Confronting Piketty: A Better Model of Wealth Inequality

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Abstract. This paper looks at trends in household wealth from 1983 to 2019. Asset prices plunged between 2007 and 2010 but then rebounded from 2010 to 2019. The most telling finding is that median wealth plummeted by 43.9 percent over years 2007 to 2010, almost double the drop in housing prices. From 2010 to 2016 median wealth rebounded by 17.1 percent and then by another 21.2 percent from 2016 to 2019. However, median wealth in 2019 was still down 20.4 percent from its peak in 2007. The inequality of net worth, as measured by the Gini coefficient, after almost two decades of little movement, was up sharply from 2007 to 2010. It then increased moderately from 2010 to 2016, while the wealth share of the top one percent shot up by 4.5 percentage points. There was a remission of inequality between 2016 and 2019, with the Gini coefficient and the top percentile share both falling. The paper then "confronts" Piketty's (2014) now famous "law" that wealth inequality rises if r>g – namely, if the rate of return on capital, r, is greater than the rate of real output growth, g – and conversely. In fact, I show that the Piketty condition is not generally met, at least in the case of the U.S. over years 1983 to 2013. The empirical analysis here focuses on years 1983-2013 since this most closely corresponds to the period which was covered in the Piketty book. [238 words]

Keywords: household wealth, inequality, portfolio composition

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1. Introduction

Relying on calculations from the Survey of Consumer Finances (SCF) from the Federal Reserve Board of Washington, this paper documents trends in household net worth from 1983 to 2019. Particular attention is paid to what happened to wealth inequality over these years, especially from 2007 to 2019. It also considers how the middle class fared over years 2007 to 2010, during one of the sharpest declines in stock and real estate prices, and over years 2010 to 2019 as asset prices recovered. It should be stressed that 2019 is pre-Pandemic, so that the results presented here do not reflect the effects of the Covid-19 Pandemic on household wealth.

The period covered is from 1983 to 2019. The choice of years is dictated by the availability of survey data on household wealth. Asset prices plunged between 2007 and 2010 but then rebounded from 2010 to 2019. The most telling finding is that median wealth plummeted by 43.9 percent over years 2007 to 2010, almost double the drop in housing prices. From 2010 to 2016 median wealth rebounded by 17.1 percent and then by another 21.2 percent from 2016 to 2019. However, median wealth in 2019 was still down 20.4 percent from its peak in 2007. The inequality of net worth, as measured by the Gini coefficient, after almost two decades of little movement, was up sharply from 2007 to 2010. It then increased moderately from 2010 to 2016, while the wealth share of the top one percent shot up by 4.5 percentage points. There was a remission of inequality between 2016 and 2019, with the Gini coefficient and the top percentile share both falling. Middle class debt, with the exception of student loans, contracted sharply, by 31.1 percent from 2007 to 2013, but then rose by 14.1 percent from 2013 to 2019.

The rest of the paper is organized as follows. The next section, Section 2 provides some historical background. Section 3 discusses the measurement of household wealth and describes the data sources used for this study. Section 4 presents time trends for median and average wealth holdings and Section 5 on the inequality of household wealth. Section 6 looks at changes in the portfolio composition of household wealth over years 1983 to 2019 and rates of return on household wealth over the same period. It also looks at developments in ownership rates for selected assets.??? Particular attention is paid to changes in relative indebtedness.

Are the rich really different from the rest of the population? Section 6.1 looks at the pattern of wealth holdings of the rich in comparison to the middle class. The rather staggering debt level of the middle class in 2019, as we shall see below, raises the question of whether this

is a recent phenomenon or whether it has been going on for some time. Section 6.2 focuses on changes in the debt of the middle class over this time period. Differences in portfolio composition, particularly leverage (indebtedness) between wealth classes translates into large disparities in rates of return on household wealth over time, as documented in Section 7. Section 8 then "confronts" Piketty's (2014) now famous "law" that wealth inequality rises if the rate of return on capital is greater than the rate of real output growth. A summary of results and concluding remarks are provided in Section 9.

2. Historical background on asset price movements

The last two decades have witnessed some remarkable events. Perhaps, most notable was the housing value cycle which first led to an explosion in home prices and then a collapse, affecting net worth and helping to precipitate the Great Recession, followed by a recovery. The median house price remained virtually the same in 2001 as in 1989 in real terms.[1] However, the home ownership rate shot up from 62.8 to 67.7 percent. Then, 2001 saw a recession (albeit a short one). Despite this, house prices suddenly took off. The median sales price of existing one-family homes spurted by 19 percent nationwide from 2001 to 2007. The home ownership rate continued to expand, though at a somewhat slower rate, from 67.7 to 68.6 percent.

Then, the recession and associated financial crisis hit. The recession officially began in December, 2007, and "officially" ended in June, 2009.[2] One consequence was that asset prices plummeted. From 2007 to 2010, the median home price (in constant dollars) nose-dived by 24.5 percent, and the share of households owning their own home fell off, from 68.6 to 67.2 percent. This was followed by a partial recovery, with median house prices rising 26.3 percent from 2010 to 2016, though still below its 2007 value. However, the homeownership rate continued to contract, falling to 63.7 percent. From 2016 to 2019, home prices were up another 7.1 percent,

[1] The source for years 1989 to 2007 is Table 935 of the *2009 Statistical Abstract*, US Bureau of the Census, available at http://www.census.gov/compendia/statab/. For years after 2007, the source is: National Association of Realtors, "Median Sales Price of Existing Single-Family Homes for Metropolitan Areas," available at: http://www.realtor.org/sites/default/files/reports/2012/embargoes/2012-q1-metro-home-prices-49bc10b1efdc1b8cc3eb66dbcdad55f7/metro-home-prices-q1-single-family-2012-05-09.pdf [both accessed October 9, 2019].The figures are based on median prices of existing houses for metropolitan areas only. All figures are in constant (2019) dollars unless otherwise indicated.

[2] The source is: http://www.nber.org/cycles/cyclesmain.html [accessed April 20, 2014]. I use the term "Great Recession" to refer to the period from 2007 through 2010, since median income and wealth showed no recovery over these years and I have data points for these two years but not in between.

finally above its 2007 level (though still below its 2005 peak), while the homeownership rate picked up a bit to 64.9 percent.

In contrast to the housing market, the stock market boomed during the 1990s. On the basis of the Standard & Poor (S&P) 500 index, stock prices surged 159.0 percent in constant dollars between 1989 and 2001.[3] Stock ownership spread and by 2001 over half of U.S. households owned stock either directly or indirectly. The stock market slowed from 2001 to 2007 and stock prices were up only 5.7 percent, while the stock ownership rate fell to 49.1 percent. Then came the Great Recession. Stock prices crashed from 2007 to 2009 and then partially recovered in 2010 for a net decline of 26.6 percent. The stock ownership rate also once again declined, to 46.9 percent. The stock market continued to rise after 2010 and by 2016 was up 59.6 percent over 2010 and way above its previous high in 2007. Moreover, the stock ownership rate rebounded to 49.3 percent. The stock market continued to boom from 2016 to 2019, up by 38.7 percent in real terms and the stock ownership rate inched up to 49.6 percent.

What have these various asset price trends wrought in terms of the distribution of household wealth? This is the subject of the remainder of this paper.

3. Data sources and methods

The primary data sources used for this study are the 1983, 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010, 2013, 2016, and 2019 SCF. Each survey consists of a core representative sample combined with a high-income supplement. Starting in 1989, the first sample was selected from a standard multi-stage area-probability design. This part of the sample was intended to provide good coverage of asset characteristics such as home ownership that are broadly distributed. The second sample, the high-income supplement, was selected as a so-called "list sample" from statistical records (the Individual Tax File) derived from tax data by the Statistics of Income (SOI) Division of the Internal Revenue Service. In this case, the IRS provided the names and addresses of a sample of very high-income families. This second sample was designed to disproportionately select families that were likely to be relatively wealthy (see, for example, Kennickell and Woodburn. 1999). The advantage of the high-income supplement is that it provides a much "richer" sample of high income and therefore potentially very wealthy

[3] The source for stock prices is Table B-96 of the *Economic Report of the President, 2013*, available at http://www.gpoaccess.gov/eop/tables13.html, with updates to 2019 from: http://us.spindices.com/indices/equity/sp-composite-1500 [both accessed October 11, 2020].

families. However, the presence of a high-income supplement creates some complications, because weights must be constructed to meld the high-income supplement with the core sample. Typically, about two thirds of the cases came from the representative sample and one third from the high-income supplement. In the 2007 SCF the standard multi-stage area-probability sample contributed 2,915 cases while the high-income supplement contributed another 1,507 cases.

The principal wealth concept used here is marketable wealth (or net worth), which is defined as the current value of all marketable or fungible assets less the current value of debts. Net worth is thus the difference in value between total assets and total liabilities. Total assets are defined as the sum of: (1) owner-occupied housing; (2) other real estate; (3) bank deposits, certificates of deposit, and money market accounts; (4) government and corporate bonds and other financial securities; (5) the cash surrender value of life insurance plans; (6) defined contribution (DC) pension plans, including IRAs 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.

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. Though the SCF includes information on the value of vehicles owned by the household, I exclude this from my standard definition of household wealth, since their resale value typically far understates the value of their consumption services to the household. The value of other consumer durables such as televisions, furniture, household appliances, and the like are not included in the SCF.[4] Another justification for their exclusion is that this treatment is consistent with the national accounts, where purchase of vehicles and other consumer durables is counted as expenditures, not savings. A further reason is that for most people the concept of wealth as a store of potential consumption means that one should exclude assets whose possession is required in order to enable consumption or to earn income – for example, cars which are needed to purchase groceries or go to work.[5]

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[4] On the other hand, the value of antiques, jewelry, art objects and other "valuables" are included in the SCF in the category "other assets."

[5] Another rationale is that if vehicles are included in the household portfolio, their "rate of return" would be substantially negative since they depreciate very rapidly over time (see Section 7 for calculations of the overall rate

Also excluded here 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 defined benefit pension plans ("DB pension wealth"). Even though these funds are a source of future income to families, they are not in their direct control and cannot be marketed.

4. Median wealth partially recovers after 2010

Table 1 documents a robust growth in wealth from 1983 to 2007 (also see Figure 1). Median wealth increased at an annual rate of 1.63 percent from 1962 to 1983, 1.13 percent from 1983 to 1989, and then 1.98 percent from 1989 to 2007. Then between 2007 and 2010, median wealth plunged by a staggering 43.9 percent! Indeed, real median wealth was actually about the same in 2010 as in 1969. The primary reasons, as we shall in Section 7, are the collapse in the housing market and the high leverage of middle-class families. Median wealth rebounded somewhat from 2010 to 2016, climbing by 17.1 percent, and again from 2016 to 2019, by 21.2 percent, though it was still down 20.4 percent from its peak in 2007.

[Table 1 and Figure 1 about here]

Mean net worth also grew vigorously from 1962 to 1983, at an annual rate of 1.82 percent, a little higher than that of median wealth. Its growth accelerated to 2.52 percent per year over years 1983 to 1989, about double the growth rate of median wealth. Over years 1989 to 2007, the growth rate of mean wealth accelerated to 3.24 percent per year. Mean wealth in 2007 was more than double its value in 1983. Another point of note is that mean wealth grew much faster than the median from 1983 to 2007, indicative of widening inequality of wealth.

The Great Recession also 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) 16.1 percent. 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. Mean wealth then grew by 27.9 from 2010 to 2016 and was 7.3 percent above its previous 2007 peak. This was followed by almost no change from 2016 to 2019.

Income trends are rather different. Median household income (based on Current Population Survey data) advanced at a fairly solid pace from 1962 to 1983, at 1.19 percent per year (also see Figure 2). Then, after gaining 2.02 percent per annum between 1983 and 1989, its

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of return on the household portfolio).

annual growth dipped to only 0.41 percent from 1989 to 2007. Then, from 2007 to 2010, it fell off in absolute terms by 6.7 percent. Though this is not an insignificant amount, the reduction was not nearly as great as that in median wealth. From 2010 to 2016, median income advanced by 8.6 percent and then a robust 9.2 percent from 2016 to 2019. By 2016, median income was about back to where it was in 2007 and by 2019 was up by 10.7 percent over its 2007 level. Mean income shows a similar time trend, though the percentage gains were greater than that of median income in every time period. By 2016 mean income was 6.0 percent above its 2007 level and by 2019 it was 17.4 percent greater.

[Figure 2 about here]

In sum, while median income grew slowly from 1989 to 2007, median net worth advanced strongly. The Great Recession, on the other hand, saw a massive destruction of median net worth but a much more modest decline in median income. Median income did fully recover by 2019 while median wealth was still below its previous 2007 peak.

5. Wealth inequality shows a slight remission in 2019

Table 2 shows that wealth inequality after increasing 1983 to 1989 it remained virtually unchanged from 1989 to 2007 according to the Gini coefficient (also see Figure 3). Over these years, the share of the top percentile actually declined a bit, from 35.2 to 34.6 percent, though this was more than compensated for by an increase in the share of the next four percentiles. As a result, the share of the top five percent increased from 58.0 percent in 1989 to 61.8 percent in 2007, and the share of the top quintile rose from 83.0 to 85.0 percent. The share of the fourth and middle quintiles each declined by about a percentage point, while that of the bottom 20 percent increased by 0.2 percentage point. Overall, the Gini coefficient saw a very small rise, from 0.828 in 1989 to 0.834 in 2007.

[Table 2 and Figure 3 about here]

The years 2007 to 2010 saw a sharp elevation in wealth inequality, with the Gini coefficient rising from 0.834 to 0.866. Interestingly, the share of the top percentile showed only a half percentage point gain. Most of the rise in wealth share took place in the remainder of the top quintile, and overall the share of wealth held by the top quintile climbed by 3.6 percentage points. The shares of the other quintiles, correspondingly, dropped, with the share of the second quintile falling by 0.4 percentage points and that of the bottom quintile by 0.7 percentage points.

From 2010 to 2016 there was a small rise in the Gini coefficient, from 0.866 to 0.877.

The share of the top one percent experienced a huge increase of 4.5 percentage points but the share of the next 19 percent went down, so that the wealth share of the top quintile dropped slightly, by 0.3 percentage points. The wealth of the fourth quintile also lost 1.3 percent, that of the middle quintile fell 0.3 percent, but that of the bottom forty percent gained 0.4 percent. From 2016 to 2019, the Gini coefficient dropped from 0.877 to 0.869. The share of the top percentile fell by 1.4 percentage points and that of the top quintile by 1.0 percentage points and the wealth share of the other quintiles rose. In constant dollar terms, the net worth of the top one percent actually declined by 1.9 percent over those years.

The top 1 percent of families (as ranked by income on the basis of the SCF data) earned 19.0 percent of total household income in 2018 and the top 20 percent accounted for 61.0 percent -- large figures but lower than the corresponding wealth shares (also see Figure 3).[6] The time trend for income inequality also contrasts with that for net worth. Income inequality showed a sharp rise from 1961 to 1982, with the Gini coefficient expanding from 0.428 to 0.480 and the share of the top one percent up from 8.4 to 12.8 percent. Income inequality increased sharply again between 1982 and 1988, with the Gini coefficient rising from 0.480 to 0.521 and the share of the top one percent up from 12.8 to 16.6 percent.

Inequality again surged from 1988 to 2006, with the share of the top percentile rising by 4.7 percentage points, the share of the top quintile up by 5.9 percentage points, the shares of the other quintiles falling again, and the Gini index advancing from 0.521 to 0.574. Perhaps, somewhat surprisingly, the years 2007 to 2010 witnessed a rather sharp contraction in income inequality. The Gini coefficient fell from 0.574 to 0.549 and the share of the top one percent dropped sharply from 21.3 to 17.2 percent. Property income and realized capital gains (which are included in the SCF definition of income), as well as corporate bonuses and the value of stock options, plummeted over these years, a process which explains the steep decline in the share of the top percentile. Real wages actually rose over these years, though the unemployment rate also increased. As a result, the income of the middle class was down but not nearly as much in percentage terms as that of the high-income groups. In contrast, transfer income such as unemployment insurance rose, so that the bottom also did better in relative terms than the top. As a result, overall income inequality fell over the years 2006 to 2009.

[6] It should be noted that the income in each survey year (say 2019) is for the preceding year (2018 in this case).

Years 2009 to 2015 saw a reversal in this trend, with income inequality once again increasing sharply. The Gini coefficient increased 0.598, above its 2006 level. The share of the top percentile rose to 23.5 percent and that of the top quintile was up to 64.0 percent, both above their level in 2006. The same set of factors, though in reverse, helps explain this turnaround in income inequality. Property income, realized capital gains, and associated income rose sharply over these years as the stock market recovered, accounting for the sharp rise in the share of the top percentile. The unemployment rate fell over these years but real wages were down, according to the BLS figures. As a result, the income of the middle class rose but not nearly as much in percentage terms as that of the high income groups. Transfer income such as unemployment insurance fell, as the extensions of benefits enacted in the early days of the recession ended. Income inequality then contracted from 2015 to 2018, with the Gini coefficient falling to 0.571, the share of the top one percent down to 19.0 percent, and that of the top quintile to 61.0 percent.

All in all, income inequality increased much more in percentage terms than net worth inequality over years 1983 to 2019. On the basis of the Gini coefficient, net worth inequality was up by 8.8 percent while income inequality rose by 18.9 percent.

6. Household debt finally recedes

In 2019, owner-occupied housing was the most important household asset in the average portfolio breakdown for all households shown in Table 3, accounting for 26.9 percent of total assets (also see Figure 4). However, net home equity -- the value of the house minus any outstanding mortgage -- amounted to only 17.7 percent of total assets. Real estate, other than owner-occupied housing, comprised 9.4 percent, and business equity another 20.0 percent.

[Table 3 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 6.8 percent and pension accounts 15.5 percent. Bonds and other financial securities amounted to 0.9 percent; corporate stock, including mutual funds, to 15.5 percent; and trust fund equity to 3.6 percent. Debt as a proportion of gross assets was 12.9 percent, and the debt to net worth ratio was 14.9 percent, while the debt-income ratio was 104.0 percent.

There were some notable changes in the composition of household wealth over years 1983 to 2019. First, the share of housing wealth in total assets, jumped from around 30 percent in

1983-2001 to a peak value of 33.5 percent but then declined to 26.9 percent in 2019. Two factors explain this movement. The first is the trend in the homeownership rate, which rose from 63.4 percent in 1983 to a top value of 69.1 percent in 2004 and then fell off to 64.9 percent in 2019. The second is that the median house price for existing one-family homes rose by 16.9 percent between 2001 and 2004 and then inched up by 3.9 percent from 2004 to 2019. 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 to 17.7 percent in 2019. The difference between the two series (gross versus net) is attributable to the changing magnitude of mortgage debt on homeowner's property, which increased from 20.9 percent in 1983 to 37.0 percent in 1998 but then fell back to 34.0 percent in 2019.

Third, overall relative indebtedness first increased, with the debt to net worth ratio climbing from 15.1 percent in 1983 to 20.6 percent in 2010, and then tumbled to 14.9 percent in 2019. Likewise, the debt-income ratio surged almost continuously over time from 68.4 percent in 1983 to a peak of 127.0 percent in 2010 but then dropped off sharply to 104.0 percent in 2019. 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 3.8 percent in 2019.

The large rise in *relative* indebtedness among all households between 2007 and 2010 could be due to a rise in the absolute level of debt and/or a fall-off in net worth and income. As shown in Table 1, both mean net worth and mean income fell over the three years. There was also a slight contraction of debt in constant dollars, with mortgage debt declining by 5.0 percent, other debt by 2.6 percent, and total debt by 4.4 percent (see Table 9??? below). Thus, the steep rise in the debt-net worth and the debt-income ratios over the three years was entirely due to the reduction in wealth and income. In contrast, from 2010 to 2019, relative indebtedness declined sharply. The main reason was sizeable gains in both mean wealth and mean income, which was reinforced by a 6.2 percent reduction in average household debt.

A fourth change is that pension accounts rose from 1.5 to 15.5 percent of total assets from 1983 to 2019. This increase largely offset the decline in the share of liquid assets in total assets, from 17.4 percent to 6.8 percent, 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 15.5 percent of gross assets over these years. Its year to year trend mainly reflects 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, but then declined to 22.6 percent in 2019. 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 2019 reflected the recovery of the stock market and increases in stock ownership.

6.1 Portfolio composition by wealth class

The tabulation in Table 3 provides a picture of the average holdings of all families in the economy, but there are marked class differences in how middle-class families and the rich invest their wealth. As shown in Table 4, the richest one percent of households (as ranked by wealth) invested almost 80 percent of their savings in investment real estate, businesses, corporate stock, and financial securities in 2019 (also see Figure 5). Corporate stock, either directly owned by the households or indirectly owned through mutual funds, trust accounts, or various pension accounts, comprised 25.8 percent by itself. Housing accounted for only 8.9 percent of their wealth (and net equity in housing 7.5 percent), liquid assets 5.0 percent, and pension accounts another 6.0 percent. Their ratio of debt to net worth was only 2.4 percent, their ratio of debt to income was 45.3 percent, and the ratio of mortgage debt to house value was 15.3 percent.

[Table 4 and Figure 5 about here]

Among the next richest 19 percent of U.S. households, housing comprised 25.9 percent of their total assets (and net home equity 198.9 percent), liquid assets 7.5 percent, and pension assets another 22.6 percent. Investment assets -- real estate, business equity, stocks, and bonds – made up 43.0 percent and 25.4 percent was in the form of stocks directly or indirectly owned. Debt amounted to 10.3 percent of their net worth and 95.9 percent of their income, and the ratio of mortgage debt to house value was 27.0 percent.

In contrast, 64.3 percent of the assets of the middle three wealth quintiles of households was invested in their own home in 2019. However, home equity amounted to only over a third of total assets, a reflection of their large mortgage debt. Another 23.1 percent went into monetary savings of one form or another and pension accounts. Together housing, liquid assets, and pension assets accounted for 87.4 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 8.6 percent of their total assets. The ratio of debt to net worth was 57.5 percent, and their ratio of debt to income was 122.0 percent, both much higher than that of the top quintile. Finally, their mortgage debt amounted to 44.5 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 70.5 percent of households in the middle three quintiles. Three-quarters of very rich households (in the top percentile) owned some other form of real estate, compared to 44.8 percent of rich households (those in the next 19 percent of the distribution) and only 12.6 percent of households in the middle 60 percent. Over 90 percent of the very rich had a pension account, compared to 85.7 percent of the rich and 47.4 percent of the middle. A stunning 71.7 percent of the very rich reported owning their own business. The comparable figures were 29.6 percent among the rich and only 9.0 percent of the middle class.

Among the very rich, 91.1 percent held corporate stock, mutual funds, financial securities or a trust fund, in comparison to 61.9 percent of the rich and 16.8 percent of the middle class. Almost all of the very rich reported owning stock either directly or indirectly, compared to 88.8 percent of the rich and 45.9 percent of the middle. If we exclude small holdings of stock, then the ownership rates dropped off sharply among the middle three quintiles, from 45.9 percent to 34.6 percent for stocks worth $5,000 or more and to 28.7 percent for stocks worth $10,000 or more.

More details are provided in Table 5 for the middle three wealth quintiles. Perhaps, the most striking development is the homeownership rate, which after rising almost continuously over time from 71.6 percent in 1983 to 78.2 percent in 2004, plunged to 67.0 percent in 2016. However, there was a notable pick-up to 70.5 percent in 2019. This trend was more pronounced than that among all households, among whom the homeownership rate dropped from 69.1 percent in 2004 to 63.7 percent in 2016 followed by a modest rebound to 64.9 percent in 2019. A similar trend is evident for the share of homes in total assets, which remained virtually unchanged from 1983 to 2001 but then rose sharply in 2004. This increase was largely a result of rising house prices and gains in the homeownership rate. The share then declined from 2004 through 2016 as the homeownership rate plummeted but then bounced back in 2019.

[Table 5 about here]

The share of pension accounts in total assets rose by 13.5 percentage points from 1983 to 2019, while that of liquid assets declined by 13.1 percentage points. This trend parallels that of

all households. In contrast, the share of middle-class households holding a pension account, after surging by 41.2 percentage points, from 12.2 percent in 1983 to 53.4 percent in 2007, contracted to 47.4 percent in 2019. The share of all stocks in total assets mushroomed from 2.4 percent in 1983 to 12.6 percent in 2001 but and then fell off to 8.6 percent in 2019. The stock ownership rate among the middle class also shot up quickly from 16.5 percent in 1983 to 51.1 percent in 2001, when it peaked. It then declined steeply to 41.4 percent in 2010 but recovered to 45.9 percent in 2019. In similar fashion, the share of middle-class households owning either corporate stock, financial securities, mutual funds or a personal trust rose from 21.6 percent in 1983 to 27.5 percent in 2001 and then plunged to 16.8 percent in 2019. Much of the decline took place between 2007 and 2010, as middle-class households got scared off by the stock market collapse of those years.

6.2 The evolution of middle-class debt

The rather staggering debt level of the middle class in 2019 raises the question of whether this is a recent phenomenon or whether it has been going on for some time. The debt-income ratio peaked in 2007 and then contracted substantially in 2010 and receded a bit more by 2019, while the debt-net worth ratio peaked in 2010 and then fell off sharply through 2019.

There was a sharp rise in the debt to net worth ratio of the middle class from 37 percent in 1983 to 61 percent in 2007. There was a particularly steep uptick between 2001 and 2004, a reflection mainly of rising mortgage debt. The debt to income ratio skyrocketed from 1983 to 2007, more than doubling. Once, again, much of the increase happened between 2001 and 2004. In constant dollar terms, the mean debt of the middle class shot up by a factor of 2.6 between 1983 and 2007, mortgage debt by a factor of 3.2, and other debt by a factor of 1.5. The rise in the debt to net worth ratio and the debt-income ratio was much more pronounced than for all households. In 1983, for example, the debt to income ratio was about the same for the middle class as for all households but by 2007 the ratio was much larger for the former.

After the Great Recession hit, the debt to net worth ratio continued to rise, reaching 69.2 percent in 2010 but there was actually a retrenchment in the debt to income ratio, falling to 134.3 percent. The reason is that from 2007 to 2010, the mean debt of the middle class actually contracted by 24.9 percent in constant dollars (see Table 9). Average mortgage debt declined by 23.1 percent, as families paid down their outstanding balances, while the mean value of other debt plummeted by 31.6 percent, as families paid off credit card balances and other forms of

consumer debt. If we separate out educational loans, which actually remained flat over these years, we find that non-educational debt plunged by 36.7 percent. Among all households, in contrast, mortgage debt in constant dollars fell by only 5.0 percent, non-educational debt was down by 9.6 percent but students loans climbed by 43.5 percent. The significant rise in the debt to net worth ratio of the middle class between 2007 and 2010 was due to the steeper drop off in net worth than in debt, while the decline in the debt-income ratio of this group was exclusively due to the sharp contraction of overall debt.

Both the debt to net worth and the debt-income ratios fell from 2010 to 2019 for the middle class. Overall mean debt actually rose by 4.7 percent in real terms over these years (see Table 6). Average mortgage debt remained fairly flat but non-mortgage debt, particularly educational loans, increased sharply – the latter by 66.4 percent. The decline in relative indebtedness was entirely due to a substantial rise in both mean income and wealth. In contrast, average overall debt fell among all households, by 6.2 percent, with mortgage debt down by 10.7 percent and non-educational debt down by 3.7 percent, whereas student loans increased by 49.6 percent.

[Table 6 about here]

Similar to the trend for all households, net home equity as a percentage of total assets for the middle class fell rather continuously from 1983 to 2010 and then rebounded. Mortgage debt as a proportion of house value rose through 2010 and then fell off a bit through 2019, though still far above its 1983 level. The decline in the former between 2007 and 2010 was relatively small despite the steep decrease in home prices, a reflection of the sharp reduction in mortgage debt. The rise after 2010 was due to rising home prices. On the other hand, the rise in the ratio of mortgage debt to house values was relatively large over years 2007 to 2010 because of the fall-off in home prices. This ratio then contracted after 2010 due to rising home prices.

7. The role of leverage in explaining time trends in wealth

7.1 Rates of return

Table 7 shows average annual *real* rates of return for both gross assets and net worth over the period from 1983 to 2019. Results are based on the average portfolio composition over the period and assume that all wealth groups receive the same rate of return, on average, by asset

type. In particular, it is assumed that there are no systematic differences in returns on, for example, stocks by wealth class.

[Table 7 about here]

What is the evidence supporting this assumption? First, Wolff (1987) also looked at asset yields by income class on the basis of the 1962 Survey of Financial Characteristics of Consumers (and reported in Wolff, 2017, Table A1.2 of Appendix 2). The results indicated that bond yields were notably higher for the top income class ($100,000 or more) than the eight other income classes. However dividend yields on stocks showed very little systematic variation with income class (they were actually highest for the second and sixth income class). Returns on unincorporated business were highest for the two middle income classes and lowest for the top two and bottom income classes. Yields on trust equity tended to be inversely related to income, highest at the bottom and lowest at the top of the income distribution.

Second, Johnson, Raub, and Newcomb (2013) used micro estate tax data of 2007 decedents matched to 2006 income tax returns to analyze rates of return by wealth class. If anything, they found slightly decreasing rates of returns for some asset classes by wealth level. Third, Saez and Zucman (2016) provided three pieces of evidence supporting this assumption. They encountered the same issue in their capitalization technique since they also assumed a uniform rate of return across income classes. They also used matched estate-income returns like Johnson et. al. (2013) and analyzed three datasets. The first piece of evidence was based on publicly available SOI tabulations of matched estate-income returns for 2008. Saez and Zucman (SZ) found that within-asset-class returns were fairly constant across wealth groups. Although rates of returns varied across individuals, they were similar across wealth groups.

The second source of evidence was the internal SOI matched estate and income tax files over years 1996–2011 period. SZ matched the estate tax returns of non-married individuals dying in this period to their prior-year income tax returns. They found that the interest rate on bonds and deposits did not vary much with wealth level. In 1997, for example, the interest rate was 3.9 percent on aggregate, and between 4.1 and 4.3 percent for all groups of estate tax payers ranging from $0.5–1 million to more than $20 million. The third source was a publicly available sample of estates filed in 1977. SZ once again found that rates of return within asset class were very similar across wealth groups. Individuals in the top 0.1 percent and top 0.01 percent had an average dividend yield of 4.7 percent, about the same as the average dividend yield of 5.1

percent among all decedents.

Fourth, Fagereng et. al. (2016), using Norwegian individual wealth returns over twenty years, reported econometric evidence of a positive correlation between wealth level and risk-adjusted rate of return (the Sharpe ratio) by asset type. The differentials were quite large – a difference of 180 basis points (that is, 1.8 percentage points) between the 10th and 90th percentile of the wealth distribution in 2013. Fifth, Bricker et. al. (2016), found a huge discrepancy on interest-bearing assets between the very rich compared to the average household. In particular, in the 2013 SCF, the average rate of return on fixed-income assets (defined as the ratio of SCF interest income to SCF fixed-income assets) across all households was about 1 percent, but the average return for the top 1 percent of families was almost 6 percent. Thus with the exception of Fagereng et. al. (2016) and Bricker et. al. (2016), most of the evidence does suggest that there is little systematic variation of rates of return by wealth or income level.

With this in mind, it is first of interest to look at the results for all households (see Appendix Table 1 for the source data). The overall average annual *real* rate of return on gross assets rose from 2.58 percent in the 1983-1989 period to 3.36 percent in the 1989-2001 period and then fell slightly to 3.10 percent in the 2001-2007 period before plummeting to -5.99 percent over the Great Recession. This was followed by a substantial recovery to 5.06 percent over years 2010 to 2016 and then a slight decline to 3.77 percent per year 2016 to 2019.

As shown in Appendix Table 1, the largest *nominal* declines in asset prices over the years 2007 to 2010 occurred for residential real estate and the category businesses and non-home real estate. The value of financial assets, including stocks, bonds, and other financial securities, registered an annual rate of return of "only" -1.33 percent because interest rates on corporate and foreign bonds continued to remain strong over these years. The value of pension accounts had a -0.20 percent annual rate of return, reflecting the mixture of bonds and stocks held in pension accounts. From 2010 to 2016, all asset classes with the exception of liquid assets made a robust recovery. This was led by financial assets which recorded a 10.10 percent annual return and pension accounts with 7.40 percent annual rate of return. Between 2016 and 2019, returns slackened a bit but were still quite strong, led by financial assets at 9.34 percent per year and then pension accounts at 7.45 percent per year. The annual return on residential real estate declined to 4.49 percent per year, as did that on the combined category of other real estate and businesses to 5.19 percent, while that on liquid assets was up slightly to 0.56 percent.

Returning to Table 7, we see that the average annual rate of return on net worth among all households also increased from 3.57 percent in the first period to 4.33 percent in the second , declined somewhat to 4.03 percent in the third and then fell off sharply to -6.82 percent in the 2007-2010 period. Once again, there was a strong recovery to 6.23 percent in the 2010-2016 period and then a modest drop off to 4.63 percent in 2016-2019. It is first of note that the annual returns on net worth were uniformly higher – by about one percentage point – than those of gross assets over the first three and last two periods, when asset prices were rising. However, in the 2007-2010 period, the opposite was the case, with the annual return on net worth about one percentage point lower than that on gross assets. These results illustrate the effect of leverage, raising the return when asset prices rise and lowering the return when asset prices fall. Over the full 1983-2019 period, the annual return on net worth was 0.84 percentage points higher than that on gross assets.

There are striking differences in rates of return by wealth class. The highest returns on gross assets were registered by the top one percent of wealth holders, followed by the next 19 percent and then by the middle three wealth quintiles. The one exception was the 2007-2010 period when the next 19 percent was first (the least negative), followed by the top one percent and then the middle three quintiles. The differences were quite substantial. Over the full 1983-2019 period, the average annual return on gross assets for the top one percent was 0.49 percentage points greater than that of the next 19 percent and 1.30 percentage points greater than that of the middle quintiles. The differences reflected the greater share of high yield investment assets like stocks in the portfolios of the rich and the greater share of housing in the portfolio of the middle class (see Table 4). Indeed, in the 2010-2016 period, the cleavage in returns between the top and middle groups was 1.55 percentage points, reflecting the much higher gains on stocks and investment assets than on housing in those years.

This pattern is almost exactly reversed when we look at returns on net worth. In this case, in the first three periods and the last two when asset prices were rising, the highest returns were recorded by the middle three wealth quintiles but in the 2007-2010 period, when asset prices were declining, the middle group registered the lowest (that is, most negative) rate of return. The exception was the first period when the top one percent had a slightly higher return on net worth than the middle class. The reason is the substantial spread in returns on gross assets between the top one percent and the middle group – 1.72 percentage points.

Differences in returns between the top one percent and the middle three quintiles were quite substantial in some years. In the 2001-2007 period, the average return on net worth was 5.58 percent for the latter and 3.91 percent for the former – a difference of 1.66 percentage points. The spread was even greater over years 2010 to 2016, 1.93 percentage points, but lower in 2016-2019, 1.18 percentage points. Over years 2007 to 2010, when asset prices declined, the return on net worth was -5.88 percent for the top one percent and -10.39 percent for the middle three quintiles – a differential of 4.51 percentage points in favor of the top one percent.

The spread in rates of return on net worth between the top one percent and the middle three quintiles reflects the much higher leverage of the middle class. In 2019, for example, the debt to net worth ratio of the middle three quintiles was 0.575 while that of the top one percent was 0.024. The debt to net worth ratio of the next 19 percent was also relatively low, at 0.103.

The huge negative return on net worth of the middle three quintiles was largely responsible for the precipitous drop in median net worth between 2007 and 2010, as we shall see in the next section. This factor, in turn, was due to the steep drop in housing prices and the very high leverage of this group. Likewise, the very high return on net worth of the middle group over the 2001-2007 period played the predominant role in explaining the robust advance of median net worth, despite the sluggish growth in median income. This in turn, was a result of high leverage coupled with the boom in housing prices. These two factors also help account for the very high return enjoyed by the middle quintiles over the 2010-2016 and 2016-2019 periods and the consequent rapid increase in median wealth.

The substantial differential in returns on net worth between the middle and top groups (four and a half percentage points lower) is one factor which explains why wealth inequality rose sharply between 2007 and 2010 despite the decline in income inequality. Likewise this differential over the 2001-2007 period (a spread of 1.66 percentage points in favor of the middle quintiles) is a factor which helps account for the stasis in wealth inequality over these years despite the increase in income inequality. The higher rate of return of the middle than the top group over years 2010 to 2016 also helps account for the relatively modest increase in wealth inequality despite the sharp rise in income inequality.

7.2 Decomposition Analysis

To understand trends in both wealth levels and wealth inequality, it is helpful to undertake a decomposition analysis. I begin with the basic wealth relationship as established in Wolff (1999):

(1) $\Delta W_T \equiv W_t - W_{t-1} = r_T W_T + S_T + G_t$.

where W_t = mean net worth (in constant dollars) at time t, ΔW_T is the change in mean wealth over period T from year t-1 to t, W_T is average wealth over period T, r_T = average real rate of return on wealth over period T, S_T = average household savings (in constant dollars) excluding capital gains and property income over period T,[7] and G_T = average net inheritances and gifts (in constant dollars) over period T. With regard to variable G_T, the SCF contains questions on (*inter-vivos)* gifts and inheritances received as well as gifts given to others and donations made to charitable organizations.

On the basis of equation (1), the change in wealth over a period can be decomposed into capital revaluation (existing wealth multiplied by the rate of return), savings, and net intergenerational transfers. The analysis is divided into six sub-periods: 1983-1989, 1989-2001, 2001-2007, 2007-2010, 2010-2016, and 2016-2019. The decomposition of mean wealth will also tell us the relative importance of capital gains and savings in explaining changes in wealth over time. The same decomposition can be used for the wealth of the top one percent and median wealth.[8] For the inequality analysis, I consider changes over time in the *ratio* of mean wealth of the top one percent to the median. I can then also determine what portion of the change in this difference is due to capital gains and what portion is due to savings.

There are several important methodological issues regarding the implementation of this model that should be addressed before the actual results are shown.

7.2.1 Methodological issues in decomposing wealth changes over time

Let us first consider changes in *aggregate* household wealth from time t to t+1. W_t is the total wealth held by households living in the U.S. at time t and W_{t+1} is the total wealth held by households living in the U.S. at time t+1. If this were a closed economy, then generally speaking the only sources of change, ΔW_t, would be from savings and capital appreciation. However,

[7] Though the standard SCF income measure includes realized capital gains as well as property income, these two components are excluded from S_T since they are already captured in the term $r_T W_T$.

[8] I use the rate of return of the middle three wealth quintiles as a proxy for the rate of return on median wealth.

there may be some "leakages" and additions for a few reasons. First, a household could make a charitable contribution, which would subtract from current household wealth. Second, someone could die in this time interval and pay estate taxes or leave a charitable bequest. Third, there may also be outflows if an American resident emigrates from the U.S. and takes wealth out of the U.S. over this interval. Fourth, there may be additions to the stock of household wealth if immigrants bring new wealth in. However, if these effects are small, then changes in aggregate wealth are due generally to only savings and capital gains on wealth.

It is true, of course, that the *identity* of the households will, in general, change over time. The two main sources are deaths and the formation of new households from marriage, children moving out of the home, and the like. However, given the stock of household wealth at time t (and ignoring international transfers and charitable giving), the only two sources of wealth change remain capital appreciation and savings.

With regard to changes in *mean household* wealth, the death of a person living alone will reduce the household count (the death of a married spouse, on the other hand, will not affect the count.) New households may also form over time. If a married couple gets divorced, the household count would increase by one. If two individuals living on their own get married, the household count would go down by one. If two individuals living with parents wed and move out, this will increase the household count by one. Likewise, a single leaving a parental home to form a new household will increase the household count by one. Emigration and immigration will also affect the household count.

The comparison becomes more complicated when we consider changes in wealth of particular sub-groups of the population. In this case, households in one group at time t may move to another group at time t+1. This problem is particularly germane to wealth classes. In the case of wealth classes, the same issues of attrition and new entrants may apply as in the case of all households for computing the overall mean. In addition, households may shift their wealth class over time. For example, the households in the top one percent say in 1983 may not be the same as those in the top one percent in 1989. There is a regression to the mean over time, and some households in the top one percent in 1983 may have slipped to the next 19 percent, say.

Let us call ΔW_{top1} the measured change in the mean wealth of the top one percent between time t- and t and ΔW^*_{top1} the actual change in the mean wealth of the households in the top one percent in year t if we followed exactly the *same households* over time. As noted above,

the SCF is a cross-sectional survey, not a panel survey, so that it is not possible to identify individual households in the two years. Then, $\Delta W^*_{top1} \leq \Delta W_{top1}$, since some of the original households in the top one percent in year t-1 may have slipped to a lower wealth class in year t. Indeed, $\Delta W^*_{top1} = \Delta W_{top1}$ only in the special case when the original top one percent households in year t-1 remain in the top one percent in year t. It is not possible to know *a priori* whether the slippage of a particular household in the top one percent in year t-1 into a lower wealth group in time t is due to a low rate of return on their wealth holdings or low savings. If it is from low savings and we call ROR_{top1} the change in the mean wealth of the top one percent emanating only from capital appreciation on initial wealth, then $ROR_{top1} / \Delta W_{top1}$ is a *lower bound* on ROR / ΔW^*_{top1}, and the contribution of the ROR effect to the change in mean wealth over the period will be biased *downward.* Since savings is imputed as a residual, the estimated savings for that wealth class will be biased *upward* over the period. If, on the other hand, the slippage occurs because the actual rate of return r^*_{top1} is lower than the estimated return r_{top1} (for example, due to mean-reversion on returns), it then becomes ambiguous which direction the bias is.

Conversely, if households move up into a higher wealth class over the period, then, $\Delta W^* \geq \Delta W$. This may be the case for the median household. On the other hand, households may also move to a lower wealth class, in which case $\Delta W^* \leq \Delta W$. In either case it is not possible to determine in which direction the ROR effect or the savings effect will be biased.

We can directly estimate ROR, the change in the mean wealth of a group emanating only from capital appreciation. The residual will include traditional savings but it will also include net wealth transfers and the effects of new households entering the wealth group over the period and existing households exiting the group.

7.2.2 Decomposition by Wealth Class

Table 8 shows the results of a decomposition of the change in mean net worth by wealth class. Considering first the time trend in mean net worth (Panel A), we find that the share of the change in mean net worth from the return on wealth alone (the "ROR effect") more than explains the growth in wealth for each of the six sub-periods. That is to say, if households had simply held onto their assets, their wealth would have grown faster than in actuality. The difference is reflected in the residual – presumably mostly dissavings. The only exception to this pattern is the crisis of 2007-2010, when the residual was positive. The results suggest that households may save only when they experience capital losses – presumably, to make up for their lost wealth.

At the median, capital appreciation accounts for more than the total increase in their wealth in all periods except 2007-2010 (Panel B). But in this case the residual (mainly savings) is negative in all six periods. Over 2007-2010, the high negative return on assets accounted for 61.0 percent of the (negative) change in wealth at the median and the residual the other 39.0 percent.

The pattern of results is somewhat different for the top one percent (Panel C). Their mean wealth rises in each of the first three periods and capital gains more than fully explains the change in their mean wealth and the residual is negative. In the fourth period, 2007-2010, the mean wealth of the top one percent shows an absolute decline, which is again more than fully explained by the ROR effect (in this case the residual is positive). In 2010-2016, their mean wealth again shows an absolute increase, and capital gains account for 93.5 percent of the growth and the residual for 6.5 percent. In the last period, 2016-2019, the average wealth of the top one percent falls by 1.9 percent. In this case, the ROR effect is positive and the residual is again negative. As argued above, the ROR effect is likely to be biased upward and thus, the savings effect biased downward.

As a measure of wealth inequality I use the ratio of the mean wealth of the top one percent to median wealth (Panel D). According to this measure, wealth inequality increased in each of the first five sub-periods but decreased in the last, 2016-2019 (row 1).[9] The second row shows what happens to the wealth ratio if capital appreciation alone is added to initial wealth. In the 1983-1989 period, the (slightly) higher return on wealth of the top percentile relative to the middle group would have raised the wealth ratio by 0.9. The wealth ratio rose, instead, by 15.1. Consequently, differences in rates of return between the two groups accounted for 5.7 percent (0.9/15.1) of the increase in the wealth ratio over these years, and the residual (presumably, the relatively smaller dissavings of the top group compared to the middle) accounted for the other 94.3 percent. In the next two periods and fifth, the change in the ratio is reduced by the ROR differential (that is, by the higher rate of return of the middle group relative to the top group). In 1989-2001, the ROR differential would have lowered the wealth ratio by 17.3, in 2001-2007 by 16.4, and in 2010-2016 by 29.7. Instead, the actual wealth ratio rose in each of these periods,

[9] Note that this trend is quite similar to that of the Gini coefficient for net worth except for 1989-2001, when the Gini coefficient shows a slight falling-off.

presumably due again to the smaller relative dissavings of the top group. In 2007-2010, the higher rate of return on wealth (that is, the less negative return) of the top relative to the middle would have caused the wealth ratio to rise by 26.2. The ratio actually rose by 91.5, so that the difference in rates of return accounted for 28.7 percent of its rise and the difference in the residual for the other 71.3 percent. In 2016-2019, the wealth ratio fell by 64.3. Of this, the ROR differential explained 18.2 percent and the difference in the residual for the other 81.8 percent.

7.2.3 Confronting Piketty's r>g proposition

This part of the paper will confront Piketty's (2014) now famous "law" that wealth inequality rises if r>g – namely, if the rate of return on capital, r, is greater than the rate of real output growth, g – and conversely. In fact, I will show that the Piketty condition is not generally met, at least in the case of the U.S. over years 1983 to 2013.

This finding is evident from Table 9. For Piketty's "r" I use my own computation of the average annual rate of return on the household portfolio from Table 7. For "g" I use the average annual growth of real GDP derived from the National Income and Product Accounts. A couple of anomalies stand out. First, from 1983 to 1989, r equaled 3.32 percent and g was 4.29 percent, so that the Piketty law would imply a decline in wealth inequality. In fact, the Gini coefficient rose rather sharply (by 0.029 points). Second, over the 2007-2010 period, r was -7.28 percent and g was -0.20 percent, so that again the Piketty law would indicate a drop in wealth inequality. In contrast, the Gini coefficient again showed a vigorous increase of 0.032 points. Indeed, the overall correlation coefficient between the difference r – g and the change in the Gini coefficient is actually strongly negative, -0.81. Though these results are hardly definitive since they are based on only five data points and my interpretation of "r" and "g", they do cast some doubt on the reliability of Piketty's law.[10]

A better rule of thumb is afforded by looking at the relation between r_t, the rate of return on the portfolio of the top one percent of wealth holders and r_m, the rate of return on the portfolio of the middle three wealth quintiles. Instead, it appears to be the case that wealth inequality rises if the rate of return on wealth is greater for the top one percent than for the middle class. As we saw in Chapter 3, there were striking differences in rates of return on net worth between these groups. For example, from 2001 to 2007 when inequality remained relatively stable, the annual

[10] In fairness to Piketty it should be noted that for Piketty r is the net return to production and financial capital while g is the world output growth rate.

real rate of return on net worth for the middle three wealth quintiles was 5.6 percent whereas it was only 3.9 percent for the top percentile. In contrast, from 2007 to 2010, when the Gini coefficient for wealth shot up by 0.032, the rate of return for the former was -10.6 percent but "only" -6.5 percent for the latter. In fact, the simple correlation between the difference r_t, - r_m and the change in the Gini coefficient is now positive and quite strong, 0.74. Wealth inequality thus tends to decline or remain stable when the return on wealth for the middle class is greater than that of the very rich and, conversely, increase when the opposite is the case.

8. Summary and concluding remarks

In terms of median wealth, year 2007, on the eve of the Great Recession, stands out as a truly high water mark. Median household net worth in constant dollars showed robust growth from 1962 to 2001, gaining 83.3 percent or 1.55 percent per year. Over the 2001-2007 period the median increased by 19.0 percent or 2.90 percent per year, even faster than in the preceding decades. Then the Great Recession hit and like a tsunami wiped out 40 years of wealth gains. From 2007 to 2010, house prices fell by 24 percent in real terms, stock prices by 26 percent, and median wealth by a staggering 43.9 percent. By 2010 median wealth was at about the same level as 1969. The share of households with zero or negative net worth rose sharply from 18.6 to 21.8 percent. However, from 2010 through 2019, asset prices recovered, as did median wealth. Indeed, from 2016 to 2019 house prices were up by 7.1 percent and stock prices by 30.2 percent in real terms, and, as a result, median wealth advanced by a robust 21.2 percent and the proportion of households with non-positive net worth was down by 1.6 percentage points. Nonetheless, median wealth was still 20.4 percent below its 2007 peak.

However, on the good news side, mean wealth more than fully recovered by 2016 and was up by 9.2 percent in 2019 from its 2007 level, while mean and median income also fully recovered and were up by 10.7 and 17.4 percent, respectively, in 2019 from their 2007 level. The results indicate that wealth grew more vigorously at the top of the wealth distribution than in the middle.

According to the Gini coefficient and top wealth shares, wealth inequality rose sharply from 1983 to 1989 (the Gini coefficient was up by 0.029), remained relatively stable from 1989 to 2007, then showed a steep increase over years 2007 to 2010 (the Gini was up 0.032), and a more modest rise from 2010 to 2016. By 2016 the Gini coefficient for net worth and the share of

the top one percent were at their highest level over the 57 years, at 0.877 and 39.6 percent, respectively. However, from 2016 to 2019there was actually a remission of wealth inequality, albeit small,. The share of the top one percent was down by 1.4 percentage points, that of the top 20 percent down by 1.0 percentage points, the Gini coefficient down by 0.008, and the mean wealth of the top one percent also down by 1.9 percent. Still, between1983 and 2019, the top one percent received 41.6 percent of the total growth in net worth, while the top 20 got 94.9 percent.

Relative debt accelerated upward after 1983. Among all households, the debt to income ratio peaked at 127.0 percent in 2010 and the debt to net worth ratio at 20.6 percent, while among the middle three wealth quantiles, the former peaked at 156.7 percent in 2007 and the latter at 69.2 percent in 2010. Since then, these two indicators have broadly retreated. The debt-income ratio fell to 104.0 percent in 2019 among all households and the debt-net worth ratio to 14.9 percent, while the former receded to 122.0 percent and the latter to 57.5 percent among the middle class. These last two trends occurred despite the fact the mean debt of the middle class rose by 10.7 percent in real terms between 2016 and 2019 and reflected rising income and wealth.

The overall homeownership rate rose from 63.4 percent in 1983 to a peak value of 69.1 percent in 2004 but the fell off by 5.4 percentage points to 63.7 percent in 2016. However, it finally rebounded a bit, by 1.2 percentage points, to 64.9 percent in 2019. The overall stock ownership rate (either directly or indirectly through mutual funds, trust funds, or pension plans), after rising briskly from 31.7 percent in 1989 to a peak of 51.9 percent in 2001, fell off to 46.1 percent in 2013. However, it rebounded to 49.6 percent in 2019, though still down from its 2001 peak. The proportion of total stocks owned by the richest 10 percent of wealth holders, after trending downward from 89.7 percent in 1989 to 76.9 percent in 2001, reversed course and reached 85.0 percent in 2019.

The final part of this paper also confronts Piketty's (2014) "law" that wealth inequality rises if the rate of return on capital, r, is greater than the rate of real output growth, g – and conversely. I use my computation of the average annual rate of return on household wealth for r and the average annual growth of real GDP for g. In the case of the U.S. over years 1983 to 2013, the correlation coefficient between the difference r – g and the change in the Gini coefficient over five periods is actually negative and quite high, -0.81. These results cast some doubt on the reliability of Piketty's law. In contrast the simple correlation between the difference

in the annual rate of return on the wealth of top one percent and that of the middle three wealth quintiles (r_t, - r_m) and the change in the Gini coefficient is positive and quite strong, 0.74. This result suggests a better rule of thumb that wealth inequality tends to decline or remain stable when the return on wealth for the middle class is greater than that of the very rich and, conversely, increase when the opposite is the case.

[Appendix Table 1 about here]

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Table 1: Mean and Median Wealth and Income, Selected Years, 1983-2019
(In thousands, 2019 dollars)

Variable	1983	1989	2001	2007	2010	2016	2019
A. Net Worth							
1. Median	81.7	88.8	106.4	126.7	71.0	83.2	100.8
2. Mean	318.0	369.9	550.3	662.6	556.2	711.3	723.8
B. Income (CPS)[b]							
1. Median	51.1	57.7	61.1	62.1	57.9	62.9	68.7
2. Mean	62.2	72.9	84.3	83.6	79.2	88.6	98.1

	Annual Growth Rates (percent)					Percentage Change		
	1983-1989	1989-2007	2007-2010	2010-2016	2016-2019	2007-2010	2010-2016	2016-2019
A. Net Worth								
1. Median	1.39	1.98	(19.28)	2.63	6.40	(43.9)	17.1	21.2
2. Mean	2.52	3.24	(5.84)	4.10	0.58	(16.1)	27.9	1.8
B. Income (CPS)[b]								
1. Median	2.02	0.41	(2.33)	1.38	2.94	(6.7)	8.6	9.2
2. Mean	2.65	0.76	(1.79)	1.87	3.40	(5.2)	11.9	10.7

Source: author's computations from the 1983, 1989, 2001, 2007, 2010, 2016, and 2019 SCF.
Wealth figures are deflated by the CPI-U-RS.
a. Source: U.S. Census of the Bureau, Current Populations Surveys, Table h05, at:
https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html

Table 2. The Size Distribution of Wealth and Income, 1983-2019

		Percentage Share of Wealth or Income held by:									
Year	Gini Coeff.	Top 1.0%	Next 4.0%	Next 5.0%	Next 10.0%	Top 20.0%	4th 20.0%	3rd 20.0%	2nd 20.0%	Bottom 20.0%	All
A. Net Worth											
1983	0.799	33.8	22.3	12.1	13.1	81.3	12.6	5.2	1.2	-0.3	100.0
1989	0.828	35.2	22.8	11.9	13.2	83.0	12.0	4.7	0.9	-0.7	100.0
2001	0.826	33.4	25.8	12.3	12.9	84.4	11.3	3.9	0.7	-0.4	100.0
2007	0.834	34.6	27.3	11.2	12.0	85.0	10.9	4.0	0.7	-0.5	100.0
2010	0.866	35.1	27.4	13.8	12.3	88.6	9.5	2.7	0.3	-1.2	100.0
2016	0.877	39.6	27.1	12.1	11.1	89.9	8.2	2.4	0.3	-0.8	100.0
2019	0.869	38.2	28.2	11.6	10.8	88.9	8.6	2.9	0.4	-0.8	100.0
B. Income											
1982	0.480	12.8	13.3	10.3	15.5	51.9	21.6	14.2	8.7	3.7	100.0
1988	0.521	16.6	13.3	10.4	15.2	55.6	20.6	13.2	7.8	2.9	100.0
2000	0.562	20.0	15.2	10.0	13.5	58.6	19.0	12.3	7.4	2.6	100.0
2006	0.574	21.3	15.9	9.9	14.3	61.4	17.8	11.1	6.8	2.8	100.0
2009	0.549	17.2	16.5	10.7	14.7	59.1	18.7	14.9	4.3	3.0	100.0
2015	0.598	23.5	16.2	10.2	14.1	64.0	16.8	10.2	6.3	2.7	100.0
2018	0.571	19.0	16.9	10.6	14.6	61.0	18.3	11.0	6.9	2.7	100.0

Source: author's computations from the 1983-2019 SCF.
Income data are from these files.

Table 3. Composition of Total Household Wealth, 1983 - 2019

(Percent of gross assets)

Wealth component	1983	1989	2001	2007	2010	2016	2019
Principal residence	30.1	30.2	28.2	32.8	30.7	25.1	26.9
Other real estate[a]	14.9	14.0	9.8	11.3	11.6	10.4	9.4
Unincorporated business equity[b]	18.8	17.2	17.2	20.1	17.7	20.1	20.0
Liquid assets[c]	17.4	17.5	8.8	6.6	7.7	6.7	6.8
Pension accounts[d]	1.5	2.9	12.3	12.1	15.1	15.6	15.5
Financial securities[e]	4.2	3.4	2.3	1.5	1.8	1.3	0.9
Corporate stock & mutual funds	9.0	6.9	14.8	11.8	11.2	16.1	15.5
Net equity in personal trusts	2.6	3.1	4.8	2.3	2.4	3.4	3.6
Miscellaneous assets[f]	1.3	4.9	1.8	1.7	1.7	1.3	1.4
Total	100.0	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	9.1
All other debt[g]	6.8	6.4	3.1	3.9	4.4	3.9	3.8
Total debt	13.1	15.0	12.5	15.3	17.1	12.5	12.9
Selected ratios in percent:							
Debt / net worth ratio	15.1	17.6	14.3	18.1	20.6	14.3	14.9
Debt / income ratio	68.4	87.6	81.1	118.7	127.0	95.1	104.0
Net home equity / total assets[h]	23.8	21.6	18.8	21.4	18.1	16.5	17.7
Principal residence debt as ratio to house value	20.9	28.6	33.4	34.9	41.2	34.4	34.0
Stocks, directly or indirectly owned as a ratio to total assets[i]	11.3	10.2	24.5	16.8	17.5	22.4	22.6

Source: author's computations from the 1983-2019 SCF.

a. In 2001, 2004, and 2007, this equals the gross value of other residential real estate plus the *net equity* in non-residential real estate.

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

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

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

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

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

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

h. Ratio of gross value of principal residence less mortgage debt on principal residence to total assets.

i. 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. Composition of Household Wealth by Wealth Class, 2019

(Percent of gross assets)

Asset	All Households	Top One Percent	Next 19 Percent	Middle 3 Quintiles
Principal residence	26.9	8.9	25.9	64.3
Liquid assets (bank deposits, money market funds, and cash surrender value of life insurance)	6.8	5.0	7.5	8.3
Pension accounts	15.5	6.0	22.6	14.8
Corporate stock, financial securities, mutual funds, and personal trusts	20.0	30.8	18.5	3.2
Unincorporated business equity other real estate	29.4	47.5	24.4	8.1
Miscellaneous assets	1.4	1.9	1.0	1.4
Total assets	100.0	100.0	100.0	100.0
Memo (selected ratios in percent):				
Debt / net worth ratio	14.9	2.4	10.3	57.5
Debt / income ratio	104.0	45.3	95.9	122.0
Net home equity / total assets[a]	17.7	7.5	18.9	35.7
Principal residence debt / house value	34.0	15.3	27.0	44.5
All stocks / total assets[b]	22.6	25.8	25.4	8.6
Ownership Rates (Percent)				
Principal residence	64.9	97.1	94.5	70.5
Other real estate	17.2	74.8	43.9	12.6
Pension assets	50.5	88.5	84.0	47.4
Unincorporated business	12.0	70.2	29.0	9.0
Corporate stock, financial securities, mutual funds, and personal trusts	23.7	89.2	60.7	16.8
Stocks, directly or indirectly owned[b]	49.6	95.6	87.0	45.9
(1) $5,000 or more	39.4	95.6	85.0	34.6
(2) $10,000 or more	35.0	95.2	83.4	28.7

Source: author's computations from the 2019 SCF. Households are classified into wealth class according to their net worth. Brackets for 2019 are:

Top one percent: Net worth of $11,115,200 or more.
Next 19 percent: Net worth between $527,400 and $11,115,200.
Quintiles 2 through 4: Net worth between $20 and $471,600.

Also, see Notes to Table 3.
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 5. Composition of Household Wealth of the Middle Three Wealth Quintiles, 1983-2019
(Percent of gross assets)

Asset	1983	1989	2001	2004	2007	2010	2016	2019
Principal residence	61.6	61.7	59.2	66.1	65.1	64.8	61.9	64.3
Liquid assets (bank deposits, money market funds, and cash surrender value of life insurance)	21.4	18.6	12.1	8.5	7.8	8.0	8.5	8.3
Pension accounts	1.2	3.8	12.7	12.0	12.9	13.9	16.6	14.8
Corporate stock, financial securities, mutual funds, and personal trusts	3.1	3.5	6.2	4.2	3.6	3.1	3.9	3.2
Unincorporated business equity other real estate	11.4	9.4	8.5	7.9	9.3	8.9	7.9	8.1
Miscellaneous assets	1.3	2.9	1.2	1.4	1.3	1.3	1.2	1.4
Total assets	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memo (selected ratios in percent):								
Debt / net worth ratio	37.4	41.7	46.4	61.6	61.1	69.2	58.9	57.5
Debt / income ratio	66.9	83.0	100.3	141.2	156.7	134.3	120.4	122.0
Net home equity / total assets[a]	43.8	39.2	33.8	34.7	34.8	31.4	33.3	35.7
Principal residence debt / house value	28.8	36.5	42.9	47.6	46.6	51.5	46.1	44.5
All stocks / total assets[b]	2.4	3.3	12.6	7.5	7.0	8.1	9.7	8.6
Ownership Rates (Percent)								
Principal residence	71.6	71.5	75.9	78.2	76.9	68.0	67.0	70.5
Other real estate	15.4	15.5	13.2	13.6	14.7	12.4	11.7	12.6
Pension assets	12.2	27.3	52.9	51.4	53.4	45.8	48.9	47.4
Unincorporated business	8.5	8.4	7.9	8.1	8.8	8.2	7.8	9.0
Corporate stock, financial securities, mutual funds, and personal trusts	21.6	24.2	27.5	27.1	23.1	15.3	15.3	16.8
All stocks[b]	16.5	29.4	51.1	49.7	47.8	41.4	45.0	45.9
Mean Debt (thousands, 2019$)[c]								
Debt on principal residence	24.6	36.3	54.6	78.5	83.7	64.3	57.4	64.6
All other debt	13.1	11.1	13.5	16.6	21.1	14.4	17.1	17.8
Total debt	37.7	47.5	68.1	95.1	104.8	78.7	74.5	82.4

Source: author's computations from the SCF.
Households are classified into wealth class according to their net worth. Also, see Notes to Table 4 and 5.
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
c. CPI-U-RS adjusted.

Table 6. The Evolution of Household Debt, 2007-2019

(Mean values, in thousands, 2019 dollars)

						Percentage Change		
	2007	2010	2013	2016	2019	2007-2010	2010-2019	2007-2019
A. All Households								
1. Mortgage Debt[a]	89.5	85.1	73.9	70.3	76.0	-5.0	-10.7	-15.2
2. All Other Debt	30.4	29.6	26.3	31.5	31.6	-2.6	6.7	3.9
a. Educational Loans	4.0	5.8	6.4	8.1	8.7	43.5	49.6	114.7
b. Non-Educational Debt	26.4	23.9	19.9	23.3	23.0	-9.6	-3.7	-13.0
3. Total Debt	120.0	114.7	100.2	101.8	107.6	-4.4	-6.2	-10.3
B. Middle Three Wealth Quintiles								
1. Mortgage Debt[a]	83.7	64.3	57.6	57.4	64.6	-23.1	0.5	-22.8
2. All Other Debt	21.1	14.4	14.6	17.1	17.8	-31.6	23.4	-15.6
a. Educational Loans	3.0	3.0	3.3	4.5	4.9	-0.6	66.4	65.3
b. Non-Educational Debt	18.1	11.5	11.3	12.6	12.9	-36.7	12.3	-28.9
3. Total Debt	104.8	78.7	72.2	74.5	82.4	-24.9	4.7	-21.3

Source: author's computations from the 2007, 2010, 2013, 2016, and 2019 SCF.
Figures are adjusted by the CPI-U-RS.
a. Principal residence debt only.

Table 7. Average Annual Real Rates of Return by Period and Wealth Class, 1983 - 2019
(percentage)

	1983-1989	1989-2001	2001-2007	2007-2010	2010-2016	2016-2019	1983-2019
A. Gross Assets							
1. All Households	**2.58**	**3.36**	**3.10**	**-5.99**	**5.06**	**3.77**	**2.72**
2. Top 1 Percent	**3.32**	**3.71**	**3.75**	**-5.75**	**5.68**	**4.22**	**3.23**
3. Next 19 Percent	**2.58**	**3.47**	**2.88**	**-5.69**	**4.99**	**3.81**	**2.74**
4. Middle 3 Quintiles	**1.60**	**2.64**	**2.71**	**-6.97**	**4.13**	**2.73**	**1.93**
B. Net Worth							
1. All Households	**3.57**	**4.33**	**4.03**	**-6.82**	**6.23**	**4.63**	**3.56**
2. Top 1 Percent	**3.71**	**3.96**	**3.91**	**-5.88**	**5.90**	**4.38**	**3.45**
3. Next 19 Percent	**3.25**	**4.09**	**3.46**	**-6.20**	**5.77**	**4.42**	**3.29**
4. Middle 3 Quintiles	**3.60**	**5.00**	**5.58**	**-10.39**	**7.83**	**5.55**	**4.09**
Memo: difference between top 1% and middle quintiles	**-0.11**	**1.04**	**1.66**	**-4.51**	**1.93**	**1.18**	**0.65**

Source: author's computations from the SCF.
Rates of return by asset type are provided in Appendix 1.
Households are classified into wealth class according to their net worth.
Calculations are based on household portfolios averaged over the period for each group.
Miscellaneous assets are excluded from the calculation.

Table 8. Decomposition of Trends in Wealth Levels

(Wealth levels in thousands, 2019 dollars)

	1983-1989	1989-2001	2001-2007	2007-2010	2010-2016	2016-2019
A. Mean Net Worth						
1. Actual change in mean net worth	51.9	180.4	112.3	-106.4	155.1	12.5
2. Change in mean net worth from return on wealth alone ($r_t w_{t-1}$)	75.9	251.9	150.7	-122.5	252.2	106.0
3. Percentage decomposition						
a. From return on wealth alone	146.4	139.6	134.1	115.2	162.6	845.0
b. Residual	-46.4	-39.6	-34.1	-15.2	-62.6	-745.0
B. Median Net Worth						
1. Actual change in median net worth	7.1	17.7	20.3	-55.6	12.2	17.6
2. Change in median net worth from return on wealth alone ($r_t w_{t-1}$)	19.7	73.0	42.3	-33.9	42.6	15.1
3. Percentage decomposition						
a. From return on wealth alone	278.2	413.8	208.9	61.0	350.2	85.6
b. Residual	-178.2	-313.8	-108.9	39.0	-250.2	14.4
C. Mean Wealth of the Top One Percent						
1. Actual change in mean wealth of the top 1%	2272.7	5380.4	4516.5	-3559.9	8783.8	-524.1
2. Change in mean wealth of the top 1% from return on wealth alone ($r_t w_{t-1}$)	2674.5	7911.8	4866.9	-3703.8	8212.8	3947.4
3. Percentage decomposition						
a. From return on wealth alone	117.7	147.0	107.8	104.0	93.5	-753.2
b. Residual	-17.7	-47.0	-7.8	-4.0	6.5	853.2
D. Ratio of the Mean Wealth of the Top One Percent to Median Wealth						
1. Change in the actual ratio	15.1	26.3	8.0	91.5	65.8	-64.3
2. Change in the ratio from return on wealth alone ($r_t w_{t-1}$)	0.9	-17.3	-16.4	26.2	-29.7	-11.7
3. Percentage decomposition						
a. From return on wealth alone	5.7	-65.7	-204.4	28.7	-45.2	18.2
b. Residual	94.3	165.7	304.4	71.3	145.2	81.8

Source: author's computations from the SCF.
Households are classified into wealth class according to their net worth.
Wealth figures are deflated using the Consumer Price Index CPI-U-RS.
Rates of return by wealth group are provided in Table 6. The rate of return for the middle three wealth quintiles is used in the decomposition for median wealth.

Table 9. Confronting Piketty's Law

(percentage)

	Change in	Average Annual Rate of Return[a]			Piketty Variables		
Period	Gini Coeff.	Top 1% (r_t)	Middle (r_m)	Diff.	r^a	g^b	Diff.
1983-1989	0.029	3.45	3.35	0.10	3.32	4.29	-0.97
1989-2001	-0.001	4.19	4.67	-0.48	4.35	3.06	1.29
2001-2007	0.008	3.92	5.58	-1.67	4.04	2.66	1.38
2007-2010	0.032	-6.52	-10.55	4.04	-7.28	-0.20	-7.08
2010-2013	0.005	6.16	6.94	-0.79	6.20	2.03	4.17
Correl. with Change in Gini Coeff.				0.74			-0.81

a. Source: Table 7.

b. Source NIPA Table 1.1.3 Real Gross Domestic Product, Quantity Indexes, available at: http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=1&isuri=1

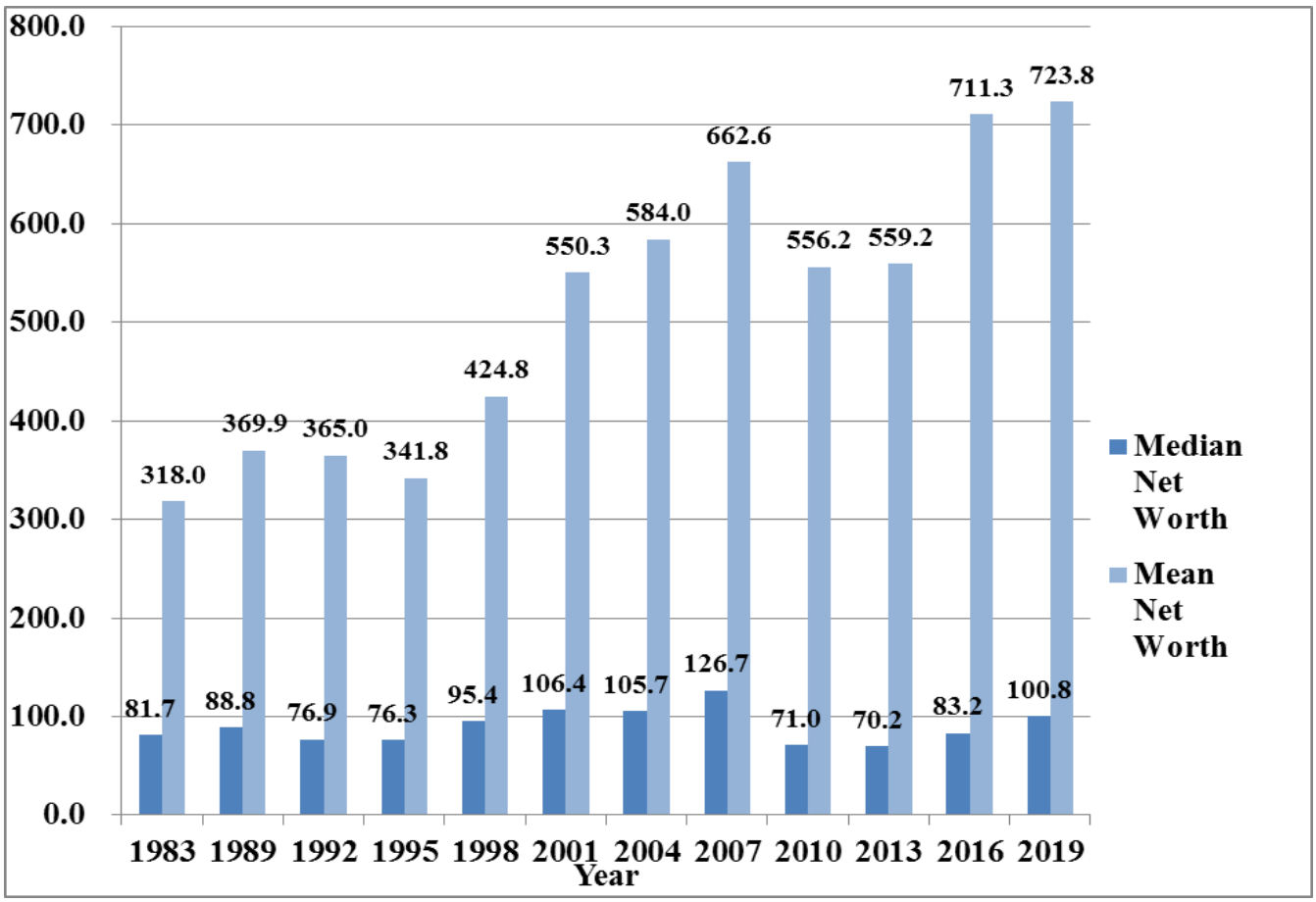


Figure 1. Mean and Median Net Worth, 1983-2019 (in thousands, 2019 dollars)

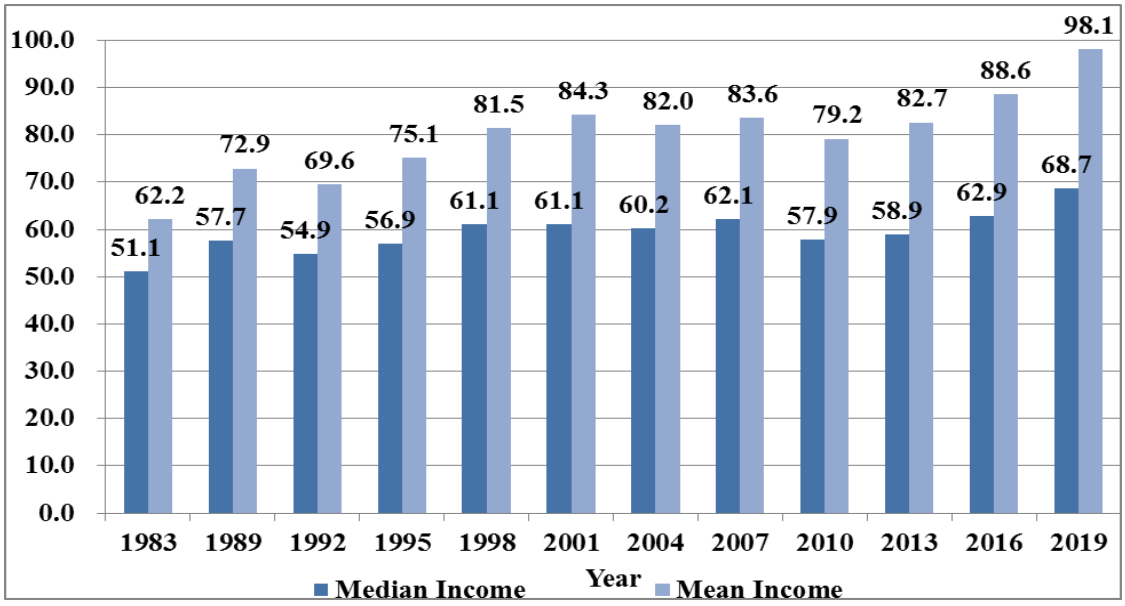


Figure 2. Mean and Median Household Income, 1983-2019 (in thousands, 2019 dollars)

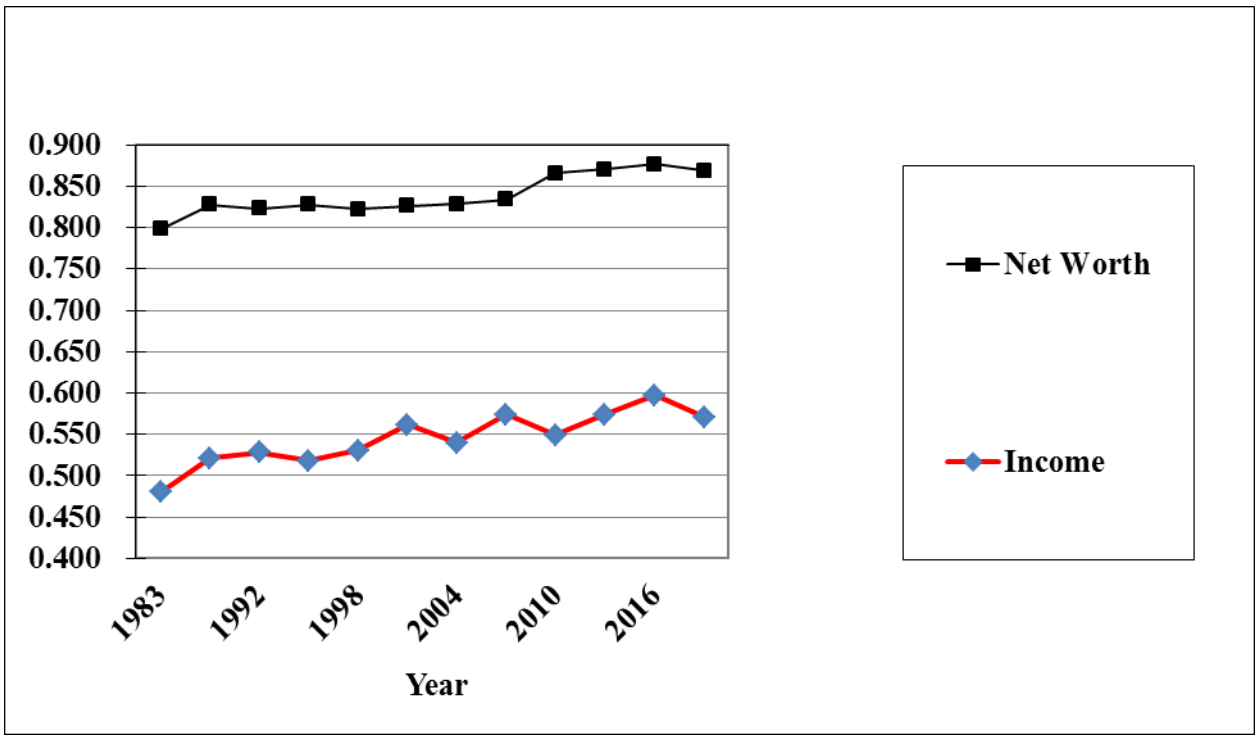


Figure 3. Wealth and Income Inequality, 1983-2019 (Gini coefficients)

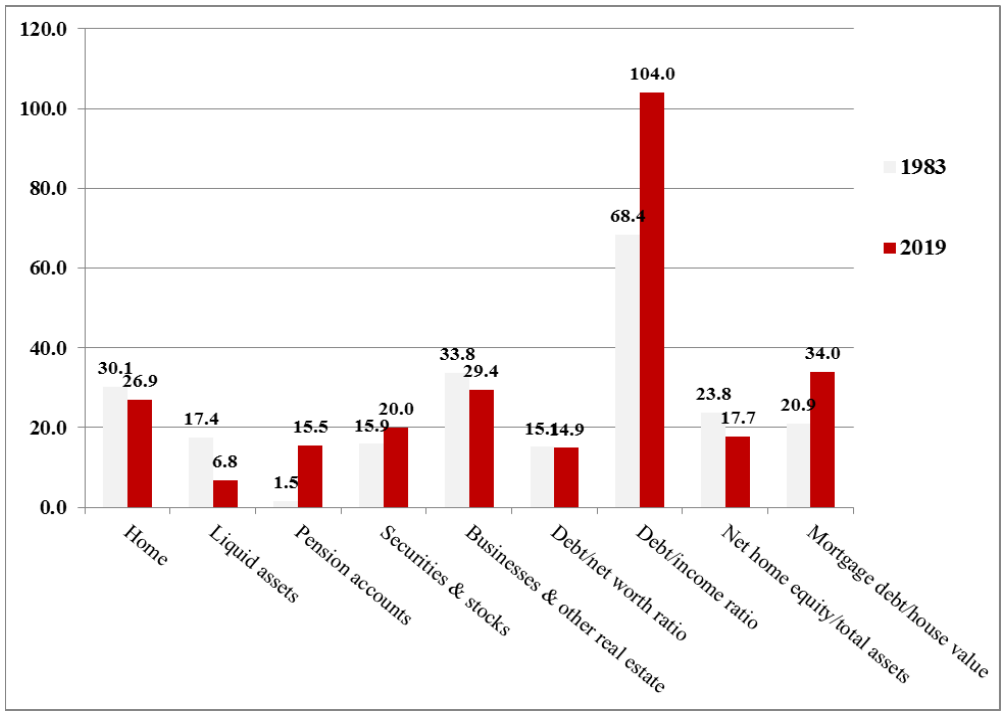


Figure 4. Composition of Household Wealth, 1983 and 2019 (percent of gross assets)

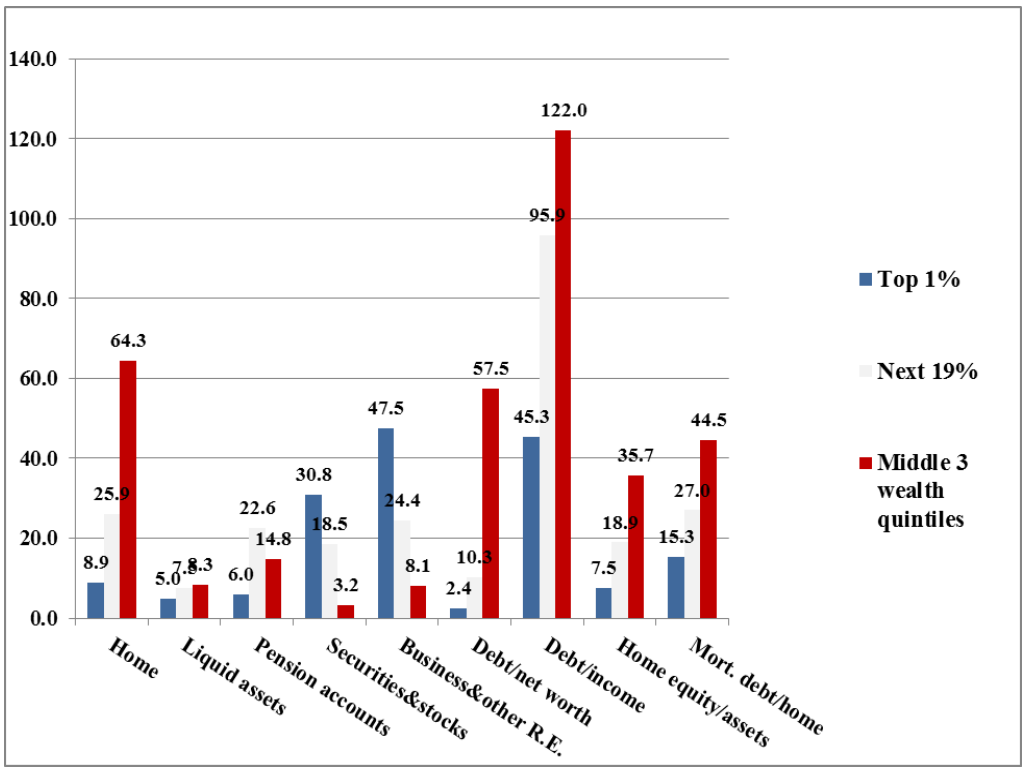


Figure 5. Composition of Household Wealth by Wealth Class, 2019 (percent of gross assets)

Appendix Table 1. Average Annual Nominal Rates of Return
By Asset Type and Period, 1983-2019
[1/9/21 version]

	Average nominal rates of return by period (percentage)					
Description	**1983-1989**	**1989-2001**	**2001-2007**	**2007-2010**	**2010-2016**	**2016-2019**
Residential real estate	**4.02**	**4.66**	**5.84**	**-7.22**	**5.72**	**4.49**
Business + non-home real estate	**3.94**	**4.10**	**9.75**	**-5.83**	**6.76**	**5.19**
Liquid assets	**6.70**	**4.69**	**3.11**	**1.28**	**0.48**	**0.56**
Financial assets (including stocks)	**13.32**	**11.17**	**2.34**	**-1.33**	**10.10**	**9.34**
Pension accounts	**11.19**	**9.68**	**2.99**	**-0.20**	**7.40**	**7.45**
Mortgage debt	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Non-mortgage debt	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Inflation (CPI-U-RS average)	**3.46**	**2.72**	**2.67**	**1.71**	**1.65**	**2.13**

Notes:

Real Rate of Return = (1 + nominal rate) / (1 + ΔCPI) -1

Residential Real Estate: The source for years 1989 to 2007 is Table 935 of the *2009 Statistical Abstract*, US Bureau of the Census, available at [http://www.census.gov/compendia/statab/].For years after 2007, the source is: National Association of Realtors, "Median Sales Price of Existing Single-Family Homes for Metropolitan Areas," at https://www.nar.realtor/sites/default/files/documents/metro-home-prices-q2-2020-ranked-median-single-family-2020-08-12.pdf

The figures are based on median prices of existing houses for metropolitan areas only.

Businesses and Commercial Real Estate: Holding gains (taken from the Financial Accounts of the United States (FA), Table R.100, divided by equity in noncorporate business (taken from the FA, Table B.100), available at: https://www.federalreserve.gov/releases/z1/20200921/z1.pdf

Liquid assets: Before 2010, the weighted average of the rates of return on checking deposits and cash, time and saving deposits, and life insurance reserves. The weights are the proportion of these assets in their combined total (calculated from the FA, Table B.100). The assumptions regarding the rates of return are: zero for checking deposits, the rate of return on a 1-month CD (taken from the table "H.15 Selected Interest Rates" published by the Federal Reserve and available at: http://www.federalreserve.gov/releases/h15/data.htm) for time and saving deposits and CDs, and, one plus the inflation rate for life insurance reserves.

2010 and after: Weights are based on the SCF. Source for interest rate data is the FDIC: https://www.fdic.gov/regulations/resources/rates/previous.html

Financial assets: The weighted average of the rates of return on open market paper, Treasury securities, municipal securities, corporate and foreign bonds, corporate equities, and mutual fund

shares. The weights are the proportion of these assets in total financial assets held by the household sector (calculated from the FA, Table B.100). The assumption regarding the rate of return on open market paper is that it equals the rate of return on 1-month Finance paper (taken from the table H.15 "Selected Interest Rates" published by the Federal Reserve and available at: http://www.federalreserve.gov/releases/h15/data.htm). The data for the rates of return on other assets are taken from the *Economic Report of the President 2020*, Table B-25, available at https://www.whitehouse.gov/wp-content/uploads/2020/02/2020-Economic-Report-of-the-President-WHCEA.pdf The assumptions regarding Treasury securities, municipal securities, corporate and foreign bonds, and corporate equities are, respectively, average of Treasury security yields, high-grade municipal bond yield, average of corporate bond yields, and annual percent change in the S&P 500 index. Mutual fund shares are assumed to earn a rate of return equal to the weighted average of the rates of return on open market paper, Treasury securities, municipal securities, corporate and foreign bonds, and corporate equities. The weights are the proportions of these assets in the total financial assets of mutual funds (calculated from the FA, Table L.123).

Stock prices: Table B-96 of the *Economic Report of the President, 2013*, available at available at http://www.gpoaccess.gov/eop/tables13.html, with updates to 2016 from: http://www.fedprimerate.com/s-and-p-500-history.htm

Pension (DC) Accounts: Weighted average of returns on stocks, bonds, and money market funds, where the weights are based on the average portfolio composition of DC accounts over the period (for the 1983-89 period period, the weights are based on 1989 data only).

CPI-U-RS: from www.bls.gov/cpi/research-series/home.htm