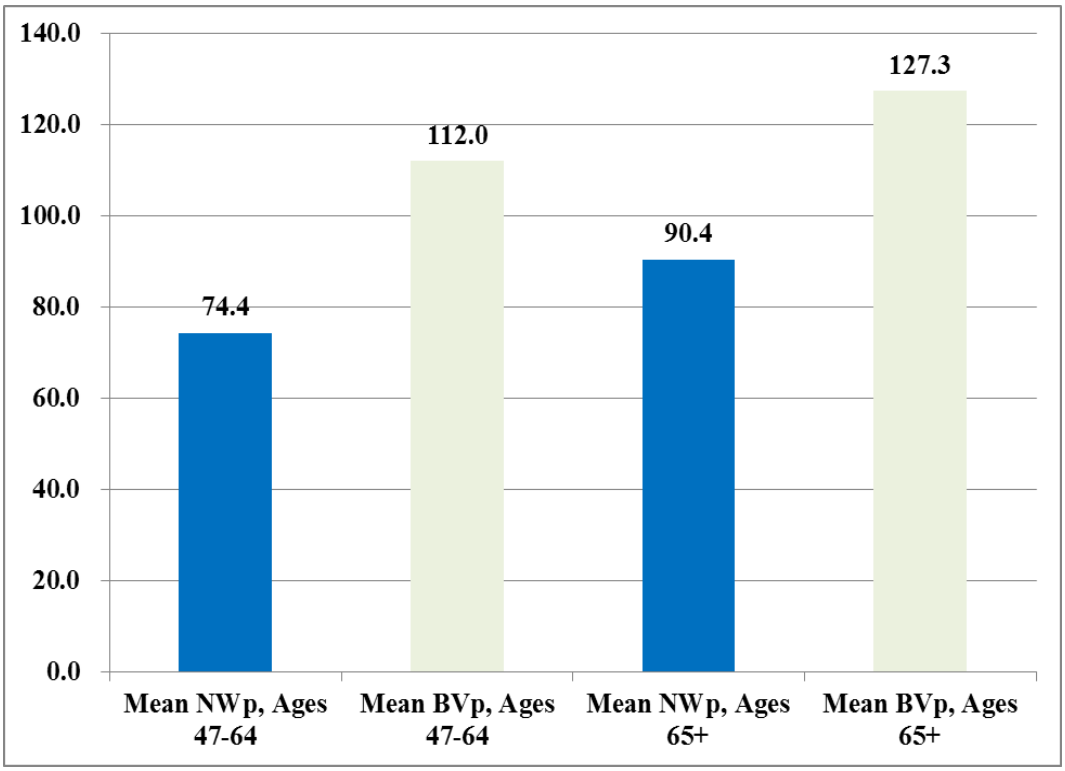

Figure 12. Post-tax Net Worth (NW_p) and Bequest Value (BV_p), Percentage Change, 1983-2016

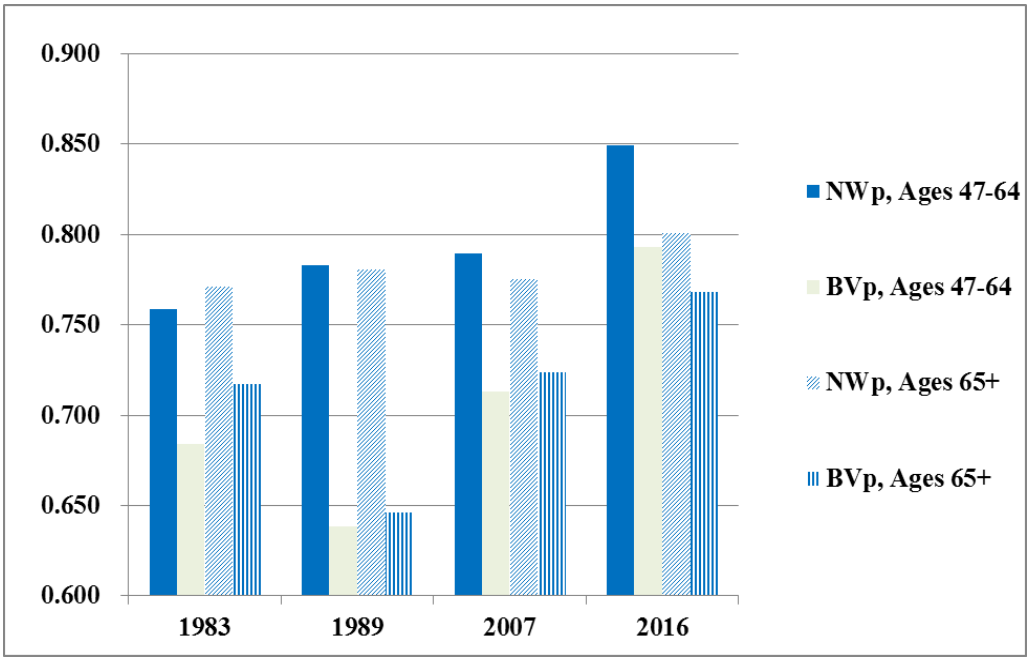

Figure 13. Inequality in Post-tax Net Worth (NWp) and Bequest Value (BV_p), 1983-2016 [Gini coefficients]

Appendix 1. Estimation of Retirement Wealth

This appendix provides methodological details on the construction of estimates for both Social Security wealth (SSW) and defined benefit pension wealth (DBW). The imputation of both defined benefit pension wealth (DBW) and Social Security wealth (SSW) involves a large number of steps, which is summarized below. It should be noted that the standard definition of DBW and SSW is based on the conventional "on-going concern" treatment. It is assumed for this that employees continue to work at their place of employment until their expected date of retirement.

A1.1 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, DB pension wealth is given by:

$$\text{(A1.1a)} \quad DBW_r = \int_0^{109-A} PB(1 - m_t)e^{-\delta t}dt$$

and in the latter case,

$$\text{(A1.1b)} \quad DBW_r = \int_0^{109-A} PB(1 - m_t)e^{-\delta^* t}dt$$

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 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 an arbitrary age limit of 109.

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 average annual change of the CPI-U index from 1983 to 2016. 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 pension wealth (and likewise Social Security wealth), and, conversely, a lower discount rate will lead to higher estimates of these two variables.[45]

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, future expected pension benefits (EPB_w) are then projected to the year of retirement or the first year of pension eligibility. Then the present value of pension wealth for current workers (w) is given by:

$$(A1.2) \quad DBW_w = \int_{LR}^{109-A} EPB(1 - m_t)e^{-\delta t}dt$$

where RA is the expected age of retirement and LR = A - RA is the number of years to retirement. The integration runs from LR to the number of years when the retiree reaches age 109.[46]

A1.2 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 by

[45] I also used a 3 percent real discount rate to estimate both DB pension and Social Security wealth. The general results contained in Section 6 above are not materially altered by the use of this higher discount rate (results not shown). 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 will have the effect of increasing estimates of DBW and SSW of higher income individuals *relative to* lower income ones.

[46] 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.

$$(A1.3) \quad SSW_r = \int_0^{109-A} SSB(1 - m_t)e^{-\delta^* t}dt$$

where it is assumed that the current Social Security rules remain in effect indefinitely.[47]

The imputation of Social Security wealth among current workers is based on the worker's actual and projected earnings history estimated by a standard human capital regression equation. 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,[48] 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,

$$(A1.4) \quad SSW_w = \int_{LR}^{109-A} PIA(1 - m_t)e^{-\delta^* t}dt$$

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.[49]

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[47] Separate imputations are performed for husband and wife. According to current and past rules, a spouse – say, the wife – is entitled to the greater of her own SS benefit or 50 percent of her husband's SS benefit. An adjustment in the Social Security benefit is also made for the surviving spouse. According to current and past rules, a surviving spouse -- is entitled to the greater of her own SS benefit or her deceased husband's.

[48] This is based on *retrospective* information on work history provided by the respondent. 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 calculation of the individual's AIME. It should be noted that though I can approximate the *number* of years of full-time and part-time work for a given worker, I cannot determine when in his or her work history periods of non-employment occurred.

[49] 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. Also, note that I use δ^* in the equation since Social Security benefits are indexed to the CPI.