Changes in the Distribution of After-Tax Wealth: Has Income Tax Policy Increased Wealth Inequality?

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Abstract

A substantial share of the wealth of Americans is held in tax-deferred form such as in retirement accounts or as unrealized capital gains. Most data and statistics on assets and wealth is reported on a pre-tax basis, but pre-tax values include an implicit tax liability and may not provide as accurate a measure of the financial position or material well-being of families. In this paper, we describe the distribution of tax-deferred assets in the SCF from 1989 to 2013, provide new estimates of the income tax liabilities implicit in those assets, and present new statistics on the level and distribution of after-tax net worth. The results of our analysis suggest that, relative to published statistics on pre-tax net worth, the distribution of after-tax wealth is slightly less concentrated in the early years of our sample period, but the effectiveness of the income tax system in reducing wealth inequality has decreased during the last decade. We find the reduction in the long-term capital gains rate is the primary reason for the muted effectiveness of the current income tax system in reducing wealth inequality.

JEL: H22, H24
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1. Introduction

A substantial share of the wealth of Americans is held in tax-deferred form such as in retirement accounts or as unrealized capital gains. According to the Federal Reserve Board's Survey of Consumer Finances (SCF), roughly 38 percent of the aggregate net worth of American families in 2013 was held in some form of tax-deferred asset; at higher levels of income and wealth the share is higher. In most data and statistics on assets and wealth—including the SCF—this wealth is reported on a pre-tax basis; for instance as the nominal retirement account balance or as the market value of equities. Measuring wealth on this basis reflects the reporting conventions of financial institutions and businesses, simplifies survey-based measurement, allows for direct comparability of estimates over time, provides a direct correspondence to legal questions about asset ownership and control, and avoids the complexities of with estimating tax implications associated with particular assets.

One disadvantage of this convention, however, is that pre-tax values may not provide as accurate a measure of the financial position or material well-being of families. If current statistics on wealth incorporate a sizable deferred tax liability, some measured wealth is not available to pay bills or finance consumption. After tax wealth—that available for consumption—may provide a better measure of well-being. Moreover, because tax rates vary by income, family structure, and other factors, the distribution of after-tax wealth is likely to differ from the distribution of pre-tax wealth at a point in time. And changes in tax policy, including changes in tax rates on ordinary income and capital gains, can result in changes over time in the level and distribution of after-tax wealth.

In this paper, we describe the distribution of tax-deferred assets in the SCF from 1989 to 2013, provide new estimates of the income tax liabilities implicit in those assets, and present new statistics on the level and distribution of after-tax net worth. We estimate family-specific and asset-specific tax liabilities using the NBER's TAXSIM program.[1] TAXSIM imputes tax rates and liabilities based on income, demographic, and other characteristics of sample families. We use the program to estimate the ordinary income taxes and capital gains taxes that would apply if tax-deferred assets were liquidated. In particular, we differentiate assets based on tax treatment

[1] See Feenberg and Coutts (1993) for a description of TAXSIM.

(including deferred retirement wealth, owner-occupied real estate, and unrealized capital gains on financial and non-financial assets) and assign tax liabilities accordingly in each survey year.

The results of our analysis suggest that, relative to published statistics on pre-tax net worth, the distribution of after-tax wealth is slightly less concentrated in the early years of our sample period, but the effectiveness of the tax system in reducing wealth inequality has decreased during the last decade. In particular, for the families in the top 1 percent of the pre-tax wealth distribution, their share of after-tax wealth is slightly higher than their pre-tax share in recent years. Furthermore, the effective tax rate on tax-deferred assets for families in the top 1 percent has decline substantially over the last decade in both absolute value and relative to other wealth groups. Much of this result is driven by the fall in capital gains tax rates over the 1989 to 2013 period.

In our analysis, we focus primarily on unrealized capital gains and assets in tax-deferred retirement accounts, which composed 21 percent and 17 percent, respectively, of (pre-tax) family net worth in 2013.[2] However, there are substantial differences in these shares across the wealth distribution. Within households in the bottom 90 percent of the wealth distribution, unrealized capital gains make up only 6 percent of their net worth and tax deferred retirement accounts about 24 percent. Within the next 9 percent, the corresponding shares are 18 percent and 21 percent; for the top 1 percent the corresponding shares are 34 percent and 8 percent.

These tax-deferred assets—like wealth more generally—are highly concentrated within the population. In 2013, about 80 percent of these tax-deferred assets are held by the top 10 percent of households ranked by (pre-tax) net worth. (By comparison, these households owned about 75 percent of total net worth.) Of the two types of assets, unrealized capital gains are particularly highly concentrated—93 percent of unrealized gains are held by the top 10 percent of families. Assets held in tax-deferred accounts are slightly less concentrated; 65 percent are held by the top 10 percent of families.

[2] All dollar values are reported in 2013 dollars, and values were adjusted using the Consumer Price Index Research Series (CPI-RS).

One result of this pattern of asset holdings is that a sizable portion of the portfolios of American families includes a tax-deferred liability. In the aggregate, we estimate that about 8 percent of net worth reported in SCF in 2013 represents taxes due on unrealized gains or on amounts held in retirement accounts. This share is only slightly below that estimated in 1989, although the composition has changed as the extent of tax-deferred retirement assets have grown. Between 1989 and 2013, the mean deferred tax liability has increased by about 53 percent, slightly slower than the increase in mean pre-tax net worth, which increased by 59 percent. As a result, mean after-tax net worth increased by slightly more (60 percent).

Because most tax-deferred assets—particularly unrealized capital gains—are held by higher-wealth households, most of this deferred tax liability is concentrated among those households. Within the bottom half of the net-worth distribution, fewer than half of households have any deferred tax liability, compared to more than 95 percent among the top 10 percent.

Effective tax rates on these assets have tended to decline over time.[3] In particular, the top tax rate on long-term capital gains, which was 28 percent in 1988, had declined to 15 percent in 2012. While the top tax rate on ordinary income in 2012 was higher, at 35 percent, than the 28 percent top-bracket rate in 1988, for most households ordinary income tax rates (which apply to withdrawals from tax deferred retirement income) were lower in 2012 than in 1988 because of changes in tax brackets and tax rates below the top bracket. While changes in ordinary income tax rates have led to a decline in tax burdens across the wealth distribution, changes in capital gains tax rates had the most impact on the highest net-worth households.

Of course, the estimates above provide a snapshot of what tax liabilities households would face were they to liquidate all of their tax deferred assets immediately and abstracts from any behavioral effects induced by tax policy.[4] This may result, in certain cases, in an overestimate of the tax liability due if the increase in reported income results in some income being taxed at higher bracket rates. Similarly, individuals may be more likely to draw down their assets in

[3] Income amounts in the SCF are from the year prior to the survey year, so tax liabilities and rates are computed using the tax code for the year prior to the survey year

[4] For example, the lock-in effect of capital gains taxes, the interaction of capital gains taxes and the estate tax, and withdrawals for tax-deferred retirement effects. See Hungerford (2010), Auten and Joulfaian (2001), and Sabelhaus (2000) for details.

retirement, when their employment-related income (and therefore tax bracket) may be lower. In our analysis we find that the tax rates that apply to older households are somewhat lower than those younger households face, which may reduce the overestimation of their tax liability.

The remainder of the paper is organized as follows. The second section reviews the literature most relevant to our analysis, the third section describes the data source, the fourth section provides an overview of distribution of net worth and the different tax-deferred assets, the fifth section describes the estimation of tax liabilities, the sixth section provides results on the after-tax distribution of wealth, the seventh section considers an effects of an alternative tax policy, and the final section concludes and provides ideas for future work.

2. Relevant Literature

Our paper touches on various strands of the economic literature. The most similar study is recent work by Stein (2014), which questions the economic reasons for two tax policies that increase income inequality; the reduced tax rates on dividends and capital gains (compared to ordinary income) and the "step-up" basis for capital gains when assets are passed to heirs. Stein shows that most of the benefits of lower tax rates on dividends and capital gains go to the highest quintile of the income distribution and that reductions in these rates almost entirely explain the reduction in average tax rates from 1992 to 2009. Stein also finds little empirical evidence that low tax rates on capital gains and dividends are correlated with higher economic growth or that high capital gains tax rates induce a substantial lock-in effect over the long term. We add to Stein's analysis by focusing on how tax policies impact wealth inequality.

The focus on how the distribution of wealth differs using pre and post-tax measures of wealth has a close connection with the vast literature on wealth inequality.[5] The recent work of Piketty (2014), Saez and Zucman (2014), Wolff (2014), Bricker et al (2014), and Bricker et al (2015) highlight changes in wealth inequality over time, especially at the very top of the distribution.[6] Estimates of how much wealth inequality has increased varies across the studies due to differing

[5] There is also a large literature on income inequality. See Atkinson and Bourguignon (2015).
[6] These studies build on numerous previous studies on wealth inequality in the United States and across the rest of the World. Examples specific to the SCF include Kennickell (2011, 2012) and Bucks and Moore (2012). For a more comprehensive list of references, see Rione and Waldenström (2015) and Davies (2009).

data sources and methodology; Kopczuk (2015) provides an overview of some of the key issues. The pre-tax estimates of wealth inequality in our paper are most similar to Bricker et al (2015), which also uses the SCF as their data source. Our contribution to this literature is the addition of after-tax estimates of wealth inequality.

The analysis of the after-tax distribution of wealth is also similar to the literature that examines more complete measures of income. Recent studies in this literature, such as Donovan (2015), Armour, Burkhauser, and Larrimore (2014), Burkhauser, Larrimore and Simon (2012), Burkhauser et al (2012), CBO (2014), and Smeeding and Thompson (2011), attempt to create a more comprehensive measure of household income that includes transfers, health insurance, capital gains and taxes. The authors then compare the income distribution for the different measures and the effects on various inequality measures. Results from the studies vary depending on how the income measure is constructed, with Armour, Burkhauser, and Larrimore finding less income inequality using their alternative income measure and CBO (2014) and Smeeding and Thompson (2010) finding more income inequality using their income measure. Across all the studies, the key driver in the difference in results is the treatment of taxable realized capital gains. In our paper, the tax treatment of realized capital gains also is an important factor in the results, as we force households to include all non-housing unrealized capital gains as taxable income when estimating the after-tax distribution of wealth.

Although our analysis includes the effect of individual income taxes on wealth, we do not incorporate the estate tax into our estimates. Under the estate tax, the basis of decedents' assets are "stepped up" to their value at death under current law, which means that any unrealized capital gains tax liability is eliminated. However, estate tax may be due on the value of the assets above an excluded (credited) amount. One could argue that omitting the estate tax leads to an overestimate of after-tax wealth for families that would be subject to the tax. As shown in Avery, Grodzicki, and Moore (2013), unrealized capital gains account for 30 to 45 percent of taxable estates, and those unrealized gains would be included in our estimates of tax liability, which will somewhat offset not including the estate tax liability.[7] Numerous other studies have explored the

[7] Although the top estate tax rate is higher than the long-term capital gains tax rate during the 1989-2013 period, the combination of a rising exemption amount (from $600,000 to $5.12 million) and the expense and valuation rules used to compute the gross estate have substantially reduced the share of adult deaths subject to the estate tax from 1.1 percent in 1989 to 0.13 percent in 2011 (http://taxpolicycenter.org/taxfacts/displayafact.cfm?Docid=52).

link between the estate tax and wealth inequality, such as Gale et al (2001), Avery and Rendall (2002), Kopczuk and Saez (2004), and Kopczuk (2012).

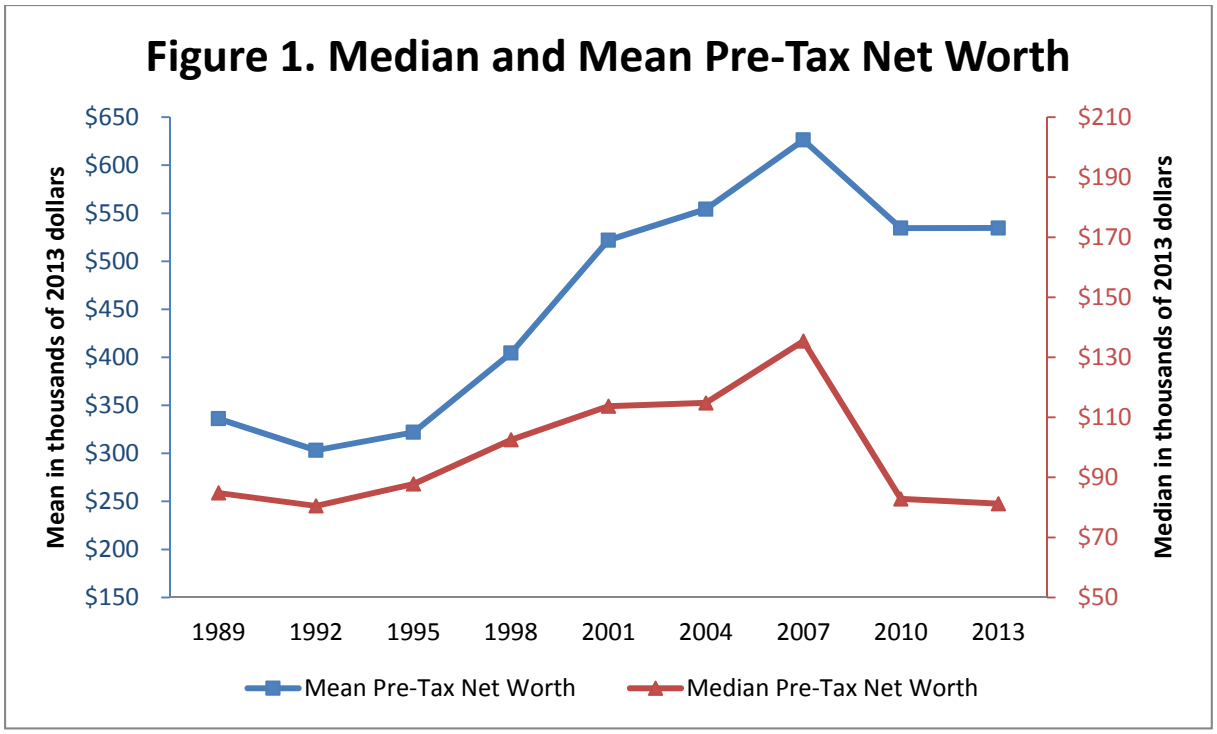
3. Measuring Wealth in the Survey of Consumer Finances

The Survey of Consumer Finances is a triennial survey that provides the most detailed look at the assets, liabilities, income, and demographic characteristics of U.S. families. Wealth (and income) is highly concentrated in the U.S., and a simple random sample would not yield enough observations at the top of the distribution to provide reliable estimates of wealth. To address this problem, the SCF combines a standard nationally-representative area probability (AP) sample with a "list" sample that oversamples high-wealth households. The list sample is drawn using statistical records derived from tax returns at the Statistics of Income (SOI) Division of the Internal Revenue Service. Relatively consistent sample methodology between 1989 and 2013 facilitates comparisons over time. Bricker et al (2014) provide a summary of the SCF survey and results of the most recent survey.

Measures of wealth from the SCF align fairly closely with other aggregated measures, such as the Federal Reserve Board's Financial Accounts, as shown in Henriques and Hsu (2014) and Dettling et al (2015). Estimates of the concentration of wealth in SCF also align fairly closely with estimates derived from capitalizing income tax data, as shown in Saez and Zucman (2014) and Bricker et al (2015).[8] A key issue in any of these comparisons is constructing a definition of wealth that is comparable across the different data sources.

As a baseline, Figure 1 plots median and mean family pre-tax net worth from each wave of the SCF from 1989 to 2013. Median net worth (right axis scale) increased steadily from 1992 to 2001, leveled off between 2001 and 2004, peaked in 2007, plummeted between 2007 and 2010 and then held steady between 2010 and 2013. Mean net worth (left axis) followed a similar pattern, but at a much higher level and with a much smaller drop between 2007 and 2010.

[8] Brown et al (2015) compare the liabilities reported in the SCF with liabilities reported in the New York Federal Reserve's Consumer Credit Panel and find the two sources are similar for most liabilities. The two data sources diverge somewhat for credit cards and student loans.



More details on pre-tax net worth by percentile groups is in Table 1A (means) and Table 1B (medians). Across all net worth percentile groups, mean wealth was increasing from 1992 to 2007 and fell between 2007 and 2010. From 2010 to 2013, mean wealth continued to decline for households below the 99th percentile, with sizeable gains for households in the top 1 percent of the distribution. A similar pattern is observed for median wealth, except that median wealth for the top 1 percent slightly declined between 2010 and 2013.

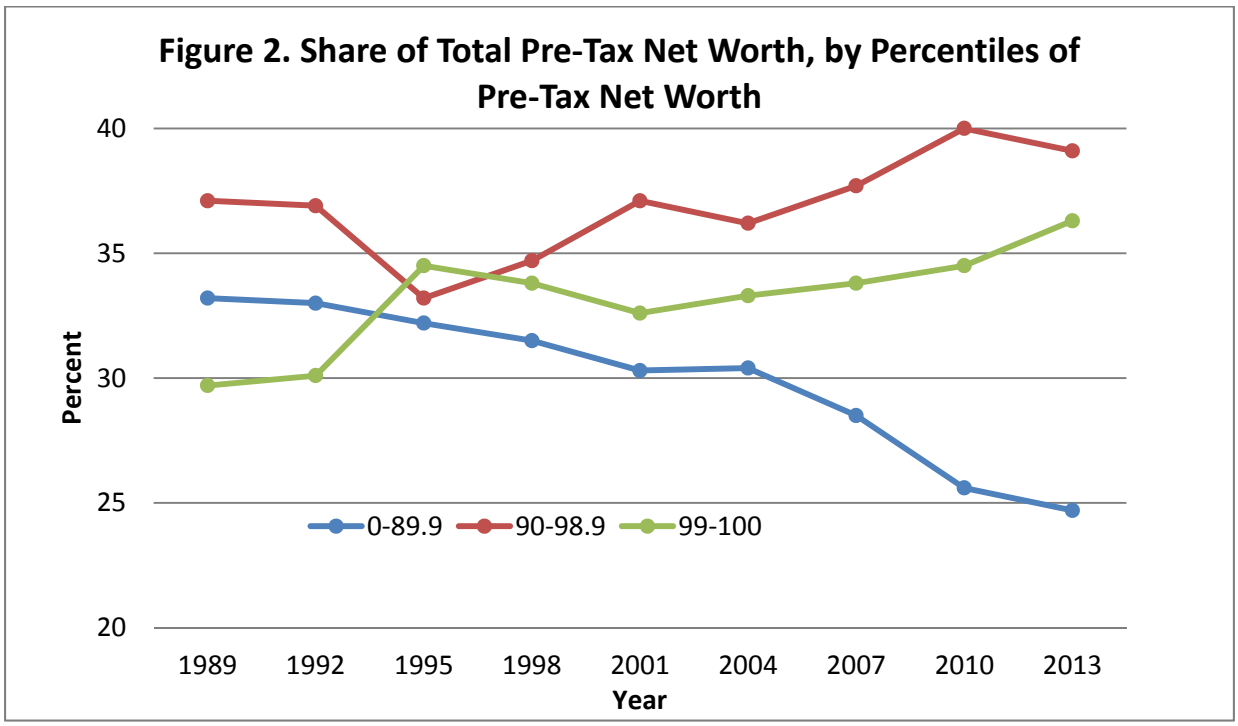
Table 1A: Mean Value of Net Worth (thousands of 2013 dollars)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
Percentile of Pre-Tax Net Worth									
0-89.9	124	111	115	141	176	188	199	151	147
90-98.9	1,386	1,242	1,189	1,560	2,148	2,226	2,623	2,376	2,317
99-100	9,953	9,123	11,112	13,672	16,991	18,435	21,105	18,437	19,358

Table 1B: Median Value of Net Worth (thousands of 2013 dollars)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
Percentile of Pre-Tax Net Worth									
0-89.9	65	62	69	77	89	87	102	61	59
90-98.9	1,098	1,001	946	1,177	1,578	1,626	1,884	1,868	1,672
99-100	6,265	5,874	6,796	8,411	11,697	11,777	13,386	12,036	12,012

Figure 2 shows the evolution of the share of net worth held by each percentile of the net worth distribution and reveals the high concentration of wealth. From 1989 to 2004, the top 1 percent of the net worth distribution accounted for about one-third of total wealth, and the next 9 percent held about one-third of total wealth and the bottom 90 percent held about one-third of total wealth.[9] Over the 2007 to 2013 period, the share of wealth held by the bottom 90 percent has declined to about 25 percent, and the share held by next 9 and top 1 percent had increased substantially. This shift in wealth concentration is similar to results found in Kennickell (2011), Saez and Zucman (2014) and Bricker et al (2015).



[9] Throughout our analysis, sample statistics and estimation results are presented on this pre-tax basis unless otherwise stated.

In the SCF, as in other surveys of wealth, like the Survey of Income and Program Participation (SIPP) and the Panel Study of Income Dynamics (PSID), survey participants are asked about the value of various assets and debts owned by the household. Implicitly, these values are provided on a pre-tax basis. Assets held in tax-deferred retirement accounts, such as 401ks or IRAs, are subject to ordinary income taxes (and potentially penalties) when assets are withdrawn from those accounts. Similarly, the current value of stocks, bonds, real estate, and other non-financial assets may include an unrealized capital gain upon which capital gains taxes may be due if the asset were sold. Hence, families holding appreciated assets or retirement accounts may owe tax on those assets.

Measuring wealth on this pre-tax basis has many advantages. For many financial assets, statements from banks or financial institutions provide easy access to the values of these assets, improving survey reliability and participants' recall. Measuring wealth on a pre-tax basis allows for consistency and comparability of SCF surveys over time, and with other surveys and measures of wealth. This convention avoids challenges of assigning tax rates and tax treatment to assets and households. Beyond the straightforward measurement of wealth, valuing assets on a pre-tax basis also better reflects macroeconomic measures of capital formation and aggregate wealth, and conforms more closely to other important legal considerations like ownership and control.

A disadvantage of the convention of reporting wealth on a pre-tax basis is that they may be an inaccurate measure of well-being or financial status. After-tax values correspond more closely to disposable wealth that could be readily available to support family consumption. Further, a key question in the design of tax policy is who bears the burden of the tax system. Understanding how tax policy and changes in tax policy affects the distribution of resources among different groups can therefore be useful for improving our tax system.

In order to understand how taxes affect the distribution of net worth, we first describe U.S. families' holdings of tax-deferred assets and then estimate the tax liabilities embedded in those asset values.

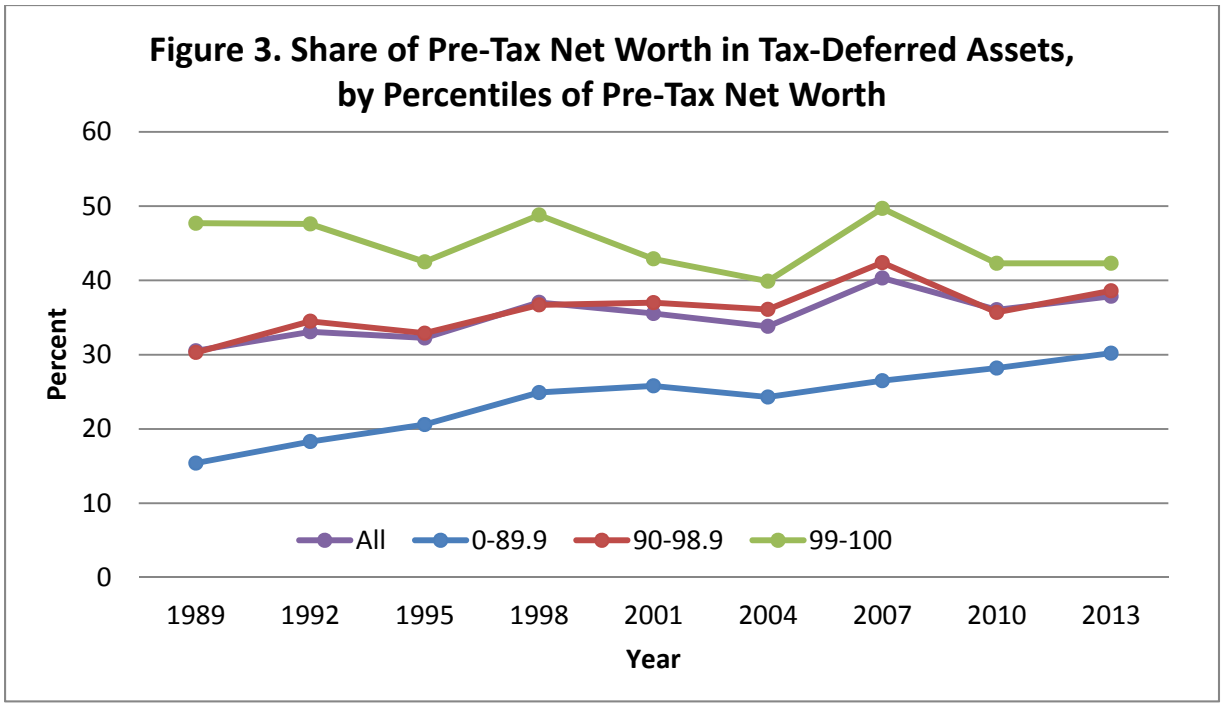
4. Tax Deferred Asset Holding

According to the SCF, holdings of tax-deferred assets are widespread and comprise a sizable portion of household wealth. As shown in Table 2, in 2013 about 56 percent of households owned assets in a tax-deferred retirement account, such as an IRA or 401k, or owned financial assets, business, or real estate (excluding a family's primary home) that included an unrealized capital gain, up from 53 percent in 1989. The fraction of households holding any tax-deferred assets peaked in 2001 at about 63 percent. Across net worth percentile groups, roughly one-half of families in the bottom 90 percent owned some type of tax-deferred asset; nearly all families in the top 10 percent of the net worth distribution have tax-deferred assets.

Table 2: Percent of Families with Tax Deferred Assets

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	53.0	53.7	57.6	60.9	63.1	59.9	62.3	58.7	56.3
Percentile of Pre-Tax Net Worth									
0-89.9	48.0	48.8	53.3	56.9	59.1	55.7	58.3	54.2	51.6
90-98.9	97.1	97.4	96.0	97.4	99.1	97.8	98.0	98.8	98.5
99-100	98.6	99.5	98.4	100.0	99.9	97.0	100.0	100.0	99.6

Figure 3 presents statistics on the extent of this asset holding across households. Overall, the share of net worth in tax-deferred assets increased from 31 percent in 1989 to about 38 percent in 2013. The share peaked in 2007 at just over 40 percent. Tax deferred wealth accounts for a higher share of net worth among higher net worth families. Over the 1989 to 2013 period, the fraction of net worth held in tax-deferred form exceeded 40 percent for families in the top 1 percent, and over 30 percent for families in 90-98.9th percentiles. For the bottom 90 percent of the wealth distribution, the share of net worth in tax-deferred assets nearly doubled between 1989 and 2013, from about 15 percent to just over 30 percent.



4.1 Tax Deferred Retirement Accounts

In our analysis, tax-deferred retirement accounts include balances in IRAs, Keoghs, and defined-contribution pension plans, such as 401(k) and 403(b) plans. The detailed data in the SCF allows us to exclude any Roth IRAs or 401(k)s from our calculations, as these accounts are funded with after-tax contributions and have no deferred tax liability.

In 2013, about 47 percent of families held assets in tax-deferred retirement accounts, up from 37 percent in 1989, as shown in Table 3A. Ownership peaked in 2001 at nearly 53 percent of families, but has declined somewhat over the last few surveys. The increase in ownership has occurred across the wealth distribution, but level of ownership is about twice as high for households in the top 10 percent compared to the bottom 90 percent. As shown in Table 3B, the increase in ownership has led to an increase in the mean value of tax-deferred retirement accounts. Across all households, the mean value of these accounts has increased from about $25,000 in 1989 to about $92,000 in 2013. The overall mean value masks substantial differences across wealth groups, with the mean value for the bottom 90 percent about one-tenth the value of the next 9 percent, and the mean value for next 9 percent about one-third the value of the top 1

percent. All groups experienced sizeable increases in their mean values over the 1989 to 2013 period.

Table 3A: Percent of Families with Tax Deferred Retirement Accounts

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	37.1	40.1	45.3	48.9	52.8	47.9	50.3	48.1	46.6
Percentile of Pre-Tax Net Worth									
0-89.9	33.5	36.3	41.4	45.1	48.9	44.2	46.7	44.0	42.3
90-98.9	69.9	73.6	80.5	82.9	87.5	80.3	82.7	84.7	84.7
99-100	72.2	76.6	78.9	85.6	89.4	81.2	85.7	87.7	85.1

Table 3B: Mean Value of Tax Deferred Retirement Accounts (thousands of 2013 dollars)

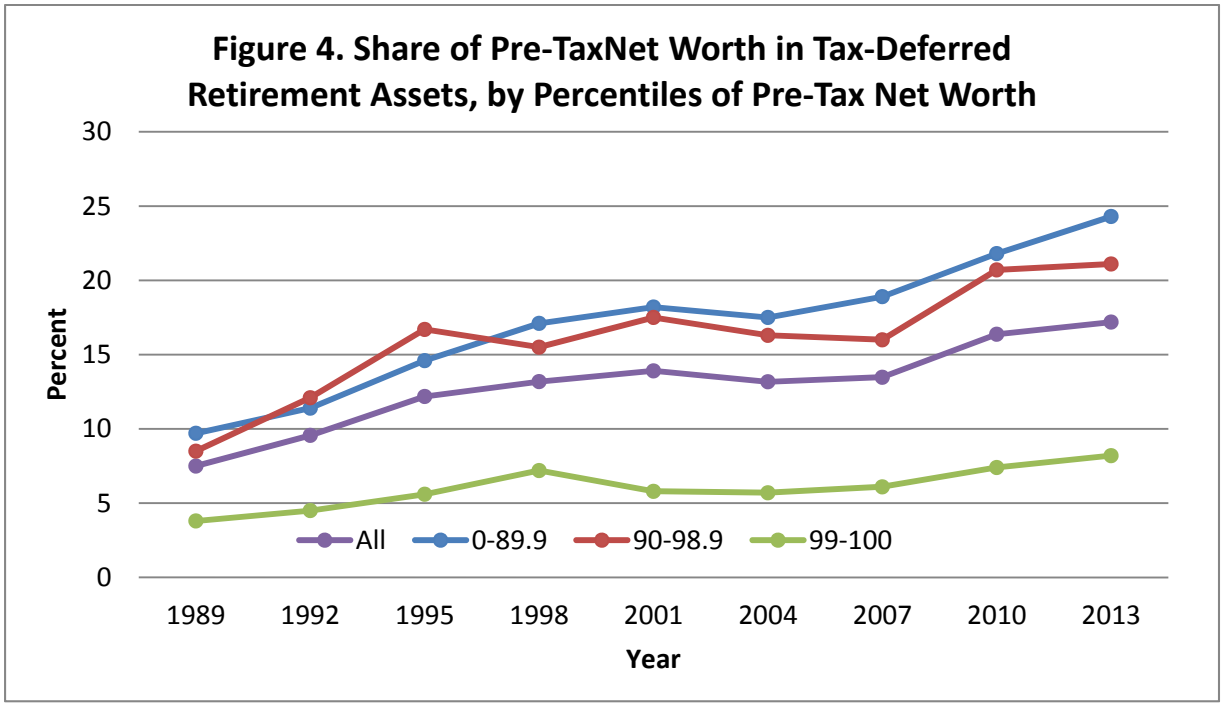
Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	25	29	39	53	73	73	84	88	92
Percentile of Pre-Tax Net Worth									
0-89.9	12	13	17	24	32	33	38	33	36
90-98.9	118	150	198	242	375	364	419	492	488
99-100	376	409	619	979	992	1,058	1,286	1,362	1,587

The share of families holding tax-deferred retirement accounts has increased over time partially due to the shift by employers from defined benefit pension plans to defined contribution pension plans. In contrast to the increase in ownership of tax-deferred accounts, the share of families with rights to a defined benefit pension has declined from 43 percent in 1989 to 31 percent in 2013. In our analysis, the shift to defined contribution pensions leads to an increase in measured wealth, as the SCF captures information on the balances in defined contribution plans, but only measures the income flows from defined benefit plans.

As shown in Figure 4, the share of net worth in tax-deferred retirement accounts has increased steadily from about 7 percent in 1989 to 17 percent in 2013. For households in the bottom 90 percent of the wealth distribution, these assets have increased from about 10 percent of net worth in 1989 to nearly 25 percent in 2013. The next 9 percent experienced a similar increase over 1989 to 2013. For the top 1 percent, the share of wealth in tax-deferred retirement assets is substantially smaller, only reaching about 8 percent in 2013.[10] Although these assets are an important part of the portfolio for families below the top 1 percent of the wealth distribution, the

[10] Contribution limits on tax-deferred retirement accounts limit are one reason for the lower share for the top 1 percent.

distribution of those assets is concentrated among higher net worth households both because those families are more likely to hold assets in tax deferred accounts and because the amount they hold is much larger.



4.2 Unrealized Capital Gains

In the SCF, data on unrealized capital gains are available for the primary residence, any other real estate, privately-held businesses, directly-held stocks and directly-held mutual funds. The value of the unrealized gains are derived from the self-reported current value and the cost basis for each type of asset. The SCF does not collect data on unrealized capital gains in retirement accounts, such as IRAs and defined contribution plans. In our analysis, unrealized capital gains from the primary residence are omitted as current and past tax treatment of these gains make it very unlikely a household would face a tax liability on these gains.[11] For unrealized capital gains,

[11] We ignore taxes on any unrealized gain from the primary residence. First, for most families this reflects the tax treatment of capital gains on primary residences. Prior to 1997, no tax was due on a home provided that the proceeds of the sale was rolled over into a new principle residence; after 1997 there was a large exemption of $250,000 per individual filer or $500,000 for joint filers. Second, as a conceptual issue, ownership of a primary residence represents a measure of consumption. In practice, the inclusion or exclusion of these gains (subject to the generous exclusions in place at different points in time) makes little difference to the figures we present here.

the story is similar to tax-deferred retirement assets, except that unrealized capital gains are even more concentrated among higher-wealth households.

According to Table 4A, the fraction of all families with unrealized capital gains rose from about 35 percent in 1989 to over 39 percent in 2001, but declined to 31 percent by 2013.[12] Across the wealth distribution, ownership of unrealized capital gains among households in the bottom 90 percent is about one-third the rate of the next 9 percent; for the top 1 percent, almost all households had unrealized gains. The mean value of the unrealized gains for all households was about $110,000 in 2013 (Table 4B). However, the mean value is highly skewed—the top 1 percent of net worth households held more than 15 times the average amount of households in the 90-98.9th percentile group, and over 60 times the average amount of the bottom 90 percent. Over time, the mean value of unrealized gains has risen and fallen with economic expansions and recessions; the mean value peaked for all net worth groups in 2007.

Table 4A: Percent of Families with Unrealized Capital Gains

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	34.5	35.4	34.8	39.4	39.4	38.3	36.2	33.0	31.2
Percentile of Pre-Tax Net Worth									
0-89.9	28.4	29.4	29.0	33.5	33.5	32.3	30.0	26.5	24.8
90-98.9	88.6	88.3	86.0	91.4	92.2	91.5	91.8	90.1	87.6
99-100	97.8	99.5	97.1	98.6	98.5	96.8	99.2	98.9	99.6

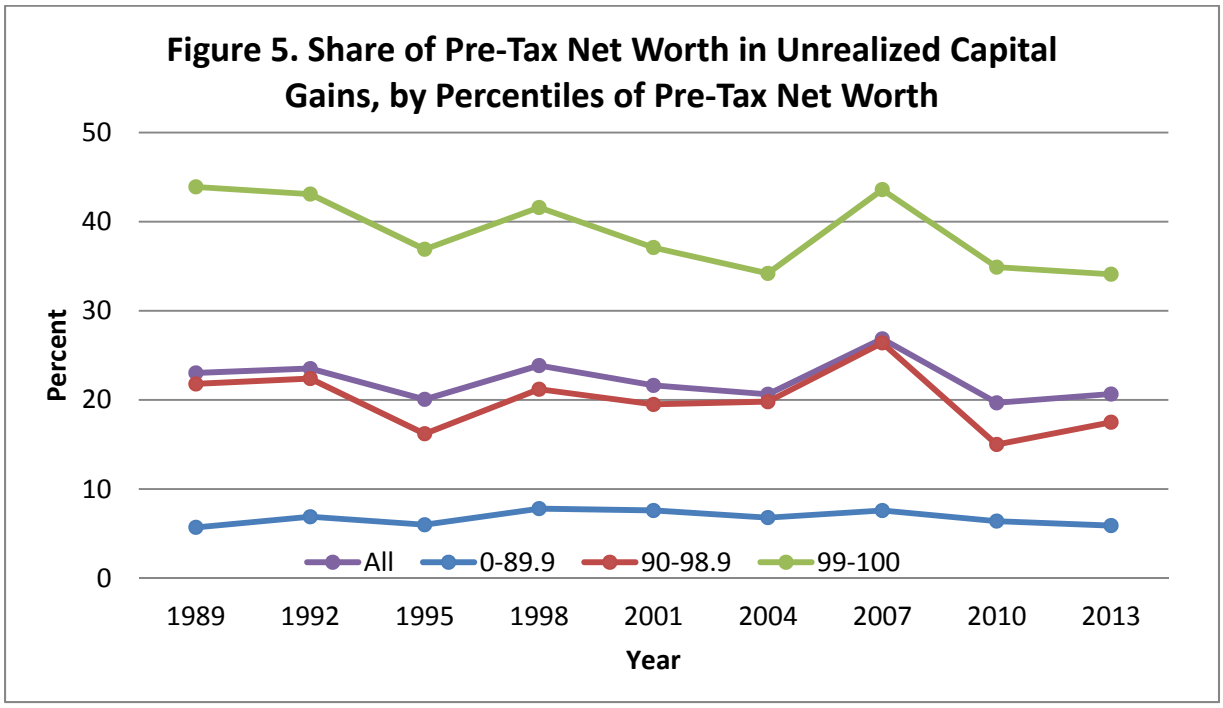
Table 4B: Mean Value of Unrealized Capital Gains (thousands of 2013 dollars)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	77	71	65	97	113	114	168	105	111
Percentile of Pre-Tax Net Worth									
0-89.9	7	8	7	11	13	13	15	10	9
90-98.9	302	279	193	330	420	441	692	357	406
99-100	4,367	3,931	4,104	5,689	6,311	6,306	9,203	6,441	6,593

As shown in Figure 5, for all households, the share of net worth held as unrealized capital gains has trended down somewhat, from 23 percent of net worth in 1989 to 21 percent in 2013. This pattern is also found across the various net worth percentile groups. Some of this decline likely

[12] Given that our measure of unrealized capital gains does not include the primary residence, the decrease in the share of families with unrealized gains is driven by a decline in the ownership and value of other real estate, stocks, mutual funds, and privately-held businesses.

reflects the lingering effects of the financial crisis. In 2007, unrealized gains composed 27 percent of overall household net worth, the high point across the 1989 to 2013 period. In contrast, the importance of unrealized gains in wealth varies across wealth groups. For the bottom 90 percent, unrealized gains are less than 8 percent of wealth in any given year, compared to roughly 20 percent for the next 9 percent and about 35 percent for the top 1 percent. Across wealth groups, 2007 was also when the share of unrealized gains in net worth reached its peak.



As a result of these differential patterns of asset holdings across time and across the wealth distribution, tax policy is likely to have an important effect on the distribution of after-tax net worth, and of changes in after-tax net worth over time.

5. Estimating Tax Liabilities Implicit in Tax-Deferred Assets

To estimate the tax liabilities implicit in the tax-deferred assets and accounts described above, we first calculate tax rates for each individual SCF household based on their income, family structure, state of residence, deductions, and other characteristics for the year prior to the survey

year using NBER TAXSIM.[13] This program encapsulates the federal income tax code and provides estimates of tax rates and liabilities for each SCF household. The initial baseline estimate of the tax rates and liabilities due is absent any realizations of capital gains or withdrawals from retirement accounts beyond those reported in the SCF questions about prior year sources of income.

We then re-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. We assume no penalty is incurred on early retirement account balances. The difference between this 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.

By necessity, our analysis ignores certain smaller tax provisions we are unable to identify in the SCF, such as separate capital gains tax rates that apply to gains on collectibles, to recaptured depreciation, to other special tax rates like those that may apply to qualified sales of small business stock, or to provisions that allow assets to be transferred or sold without immediately realizing a tax liability.

6. Results

6.1 Estimates of Implicit Tax Liabilities

Our analysis suggests that the net worth of American households includes a substantial tax-deferred liability. According to Table 5A, about 51 percent of families owed a tax liability on their tax-deferred assets in 1989, with the fraction increasing to over 61 percent by 2004, before falling to 53 percent in 2013. The decline after 2004 coincides with the start of the Great Recession. Across wealth groups, a similar time pattern is observed for the bottom 90 percent, but only about one-half of households owe a tax liability. For families in the top 10 percent, at least 96 percent owe a tax liability, depending on the survey year. As shown in Table 5B, for all households, the mean value of the implicit tax liability increased from about $29,000 in 1989 to nearly $45,000 in 2013. Not surprisingly, the mean tax liability peaked in 2007 at $51,000.

[13] See Argento and Moore (2013) for an analysis of how 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/.

Among net worth percentile groups, the differences in the mean value of deferred tax liability is similar to differences in the mean wealth across the groups.

Table 5A: Percent of Families with a Deferred Tax Liability

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	51.1	51.5	55.6	59.8	61.0	61.3	60.2	55.4	52.9
Percentile of Pre-Tax Net Worth									
0-89.9	46.0	46.5	51.1	55.6	56.9	57.2	55.9	50.6	47.9
90-98.9	96.6	96.1	95.8	97.1	98.2	97.7	98.0	98.1	98.0
99-100	98.6	99.2	98.2	100.0	99.9	97.2	100.0	99.7	99.4

Table 5B: Mean Value of Deferred Tax Liability (thousands of 2013 dollars)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
All families	29	29	32	37	49	46	51	43	45
Percentile of Pre-Tax Net Worth									
0-89.9	6	6	7	9	13	12	13	11	11
90-98.9	125	125	132	153	228	208	240	215	216
99-100	1,265	1,239	1,397	1,493	1,643	1,632	1,786	1,408	1,476

Figure 6 presents these implicit tax liabilities as a percent of family (pre-tax) net worth for all families, and for families grouped by percentile ranges of the distribution of (pre-tax) net worth. Across all households the implicit liability has moved in a narrow range between 8 and 10 percent of pre-tax net worth over 1989 to 2013.

For the bottom 90 percent of the wealth distribution, the deferred tax liability has increased as a share of wealth from less than 5 percent in 1989 to about 8 percent in 2013. This increase is driven by the increased ownership of tax-deferred retirement accounts and the rise in ordinary income tax rates over the period. The share of deferred tax liability in wealth for families in the next 9 percent was remarkably constant over the period, varying between 9 and 11 percent. The most notable change in the share of tax liability in wealth occurred for the top 1 percent; the share fell from nearly 13 percent in 1989 to about 8 percent in 2013. In 1989, there were substantial differences across percentile groups in the deferred liability as a share of wealth, but by 2013 the shares had converged to within a few percentage points. This pattern of changes reflects the difference in the composition of tax-deferred assets across the distribution of net worth. For the top 10 percent of households and especially among the top 1 percent, the majority

of tax-deferred assets are unrealized capital gains, whose tax rate fell from 28 percent to 15 percent over this time period.

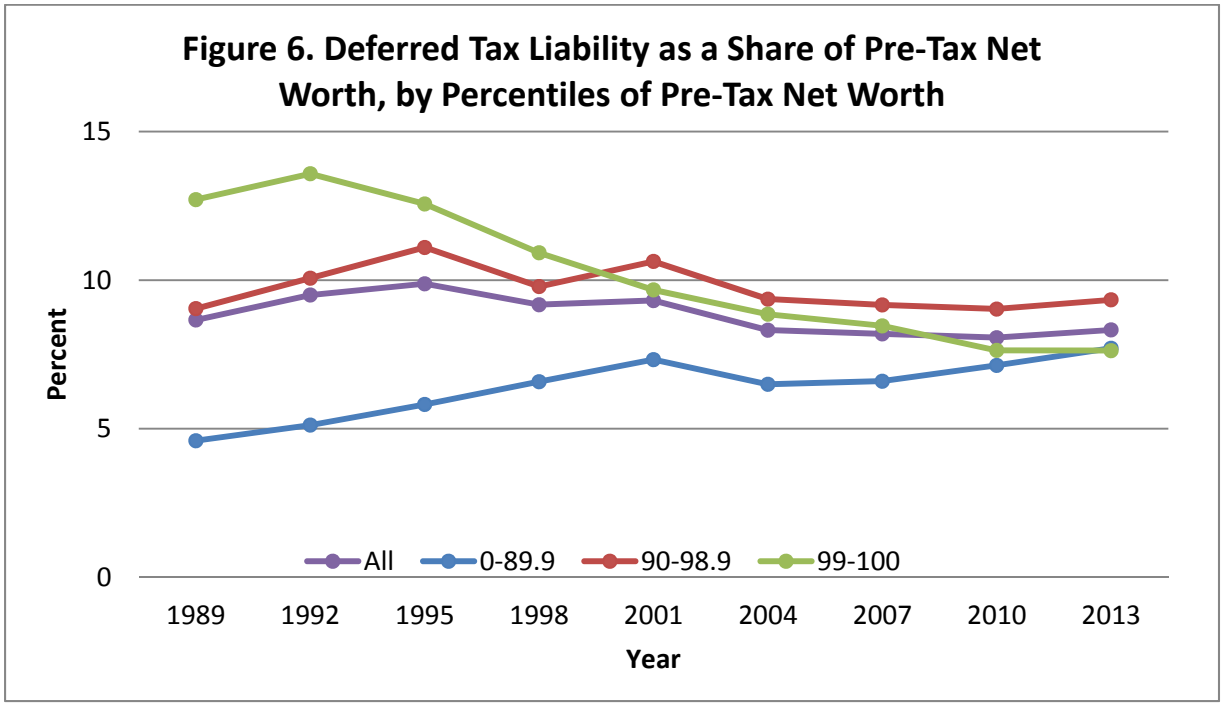
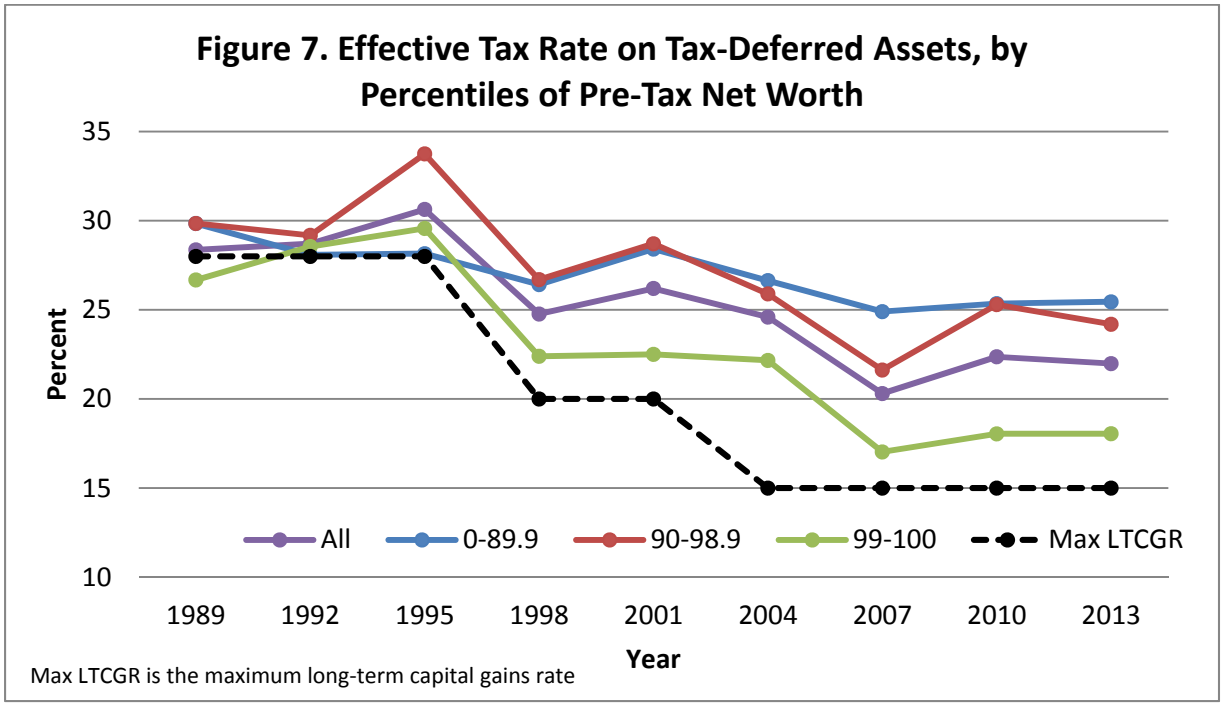


Figure 7 provides estimates of effective tax rates on tax-deferred assets for all families and within selected ranges of the distribution of net worth.[14] For all families, we estimate that the effective tax rate on tax-deferred assets was about 22 percent in 2013, down from 28 percent in 1989. The decline largely reflects the change in the tax treatment of capital gains, whose rate has declined from 28 percent to 15 percent over this time period.

The decline in effective tax rates between 1989 and 2013 is also widespread across the net worth percentile groups. For the bottom 90 percent, the decrease in effective tax rates was about 5 percentage points over the period; the next 9 percent experienced a decline of nearly 6 percentage points. The largest decline was for families in the top 1 percent of the net worth distribution, were the effective tax rate declined almost 9 percentage points to 18 percent. As

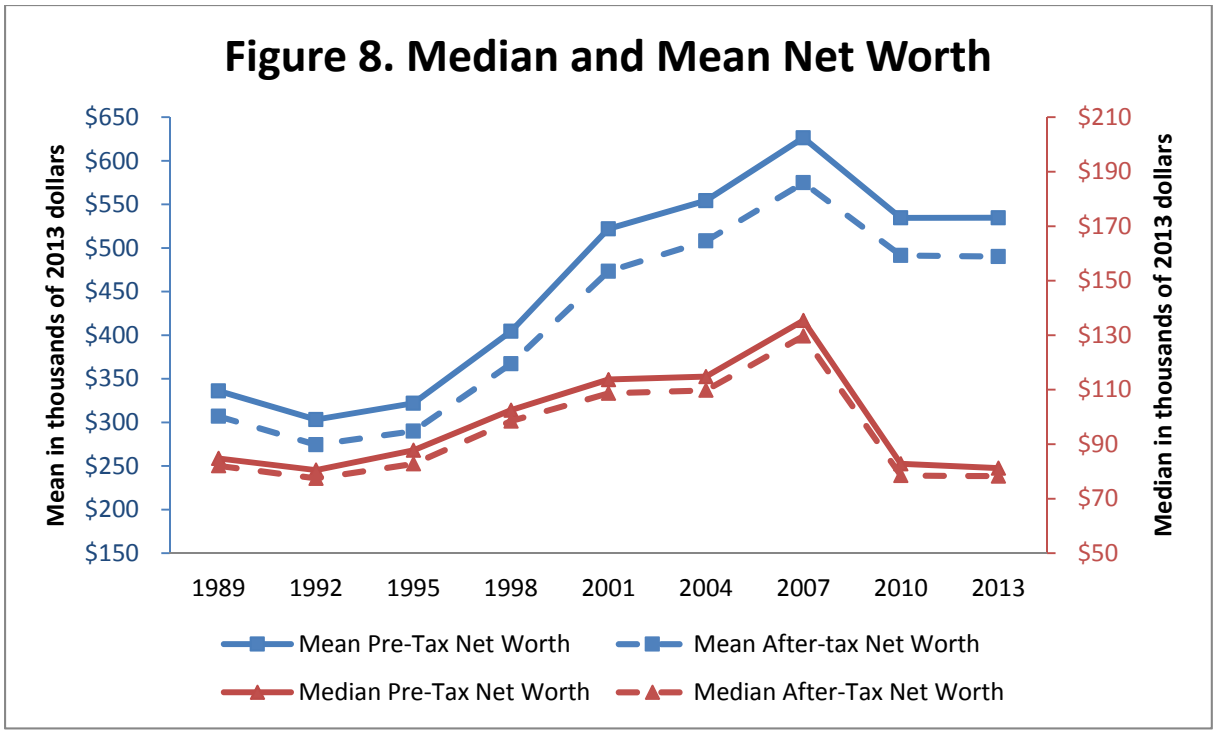
[14] The effective tax rate is defined as the tax liability on tax-deferred assets divided by the total value of tax-deferred assets.

shown in figure 7, the decline in effective tax rates for the top 1 percent mirrors the decline in the long-term capital gains rate over the period.

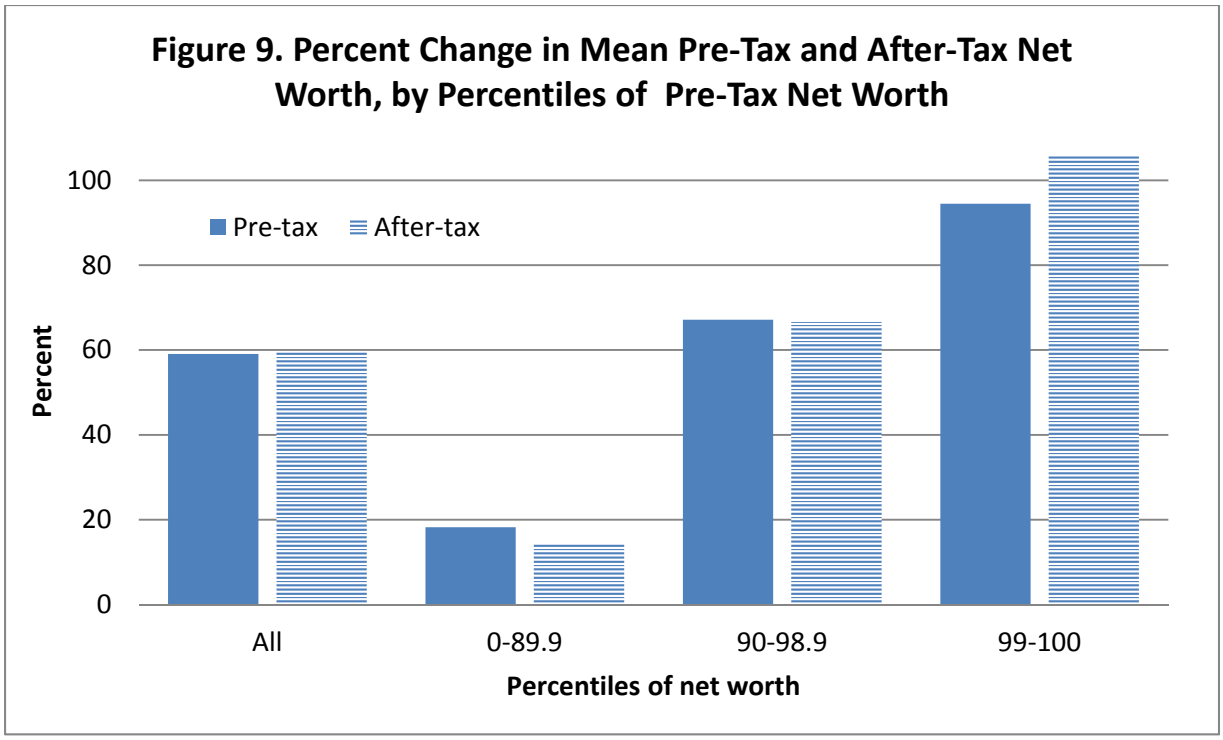


6.2 The Distribution of After-Tax Net Worth

The net effect of these estimated taxes on median and mean net worth is presented in Figure 8. Not surprisingly, both median and mean after-tax net worth are lower than pre-tax net worth across all survey years, with a larger effect on mean net worth. The gap between pre-tax and after-tax net worth is slightly wider over time; at the median this is due to the increase in fraction of families with tax-deferred retirement accounts, at the mean this is due to an increase in the share of unrealized capital gains in net worth. Across net worth percentile groups, the trends are similar to those found for overall mean and median pre-tax and after-tax wealth. Appendix Tables 1A and 1B provide estimates of mean and median after-tax net worth by percentiles of the distribution of pre-tax net worth.



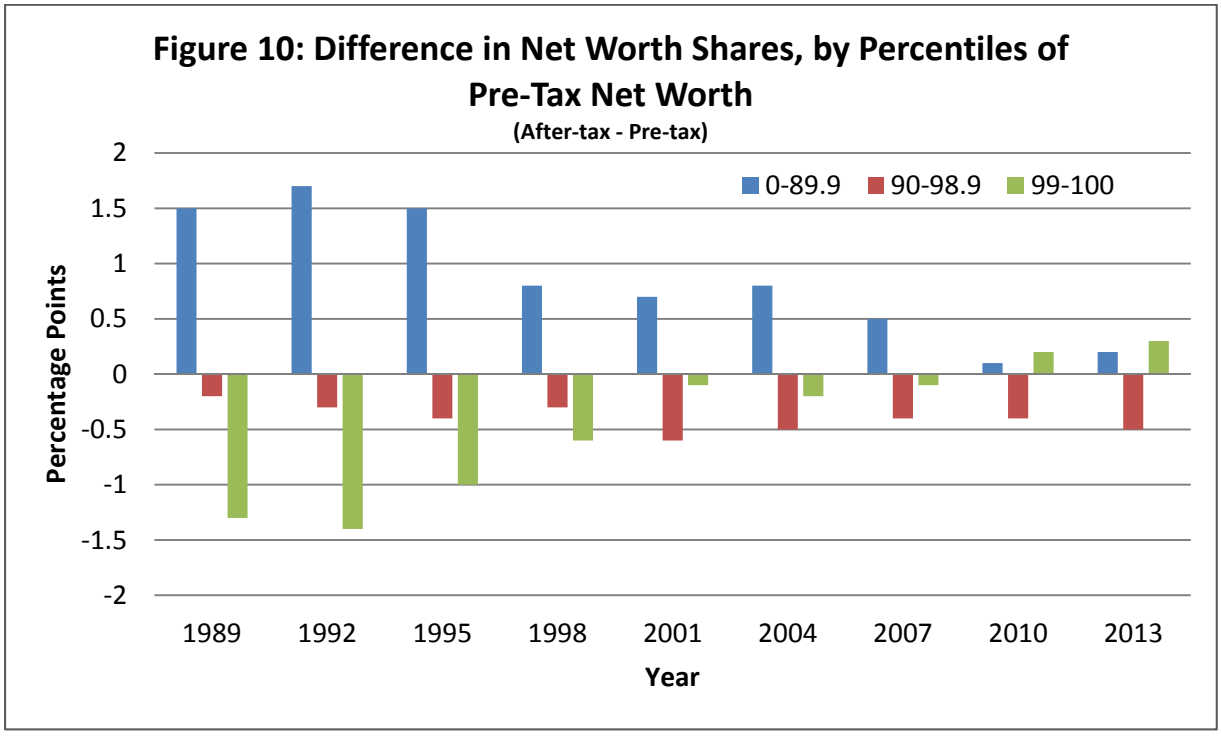
To better understand how pre-tax and after-tax wealth have changed over time, Figure 9 presents the percent change in the mean of both net worth measures for pre-tax net worth groups between 1989 and 2013. Across all families, both mean pre-tax and after-tax net worth increased by about 60 percent over the period, indicating a fairly uniform effect of tax policy on households with mean wealth. For families in the bottom 90 percent of the pre-tax wealth distribution, mean after-tax wealth grew at a somewhat slower pace than pre-tax wealth, 14 percent compared to 18 percent, a result driven largely by the increasing share of tax-deferred retirement accounts in pre-tax net worth. Households in the next 9 percent saw both pre-tax and after-tax wealth increase by about 67 percent over the period. For families in the top 1 percent of the pre-tax wealth distribution, after-tax wealth grew faster than pre-tax wealth by about 12 percentage points. This result is the direct effect of the substantial decrease in capital gains tax rates between 1989 and 2013 and the share of unrealized capital gains in wealth for this group.



Another way to examine how income tax policy affects the wealth distribution is to compare the share of each wealth measure held by each pre-tax net worth percentile group. Figure 10 shows the difference in after-tax and pre-tax wealth shares for the bottom 90 percent, the next 9 percent and the top 1 percent of the pre-tax wealth distribution. A positive value indicates that the after-tax wealth share for that group was larger than the pre-tax wealth share, while a negative value indicates that the after-tax wealth share is smaller than the pre-tax wealth share.

For families in the bottom 90 percent, the increase in their after-tax wealth share peaks in 1992 at 1.7 percentage points, then begins a steady decline to end at 0.2 percentage points in 2013. Families in the next 9 percent experienced a fairly constant reduction of between 0.2 and 0.6 percentage points in their pre-tax wealth share over the period. In direct contrast to the bottom 90 percent, families in the top 1 percent saw decline in their pre-tax wealth share through 2007, but since then their after-tax wealth share has surpassed their pre-tax share. Again, the reduction in capital gains tax rate appears to be one of the primary reasons for changes in after-tax wealth

shares. Figure 10 reveals how changes in income tax policy can turn the tax system from a mechanism that reduces wealth inequality to one that increases wealth inequality.[15]



6.3 The Top 1 Percent

In all of the previous analysis, some of the largest changes over time have occurred for families in the top 1 percent of the pre-tax wealth distribution. Given the focus by many other researchers on even higher points in the wealth distribution, such as Saez and Zucman (2014) and Bricker et al (2015), we break out the top 1 percent into two groups: the top 0.1 percent and the remaining 0.9 percent.

As shown in Table 6A, there are considerable differences between the top 0.1 percent and all other families in the top 1 percent of the net worth distribution. The first two columns of the table show mean pre-tax net worth for the two groups; mean wealth for the top 0.1 percent is about $75 million in 2013, compared to mean wealth of $13 million for the other families in the top 1 percent. The difference in means is fairly consistent over 1989 to 2013. In terms of tax-

[15] Gini coefficients for pre-tax and after-tax wealth show similar pattern in the difference in wealth shares. The largest differences the pre-tax and after-tax Gini coefficients is for 1989, with essentially no differences after 2007.

deferred retirement assets, the two groups have much more similar mean values over the period, with a mean value of about $1.6 million and $1.7 million in 2013. This is a direct result of the limits on contributions to these types of assets. For unrealized capital gains, the differences in mean values are even larger than for overall wealth, with the mean value for the top 0.1 percent nearly $30 million in 2013, compared to around $4 million of the rest of the top 1 percent.

Table 6A: The Top 1 Percent of Pre-Tax Net Worth (thousands of 2013 dollars)

Year	Mean Pre-Tax Net Worth		Mean Tax-Deferred Retirement Assets		Mean Unrealized Capital Gains		Mean Deferred Tax Liability	
	99-99.89	99.9-100	99-99.89	99.9-100	99-99.89	99.9-100	99-99.89	99.9-100
1989	7,042	35,467	336	723	2,635	19,547	793	5,405
1992	6,347	34,056	398	510	2,520	16,604	852	4,713
1995	7,821	40,718	608	713	2,666	17,035	1,013	4,848
1998	9,527	50,997	935	1,373	3,532	25,109	1,058	5,413
2001	12,499	57,282	948	1,385	4,402	23,434	1,249	5,176
2004	13,301	64,668	1,038	1,233	3,813	28,762	1,136	6,098
2007	14,712	78,436	1,297	1,179	5,677	40,814	1,272	6,391
2010	12,859	68,663	1,367	1,323	3,600	32,025	978	5,284
2013	13,091	75,772	1,574	1,709	4,007	29,865	1,086	4,990

Given the large differences in mean wealth within the top 1 percent, it is not surprising that the top 0.1 percent account for a large share of overall wealth. As shown in Table 6B, in 2013, the top 0.1 percent held about 14 percent of pre-tax wealth, and the rest of the top 1 percent held 22 percent; both values are the high points over 1989 to 2013.

Further evidence of the importance of unrealized capital gains in the portfolios of the top 0.1 percent is presented in Table 6B. Unrealized capital gains account for nearly 40 percent of wealth in 2013, compared to about 30 percent of the rest of the top 1 percent. However, the share in 2013 is at or near its low point for both groups, evidence of the lingering effects of the financial crisis. Tax-deferred retirement assets only account for about 2 percent of the net worth of the top 0.1 percent, but have increased in importance for the rest of the top 1 percent, rising to 12 percent of wealth in 2013. Taken together, the share of tax-deferred assets in wealth is similar for both groups (about 42 percent in 2013), but this masks substantial differences in allocation across the two types of tax-deferred assets.

The final column of Table 6B shows the share of the deferred tax liability in wealth for the two high net worth groups. As with households in the overall top 1 percent, the share of deferred tax liability in wealth has been falling over time for both groups within the top 1 percent. However, the decline is substantially larger for the top 0.1 percent, nearly 9 percentage points, compared to a 3 percentage point decline for rest of the top 1 percent.

Table 6B: The Top 1 Percent of Pre-Tax Net Worth (percent)

Year	Share of Pre-Tax Net Worth		Tax-Deferred Retirement Assets as a Percent of Net Worth		Unrealized Capital Gains as a Percent of Net Worth		Deferred Tax Liability as a Percent of Net Worth	
	99-99.89	99.9-100	99-99.89	99.9-100	99-99.89	99.9-100	99-99.89	99.9-100
1989	18.9	10.8	4.8	2.0	37.4	55.1	11.3	15.2
1992	18.8	11.3	6.3	1.5	39.7	48.8	13.4	13.8
1995	21.9	12.7	7.8	1.8	34.1	41.8	12.9	11.9
1998	21.2	12.6	9.8	2.7	37.1	49.2	11.1	10.6
2001	21.6	11.0	7.6	2.4	35.2	40.9	10.0	9.0
2004	21.6	11.7	7.8	1.9	28.7	44.5	8.5	9.4
2007	21.2	12.6	8.8	1.5	38.6	52.0	8.6	8.1
2010	21.7	12.8	10.6	1.9	28.0	46.6	7.6	7.7
2013	22.1	14.2	12.0	2.3	30.6	39.4	8.3	6.6

As shown in Figure 11, this has direct implications for the effective tax rate on tax-deferred assets. Between 1989 and 2013, both groups experienced a substantial decline in effective tax rates, but the fall for the top 0.1 was much larger. The effective tax rate for the top 0.1 plummeted nearly 11 percentage points, to end at about 16 percent in 2013, compared to a 7 percentage point decline to about 20 percent for the rest of the top 1 percent. Also plotted in Figure 11 is the long-term capital gains rate over the period. Although both high net worth groups track the capital gains rate, the effective tax rate for the top 0.1 percent follows the capital gains rate more closely, a result of the high share of unrealized capital gains in wealth for that group.

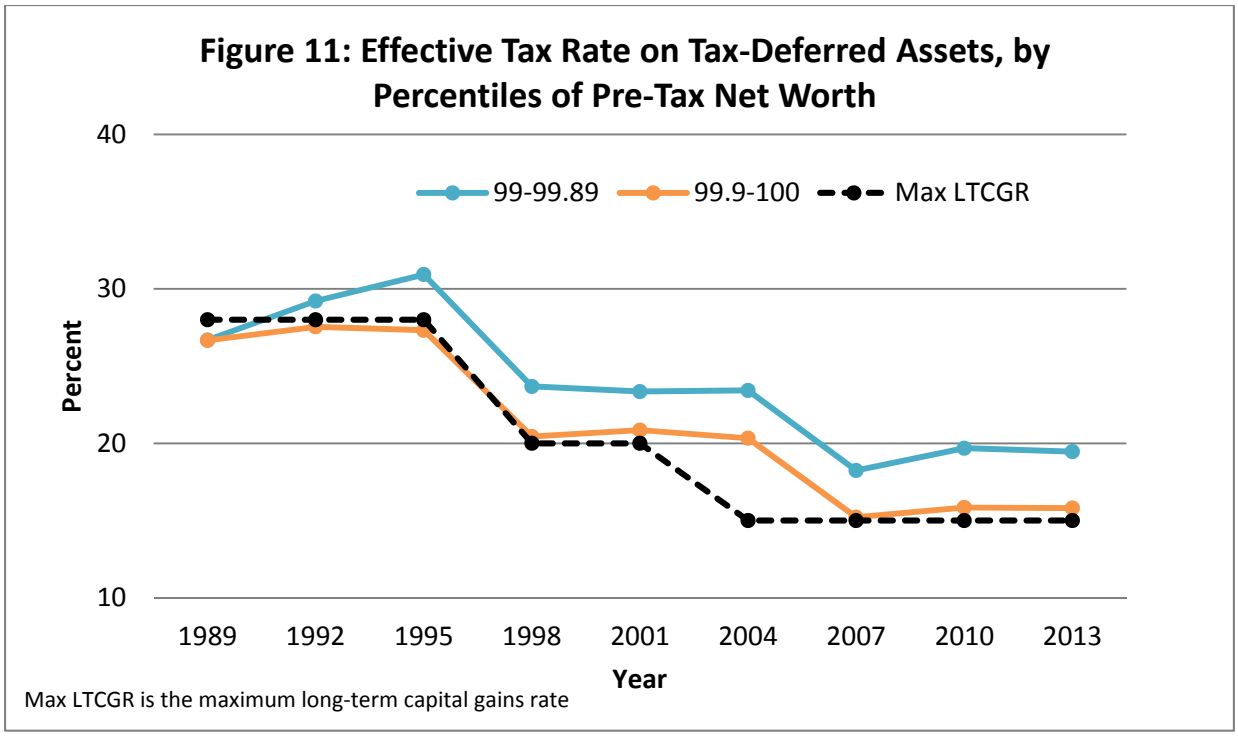
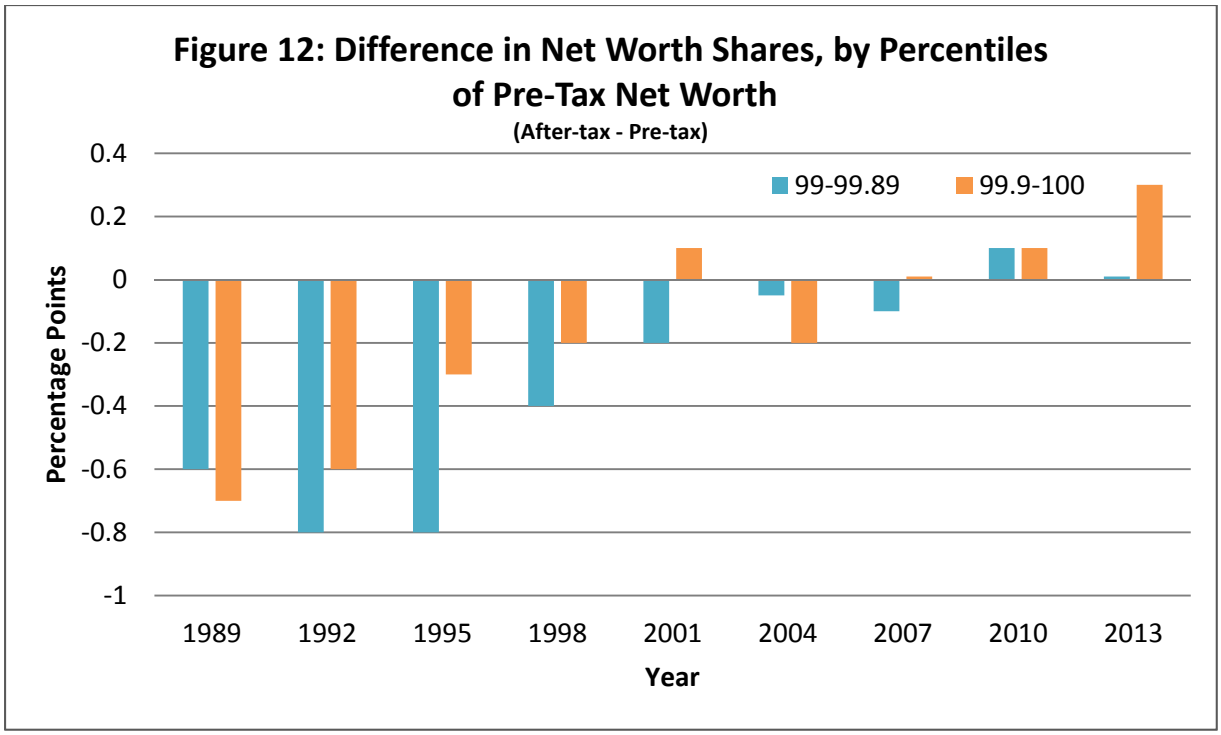


Figure 12 shows the difference between the after-tax and pre-tax wealth share for the top 0.1 and the rest of the top 1 percent of wealth distribution. Similar to results for the top 1 percent net worth group in Figure 10, the two top net worth groups had a lower after-tax share of wealth than pre-tax share from 1989 to 1998. The trend continued for families in the first 0.9 percent of the top 1 percent through 2007. Since 2010, the after-tax wealth share for this group has been slightly higher than the pre-tax share. For the top 0.1 percent, the after-tax share of wealth surpassed the pre-tax share in 2001, 2007, 2010 and 2013. The switch to a higher after-tax share of wealth occurs much earlier in the time period and appears to be directly related to the fall in capital gains tax rates.



7. Alternative Tax Policy

Given the central role of the reductions in capital gains tax rates in our results, this section simulates an alternative tax regime in which unrealized capital gains are taxed at ordinary income tax rates (the same as tax-deferred retirement assets). We re-estimate the household's tax liability under the new tax policy and take the difference between the household's base tax liability (without any tax-deferred assets included) and household's tax liability when all tax-deferred assets are taxed as ordinary income. Not surprisingly, this leads to an increase in the effective tax rate on tax-deferred assets for any household with unrealized capital gains. Figure 13 shows the base and alternative effective tax rates for three wealth groups over the 1989 to 2013 period. The base tax rates, the solid lines, are generally declining over the period, but the bottom 99 percent of the distribution has a higher rate than the top 1 percent from 1998 forward. In stark contrast, the alternative tax rates, the dashed lines, increased substantially for the top two groups from 1989 to 1995, leveled off from 1998 to 2001, and declined over the rest of the period. The alternative effective tax rate for the lowest wealth group moved in a narrow range over the period. Under the alternative tax policy, the lowest wealth group has the lowest effective tax rate and the rate for the top two wealth groups is fairly similar.

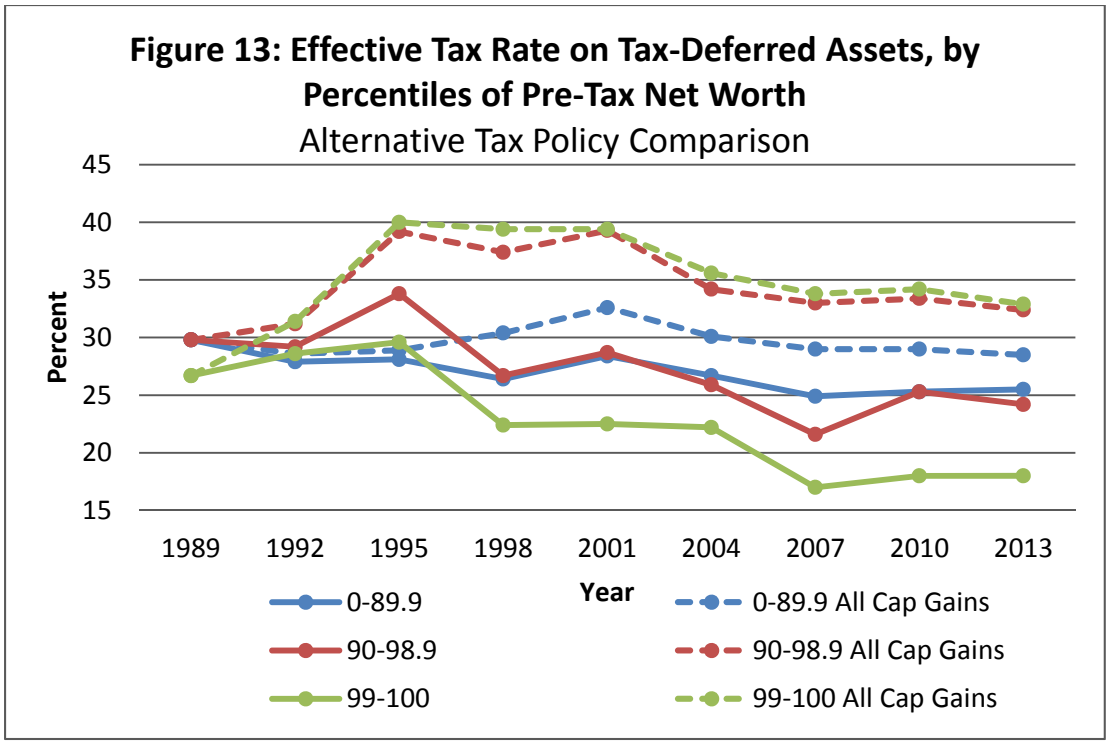
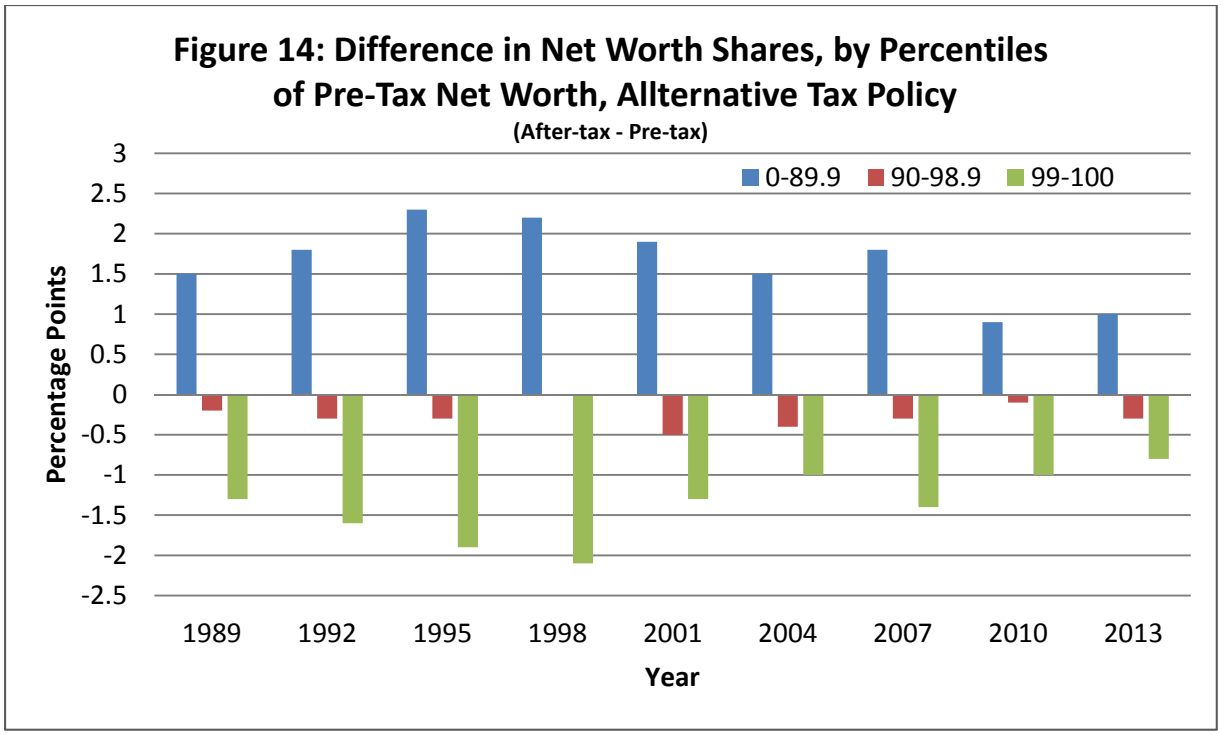


Figure 14 shows how the alternative tax policy would affect the difference between pre-tax and after-tax wealth shares across the distribution.[16] In contrast to Figure 10, the after-tax wealth share for the top 1 percent is lower than the pre-tax share in every survey year and the after-tax share is higher than the pre-tax share for the bottom 90 percent of the wealth distribution. There was little difference in the after-tax share of wealth for the 90-98.9th percentile group in any year. Thus, the majority of the differences in the pre-tax and after-tax concentration of wealth is driven by the increased tax rates on capital gains, which modestly reduces the after-tax wealth share of the top 1 percent.

[16] Appendix Table 2A presents results for the after-tax share of wealth under the alternative tax policy for the three pre-tax net worth percentile groups used earlier in the paper.



8. Conclusions

This paper presents some of the first estimates of the after-tax distribution of wealth, which provides a new measure of the financial well-being of families. We construct our measure of after-tax wealth by estimating the implicit tax liability that exists in tax-deferred retirement accounts and unrealized capital gains and subtracting that liability from pre-tax wealth. Our results show that although early in our sample period income tax policy tended to make the after-tax distribution of net worth less concentrated than the pre-tax distribution, the effectiveness of the tax system in reducing inequality has decreased over time. The main driver of this result is a combination of the substantial decline in capital gains tax rates and the large share of unrealized capital gains in the portfolios of households at the top of the wealth distribution. This effect is magnified within the top 1 percent, as households in the top 0.1 percent have an even larger share of unrealized gains in their portfolios. Given the importance of the tax rate for capital gains in our results, we construct an alternative tax policy in which unrealized capital gains are taxed at ordinary income rates. While this alternative policy does reduce wealth concentration relative to current tax policy, the after-tax distribution of wealth still exhibits increasing inequality over the

1989 to 2013 period. Our results clearly show the ability of the income tax system to have a substantial impact on wealth inequality.

A key assumption in our analysis is the realization all tax-deferred assets at one point in time, versus a gradual pattern of realizations over a number of years. This assumption may seem especially strong with regards to tax-deferred retirement accounts, as families often make withdrawals on an annual basis during retirement. One area for future work is to relax this assumption by modeling withdrawals from tax-deferred retirement accounts over a longer time frame. Another possibility is to limit realizations of tax-deferred assets in a given year to a level that does not push a family into a higher income tax bracket for that year. One would have to incorporate the difference in income tax rates and capital gains tax rates into the decision about which tax-deferred assets to realize in a given year. Of course, both of these methods would require assumptions about future tax rates and projections of future income levels for families.

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Appendix Tables

Table A1A: Mean Value of After-Tax Net Worth (thousands of 2013 dollars)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
Percentile of Net Worth									
0-89.9	118	106	109	132	163	176	185	141	135
90-98.9	1,261	1,117	1,057	1,407	1,920	2,018	2,382	2,161	2,100
99-100	8,688	7,884	9,716	12,179	15,347	16,803	19,319	17,029	17,881

Table A1B: Median Value of After-Tax Net Worth (thousands of 2013 dollars)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
Percentile of Net Worth									
0-89.9	63	61	67	74	84	85	97	59	56
90-98.9	1,001	895	847	1,054	1,429	1,481	1,675	1,692	1,521
99-100	5,546	5,089	6,036	7,558	10,377	11,100	12,306	11,171	10,679

Table A2: Shares of After-Tax Net Worth, Alternative Tax Policy (percent)

Year	1989	1992	1995	1998	2001	2004	2007	2010	2013
Percentile of Net Worth									
0-89.9	34.7	34.8	34.5	33.7	32.2	31.9	30.3	26.5	25.7
90-98.9	36.9	36.6	32.9	34.7	36.6	35.8	37.4	39.9	38.8
99-100	28.4	28.5	32.6	31.7	31.3	32.3	32.4	33.5	35.5