Top Wealth in the United States: New Estimates and Implications for Taxing the Rich*

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Abstract

This paper uses administrative tax data to estimate top wealth in the United States. We build on the capitalization approach in Saez and Zucman (2016) while accounting for heterogeneity within asset classes when mapping income flows to wealth. Our approach reduces bias in wealth estimates because wealth and rates of return are correlated. Overall, wealth is very concentrated: the top 1% holds as much wealth as the bottom 90%. However, the "P90-99" class holds more wealth than either group after accounting for heterogeneity. Relative to a top 0.1% wealth share of more than 20% under equal returns, we estimate a top 0.1% wealth share of [15%] and find that the rise since 1980 in top wealth shares falls by [half]. Top portfolios depend less on fixed income and public equity, depend more on private equity and housing, and more closely match the composition reported in the SCF and estate tax returns. Our adjustments reduce mechanical revenue estimates from a wealth tax and top capital income shares in distributional national accounts, which depend on well-measured estimates of top wealth. Though the capitalization approach has advantages over other methods of estimating top wealth, we emphasize that considerable uncertainty remains inherent to the approach by showing the sensitivity of estimates to different assumptions.

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1 Introduction

How rich are the richest Americans? A thorough answer to this question is necessary to address public concern over rising inequality, whether the distribution of resources is fair, and how policy ought to respond. Evaluating tax policies that target capital accumulation at the top depends upon the quality of top wealth estimates. Measuring the concentration of wealth also matters for economic analysis of growth, savings, and capital accumulation.

Despite the importance of having high quality top wealth estimates, there remains considerable disagreement about the level, composition, and evolution of top wealth in the United States. The literature, surveyed by Kopczuk (2015), uses three main approaches for estimating top wealth and each approach appears to deliver qualitatively different answers. The first approach, going back to Mallet (1908) and most recently used by Kopczuk and Saez (2004), combines estate tax data and mortality statistics to estimate top wealth. However, tax avoidance and evasion as well as mortality differences along the wealth distribution likely induce measurement error and may bias estimates downward. The second approach is to use surveys such as the Federal Reserve's Survey of Consumer Finances (SCF), which oversamples high income people and collects detailed information on income and wealth. Yet the voluntary nature of responding, the preference for privacy among the wealthy, and the unwillingness to answer long surveys make the SCF subject to uncertainty, especially at the very top. The SCF also intentionally excludes the "Forbes 400 Richest Americans" from its sample.[1] The third approach, going back to Giffen (1913) and Stewart (1939) and most recently used by Saez and Zucman (2016), scales up or "capitalizes" income observed on tax returns to estimate top wealth. However, this approach relies upon having an accurate mapping of income to wealth, or equivalently knowing the rates of return earned on different types of income by different groups of people. In addition, the current state-of-the-art deploys the simplifying assumption of equal returns within asset class to map income flows to wealth estimates.

The most recent estimates from these approaches tell starkly different stories about the level and evolution of top 0.1% wealth (Figure 1). The estate tax series suggests the share of wealth held by the top 0.1% in 2014 was 10% and has changed little since 1975 but was twice as high in the era before the Great Depression. The capitalization approach, in contrast, shows a dramatic U-shape in wealth concentration: top 0.1% wealth matched the estate tax series in the early years, then diverged and surged spectacularly since 1980 to above 20% in 2014. The survey data from the SCF, available every three years since 1989, has hovered

[1] See Bricker, Henriques, Krimmel and Sabelhaus (2016) for a detailed discussion of the SCF and how it compares to capitalized wealth estimates.

between the estate and capitalization series and shows only modest growth. This pattern holds even when adding the Forbes 400 to the SCF sample. The composition of top 0.1% wealth, moreover, differs greatly across these series: fixed income assets account for 40% in the capitalization series and less than 20% in the SCF; private business wealth accounts for 14% in the capitalization series and approximately 50% in the SCF.

This paper builds on the pioneering work of Saez and Zucman (2016) and provides new estimates of top wealth that account for heterogeneity when capitalizing income flows. Accounting for heterogeneity reduces estimated wealth concentration, especially at the very top. Figure 1 shows how our preferred adjustments alter estimated wealth for the top 0.1%, holding fixed wealth ranks relative to the equal-return capitalization series. The top 0.1% wealth share is [15.1%] when accounting for return heterogeneity, and more than 20% when assuming equal returns. Top 1% and 0.01% shares fall by [20 percent] and [33 percent], respectively. The growth in top wealth shares is also less dramatic. Accounting for heterogeneity reduces the growth in top shares since 1980 by [half], leaving the recent wealth estimates above the estate tax series and closer to the SCF.[2] Overall, wealth concentration when accounting for heterogeneity is still very high: the top 1% holds as much wealth as the bottom 90%. However, the "P90-99" class holds more wealth than either group after accounting for heterogeneity.

Our approach also alters the composition of top wealth. We find a larger role for private business wealth and a smaller role for fixed income wealth, consistent with the composition of top wealth in the SCF and estate tax data. Less than half of top wealth takes the form of liquid securities with clear market values. This fact underscores the importance of precise compositional estimates for evaluating and administering top capital tax policies.

We account for four main types of heterogeneity. To motivate the importance of accounting for heterogeneity, we present novel evidence supporting the alternative assumptions we use. We draw evidence from a variety of sources, including the SCF, estate tax returns linked to income tax returns, the population of information returns for capital gains and interest income, data from tax assessor files and the Census on state-level property taxes, and Compustat.

First, for fixed income wealth, we relax the assumption of a common yield on fixed income along the wealth distribution. We show that fixed income portfolios of the wealthy skew toward high-yield bonds, whereas the fixed income portfolios of the non-wealthy are mostly bank deposits. This compositional difference results in higher returns at the top and

[2]Estimates for the time series currently do not include our private business adjustment, which increases concentration by approximately 1% in 2014. We are working to incorporate this refinement going back to the early 2000s.

lower implied capitalization factors. In 2014, the adjustment reduces the top capitalization factor—and thus estimated top fixed income wealth—by a factor of 4.7, or 80%. Within data sets that have both income flows and reported wealth, we show that capitalizing flows with unequal returns more closely matches the actual wealth data than an equal returns approach.

Second, for C-corporation equity wealth, we change the relative weight placed on different types of equity income when estimating the aggregate yield and choosing which income flows to capitalize. Specifically, instead of treating equally a dollar of dividend income and a dollar of realized capital gains, we consider the effect of reducing the weight on realized capital gains because most realized capital gains do not reflect C-corporation stock. A considerable share of realized capital gains reflect sales of non-stock assets, including real estate, private pass-through business holdings, and labor income in the form of "carried interest" compensation. Realized capital gains are more concentrated than C-corporation dividends. Consequently, top C-corporation wealth estimates are lower when using reduced weights on capital gains. This adjustment reduces the estimate of top C-corporation wealth by 35% when excluding realized capital gains, and by 15% with our preferred weight.

Third, we capitalize pass-through income using heterogeneous returns across industries. For example, a dollar of capital-light legal services income is associated with less wealth than a dollar of capital-intensive real estate income. This adjustment matters more for the allocation of pass-through wealth across people than for the level of top wealth, as pass-through income is concentrated within top groups. When estimating pass-through business wealth, we also show the effect of departing from the Financial Account totals, which likely understate the value of private business wealth. We consider this exercise because SCF total private business wealth considerably exceeds the Financial Account totals. Furthermore, private business wealth is the largest category of top wealth in the SCF, whereas the baseline capitalization approach suggests a much smaller role. Our adjustment uses market-based valuation models to estimate pass-through wealth from pass-through income and assets apportioned to business owners. Total pass-through wealth under this approach increases by 36%, and by 90% for the top 0.1%.

Fourth, for housing wealth, we allow effective property tax rates to vary across US states, which matters less for the level of top wealth and more for the geographic distribution and evolution. For example, a dollar of property taxes paid in California is associated with four times as much housing wealth as a dollar paid in Illinois.

We study the implications of our new estimates for wealth taxation, measures of income inequality, and the geography of wealth inequality. First, for wealth taxation, we consider different proposals for a new tax on wealth. A one percent tax on the top 0.1% generates

mechanical tax revenue estimate of $111B, relative to $139B for an equal return approach.[3] A graduated tax along the lines of Senator Warren's recent proposal, which taxes wealth above $50M at 2% and adds a surtax of 1% of wealth exceeding $1B, raises [half] as much under an unequal returns approach.[4] To raise the same amount of mechanical tax revenue as under an equal return approach would require lowering the first wealth threshold from $50M to [$11M]. We find a much larger role for illiquid wealth categories where agreed-upon valuations are more contentious, which may result in higher administrative burdens.

Second, a recent strand of the income inequality literature uses wealth estimates to apportion components of national income not captured by fiscal income data (Piketty, Saez and Zucman, 2018; Auten and Splinter, 2017; Smith, Yagan, Zidar and Zwick, 2019; Garbinti, Goupille-Lebret and Piketty, 2018). For example, the top 1% share of C-corporation retained earnings, which are not immediately distributed to their owners, is equal to that group's share of C-corporation wealth within the household sector. As a result, changes in top wealth estimates imply changes in the distribution of capital income. Using our preferred wealth estimates, top income inequality is driven less by C-corporation income and fixed income and more by labor income. Specifically, the top 1% income due to C-corporation income falls by $57B, and top 1% income due to fixed income falls by $262B. Overall, the capital share of top 1% earners falls from 55% to [49%]. The "P90-99" class receive most of the reallocated income and wealth due to our adjustments.

Last, we conduct a novel investigation of the geography of wealth inequality. We provide state-level estimates of wealth and explore the evolution of wealth-to-income ratios between 1980 and 2014. The data reveal vast disparities in wealth across regions. For example, wealth in the Northeast exceeds $450K per capita, whereas wealth in the poorest states in the South is less than $200K. The coastal states have experienced substantial wealth growth since 1980, with wealth-to-income ratios increasing by between 100% and 300% of national income, while inland states have seen much more modest growth. Thus, the period of aggregate wealth growth in the United States has coincided with striking regional divergence.

This paper contributes to the wealth literature in several ways. First, we provide new estimates of top wealth inequality in the US at both the national and state levels. These estimates are essential inputs to economic analysis of the distribution of capital and policy analysis of capital taxation. Second, we present new evidence quantifying the importance of heterogeneous returns when capitalizing income flows to estimate wealth. Kopczuk (2015)

[3]Mechanical tax revenue calculations presented here include no behavioral response and should not be construed as a true revenue estimate.

[4]Updated calculations that incorporate private business adjustments and rankings are in progress. They will likely increase the mechanical tax revenue by roughly [20%] relative to the adjusted series that does not include private business adjustments.

suggests these adjustments are especially important when average returns are close to zero, such as when interest rates are near the zero lower bound or for property tax rates, which average 1% across states. Other papers, especially Bricker, Henriques and Hansen (2018) and Fagereng, Guiso, Malacrino and Pistaferri (2016), emphasize that higher returns at the top affect wealth estimates.[5] Our contribution is to build on these insights by implementing proposed adjustments in the tax data and combining them with other refinements. Third, by combining these refinements, we shed new light on the composition of top wealth. In particular, relative to an equal returns baseline, top wealth depends less on fixed income and public equity and more on housing and private equity. Our refined portfolio shares line up more closely with the SCF and estate tax data for fixed income, although SCF private equity noticeably exceeds private equity estimates from capitalized income flows. Our market-value adjustment that departs from Financial Account totals more closely aligns with the SCF private equity estimates.

Piketty (2014) and Piketty, Saez and Zucman (2018) emphasize the rising importance of non-human capital for top income and wealth, while Smith, Yagan, Zidar and Zwick (2019) show that much of the recent rise of top incomes represents a return to human capital, including the labor income of private business owners characterized as capital income for tax purposes. A larger role for pass-through business wealth, lower concentration of financial wealth, and a less rapid rise in recent years in financial wealth and capital shares at the top all point to a larger role for human capital and a smaller role for non-human capital in top income growth. Providing this reconciliation would not have been possible without the comprehensive framework of Saez and Zucman (2016) and Piketty, Saez and Zucman (2018) for estimating the joint distribution of wealth and national income. We hope our estimates of geographic disparities in wealth can inform research on intergenerational mobility, migration, and regional convergence.

Last, we make a methodological contribution by clarifying how capitalization works in practice and by emphasizing both heterogeneity and the concomitant uncertainty that arises. These clarifications can help others implement the capitalization approach in other countries and settings, which is especially important as the BEA and other statistical agencies consider adopting this approach to compute distributional national accounts. Accordingly, our estimates suffer from important limitations inherent to the method of estimating an unknown quantity of wealth in an environment with tax avoidance, tax evasion, difficulty linking pensions and other indirectly held assets to individuals, and other missing data. We therefore view this work as a step forward in the literature on wealth in the United States,

[5]Other contributions include Arrow (1987); Piketty (2014); Gabaix, Lasry, Lions and Moll (2016); Bach, Calvet and Sodini (2016); Guvenen, Kambourov, Kuruscu, Ocampo and Chen (2017).

but underscore the uncertainty that remains and the importance of continued refinements to this powerful approach.

2 Data

Aggregate wealth comes from the U.S. Financial Accounts (formerly Flow of Funds) at the Federal Reserve Board, and national income comes from the National Income and Product Accounts at the U.S. Bureau of Economic Analysis.

Fiscal income data comes from the IRS Statistics of Income (SOI) stratified random samples for 1965 to 2014. We follow Saez and Zucman (2016) for estimating individual wealth for all components of private wealth based on capitalizing fiscal income, described in more detail below. Saez and Zucman (2016) also present an updated series following Kopczuk and Saez (2004) for estimating wealth using estate tax data. We use this updated series when comparing different methodologies. We separately use public aggregate data from SOI on portfolio composition from estate tax filings.

We combine these data with wealth data from the Survey of Consumer Finances (SCF) for 1989 through 2016, supplemented with the Forbes 400 list. The SCF sample is drawn based on administrative tax data and is available every three years. In 2016, the SCF contains 31K observations and sampling weights based on a mix of capitalized income, the level of taxable income, and correlations between these. The design of the SCF is meant to oversample the top of the wealth distribution, except for the Forbes 400. However, response rates decline with wealth and are below 20% at the very top (Bhandari, Birinci, McGrattan and See, 2018). We also consider the recent Distributional Financial Accounts series, which maps the SCF onto Financial Accounts categories, providing a useful bridge between the SCF and the aggregate series in the capitalization approach.[6]

To analyze the assumptions underlying fixed income wealth estimates, we combine data on asset holdings and fixed income flows from the SCF, yields on fixed income securities over time from Federal Reserve Economic Data (FRED), and data on fixed income wealth and fixed income flows from a sample of estate tax filings merged to prior year individual tax filings.

To analyze the assumptions underlying equity wealth estimates, we use data from the IRS Sales of Capital Assets files and population-level information returns (Form 1065 K1) to explore the composition of realized capital gains.

To estimate the value of private business, we draw on public company filings from Compu-

[6]See Batty, Bricker, Briggs, Holmquist, Hume McIntosh, Moore, Nielsen, Reber, Shatto, Sommer, Sweeney and Henriques Volz (2019) for details on constructing the Distributional Financial Accounts.

stat to construct alternative multiple-based valuation models. We combine these data with fiscal income data on S-corporations and partnerships at the 4-digit-industry-by-owner-group level.

To estimate housing wealth across state, we combine data on effective property tax rates by state from ATTOM, assessed tax values for all residential properties from DataQuick, house price indexes by state from CoreLogic, and state-by-year property tax revenues and population from the Census of States.

3 Capitalizing Income to Measure Top Wealth

This section presents the aggregate inputs into wealth estimates based on capitalized income. We then explain how capitalization works and present evidence on the level and distribution of observed capital income components.

3.1 The Level and Composition of Aggregate Wealth

Our goal is to estimate the distribution of wealth across individuals in the United States using aggregate wealth data and individual-level income data.

For aggregate wealth, we follow Saez and Zucman (2016) in defining wealth as total assets minus liabilities of individuals at market value, excluding durable goods, unfunded defined benefit pension plans and Social Security, non-profits, and human capital. This wealth concept is therefore closer to private financial wealth than it is to permanent income. We depart from Saez and Zucman (2016) and follow Piketty, Saez and Zucman (2018) in focusing on individual-level estimates rather than tax unit-level estimates, which helps account for evolving household structure over time and across the income distribution.

Figure 2A decomposes aggregate national wealth into six components and plots their evolution relative to national income. In 2014, national wealth amounts to 449% of national income. The largest component is pensions, which equals 162% of national income. Because we follow Saez and Zucman (2016) in allocating this component, we focus on the other components for which we adjust the allocation approach. Of these, housing net of mortgages is the largest (84%), followed by C-corporation equity (73%), fixed income assets (64%), proprietor and partnership assets (47%), and S-corporation equity (19%). Combining C-corporation and S-corporation equity with proprietor and partnership assets gives 139%, more than twice the amount of fixed income wealth and commensurate with pension wealth.

At the aggregate level, wealth has increased since 1965 by from 305% to 449% of national income. Of that increase, 123 percentage points are from pensions, 8 are from net housing,

12 are from corporate and non-corporate equity, and 1 are from fixed income. Pension growth partly reflects the transition from defined benefit to defined contribution plans. Both aggregate housing and equity components mirror the rise and fall of asset prices associated with the stock market boom in the late 1990s and housing boom and bust in mid 2000s. Fixed income wealth has grown the least among these components, though it has increased since its low point at 45% of national income in 2000 to a level last seen in the early 1990s.

The Financial Accounts are not perfect measures of wealth. First, they do not include unfunded pensions or Social Security wealth, nor do they reflect the stock of human capital. Second, data limitations imply the value of non-public equity is imperfectly estimated. A significant share of non-public equity comes from multiplying the book value of private company assets by market-to-book ratios at the two-digit industry level and then applying a 25% discount for illiquidity. This procedure may significantly understate the value of private equity, which motivates our adjustment for valuing private business assets. Third, they may miss wealth held abroad by U.S. persons, which Zucman (2013) estimates to be 4% of U.S. financial wealth. Last, the household sector is a residual category that includes hedge funds and other entities with unclear ultimate ownership. Each of these considerations may affect the total wealth to be distributed.

3.2 How Capitalization Works

To estimate top and bottom wealth, we apply the capitalization approach for different capital income types corresponding to different asset classes. For a given asset class, this approach scales up a flow of observed income by a capitalization factor (or multiple) that maps income to wealth.

The procedure takes as inputs observed income, aggregate wealth, and three accounting identities. The flow of income can be decomposed into a return multiplied by a stock of wealth. The top group's income flow can be decomposed as,

$$y^T = r^T \times W^T, \tag{1}$$

where T denotes the top wealth group, y^T is capital income of the top group, r^T is the return, and W^T is top wealth. The bottom group's income flow can be decomposed as,

$$y^B = r^B \times W^B, \tag{2}$$

where B denotes the bottom wealth group and the other components are defined analogously

to equation (1). Last, top and bottom wealth sum to equal total wealth,

$$W = W^T + W^B, \tag{3}$$

where W is total wealth. This setup has three equations and four unknowns. Thus, estimating W^T and W^B requires either an additional assumption or more data.

The main approach in Saez and Zucman (2016), the most prominent recent paper using capitalization to estimate the wealth distribution, is to assume equal returns across groups within asset classes, or $r^T = r^B = \bar{r}$. This equal return assumption reduces the problem to three unknowns, delivering estimates of top wealth given by:

$$\hat{W}^T = y^T \times \frac{1}{\bar{r}}, \tag{4}$$

where $\hat{W}^T$ is estimated top wealth under the equal returns assumption. $\bar{r} \equiv \frac{y^T + y^B}{W}$ is the aggregate yield across groups, i.e., aggregate flow income divided by aggregate wealth within asset class. The estimate for bottom wealth is $\hat{W}^B = y^B \times \frac{1}{\bar{r}}$. By equation (3), the estimate of bottom wealth also equals the difference between total wealth W and the top wealth estimate $\hat{W}^T$.

3.3 The Level and Distribution of Observed Capital income

We now show how to compute wealth estimates under the equal returns assumption. Implementing the capitalization approach starts with fiscal income data broken up by capital income component. Figure 2B plots six types of capital income relative to national income from 1965–2014.[7] Aggregate interest income of U.S. individuals increased in the late 1970s and boomed in the early 1980s. It then fell in the 1990s back to its initial share of national income. Since 2000, aggregate interest income has been falling and amounted to 0.6% of national income or 98 billion dollars in 2014. Aggregate dividend income of U.S. individuals amounts to 1.7% of national income and has fluctuated mildly around that level over this period. In contrast, aggregate capital gains of U.S. individuals is much more volatile and ranges from 1.9% of national income to over 8.2% of national income. S-corporation income was approximately zero prior to the Tax Reform Act of 1986, then rose steadily to 2.7% of national income in 2014. Proprietor and partnership income fell from 6.5% in 1965 to a low of 3.8% in the early 1980s, then recovered to 4.8% in 2014. The relative constancy of this

[7] We use the term "capital income" because these flows will be used to allocate wealth. However, such income may also reflect labor income characterized as capital income for tax purposes (Smith, Yagan, Zidar and Zwick, 2019).

income source masks a substantial shift toward partnership income. Aggregate property tax payments, which are capitalized to estimate housing assets, amount to approximately 2.1% of national income and grew modestly during the boom and bust of the 2000s.

Capitalizing individual-level income tax data separately for different classes of capital income permits a mapping of income flows to specific classes of wealth. For each asset class, under the equal returns assumption, these capital income types enter the numerator of a time- and asset-specific yield, $\bar{r}_{a,t}$. We then use individual-level tax data to estimate wealth in each asset class for different groups and sum across all asset classes to estimate total wealth by group.

For example, consider taxable interest income. In 2014, the aggregate flow of interest income was \$98B, and the stock of fixed income wealth was \$11T. The ratio gives the average yield, $\bar{r}_{fix,2014} = \frac{\$98B}{\$11T} = 0.89\%$. Using this yield to capitalize income amounts to multiplying every dollar of interest income by $\frac{1}{0.89\%} = 113$ to estimate fixed income wealth. Using the final wealth ranks to define top 0.1% and bottom 99.9% groups, we can start with the \$42B of interest income received by the top 0.1%. Implementing equation (4) for fixed income gives an estimate of top fixed income wealth of $\$42B \times 113 = \$4.7T$ of fixed income wealth held by the top 0.1%. The bottom 99.9% estimate is $\$56B \times 113 = \$6.4T$.

We follow similar steps for each type of capital income. For interest income, taxable interest income is capitalized.[8] In the case of C-corporation equities, the income flow is dividends plus capital gains. For S-corporation equities, the income flow is S-corporation income. For proprietor and partnership wealth, the income flow is the sum of proprietor income and partnership income.[9] In the case of real estate, property tax is capitalized to estimate housing assets and then mortgage payments are capitalized to estimate mortgages. The difference is net housing wealth. For housing, adjustments for non-itemizers are made.[10]

Another way to think about capitalization under the equal returns assumption is that the approach effectively allocates total wealth in each asset class in proportion to the income assigned to that class. Rearranging equation 4 gives,

$$\hat{W}^T = \frac{y^T}{y^T + y^B} W, \tag{5}$$

[8]We allocate non-taxable interest wealth, including currencies and municipal bonds, in the same proportion as taxable fixed income assets.

[9]Technically, the proprietors income includes royalties and business income distributed through estates and trusts. For C-corporation equities and interest, we also include dividends, capital gains, and interest distributed through estates and trusts.

[10]Specifically, we follow Saez and Zucman (2016) and gross up total itemized deductions of property tax payments by 1/0.75 and total itemized mortgage deductions by 1/0.8. For non-itemizers, we adopt Saez and Zucman's (2016) CPS-based imputations.

where $\frac{y^T}{y^T+y^B}$ is the top share of total income and W is total wealth. Under equal returns, wealth is allocated in proportion to income for each type of capital income.

This observation motivates Figure 3, which shows the evolution of the top shares of interest income, property tax payments, dividends, capital gains, S-corporation income, and proprietors plus partnership income. Each series shows the share of fiscal income for each category accruing to the top 1%, top 0.1%, and top 0.01%, where the ranks are defined using wealth ranks under equal returns.[11] Figure 3A shows that concentration has risen dramatically for interest income. The top 1% received approximately 20% of all taxable interest income from 1965 to 1985. This share started climbing steadily to above 30% in the 1990s, to above 40% in the mid-2000s, and then rapidly rose after 2009 to more than 60%. Under the equal returns assumption, this growth in interest income concentration implies spectacular growth in the concentration of fixed income wealth. Specifically, equation (5) implies that $\hat{W}^T_{fix}$ more than tripled as a share of total wealth W since 1960.

Figures 3B-F show that the evolution of other capital income components has been less dramatic over time. Property tax payments are much less concentrated than the other components, reflecting the broad holdings of owner-occupied real estate across people. Top 1% shares have hovered around 10 percent since the late 1980s. This relative constancy obscures significant changes in these shares across region, which we explore below.

For C-corporation equity wealth, Figures 3C and 3D show the extent of concentration depends on the measure being used. Figure 3C plots the top share of dividends and 3D plots the top share of (realized) capital gains. Concentration is higher for capital gains than dividends, though both are very concentrated. The top 1% dividend share exceeded 50% in the late 1960s, hovered around 40% from 1980 to 2000, and resurged to around 50% since the early 2000s. Top 1% capital gains, in contrast, started near 60%, fell and recovered in the late 1970s and early 1980s and have fluctuated between 70 and 80% since 2000. As shown in Figure 2B, the aggregate capital gains series is also more volatile than the other series, reflecting the accumulation of past gains and losses and the importance of timing decisions for realization. Income concentration among S-corporations is higher than for C-corporation dividends and has been stable over time. Proprietor and partnership income is less concentrated, but has been increasing recently as top-owned partnerships become more important relative to bottom-owned proprietorships.[12]

[11] This definition is not circular since each individual's income component is capitalized using average returns $\bar{r}$ for each asset class. [TODO: show ranks by fiscal income].

[12] S-corporation income concentration is somewhat lower than in Cooper, McClelland, Pearce, Prisinzano, Sullivan, Yagan, Zidar and Zwick (2016) because we rank by wealth rather than fiscal income. Note also that here we pool proprietorships, which are not concentrated at the top, with partnerships. We do this because the Financial Accounts do not decompose these components.

In the subsequent sections, we motivate and study the effects of making alternative assumptions for estimates of the distribution of fixed income, housing, and equity wealth. In the case of housing and fixed income, the alternative assumptions use additional data to permit heterogeneous returns across people within asset class. Specifically, we relax the assumption of a common yield on fixed income along the income distribution and allow effective property tax rates to vary across US states. In the case of C-corporation equity wealth, the alternative assumption changes the relative weight placed on different types of equity income when estimating the aggregate yield and choosing which income flows to capitalize. Specifically, instead of treating equally a dollar of dividend income and a dollar of realized capital gains, we consider the effect of reducing the weight on realized capital gains. Finally, for S-corporation and partnership wealth, we consider heterogeneous returns across firms in narrowly defined industries. We also depart from the Financial Accounts aggregates to permit a more comprehensive estimate of private business wealth.

4 Fixed Income Wealth with Unequal Returns

This section shows the effect of relaxing the assumption for capitalizing fixed income to allow for heterogeneous returns within asset class. Saez and Zucman (2016) highlight the possibility that heterogeneous returns can create bias in wealth estimates if top groups have higher returns than average. Based on analysis from estate tax data and a test of the capitalization method for endowments, they argue that the equal returns assumption is a good starting point but that more tests of this assumption would be helpful.[13] More recent work by Kopczuk (2015), Bricker, Henriques and Hansen (2018), and Fagereng, Guiso, Malacrino and Pistaferri (2016) weighs in on this argument, emphasizing the importance of higher returns at the top, especially when the average rate of return approaches zero.[14] Using data from the SCF and estate tax aggregates, Bricker, Henriques and Hansen (2018) show that the ratio of top 1% interest bearing income to top 1% interest bearing assets varies over time relative to the bottom 99%, and this ratio increased in recent years.

How much these considerations matter for top wealth estimates in the US remains unclear. We therefore begin by presenting additional evidence that high income and high wealth people earn materially higher returns within the category of assets that generate taxable interest income. We then show the effects of our proposed refinement on top fixed income wealth estimates.

[13]See the discussion in Section IV.F, especially p.550–551, which calls for new evidence and estimates accounting for heterogeneous returns.

[14]Other contributions include Arrow (1987); Piketty (2014); Gabaix, Lasry, Lions and Moll (2016); Bach, Calvet and Sodini (2016); Guvenen, Kambourov, Kuruscu, Ocampo and Chen (2017).

4.1 Evidence on Higher Returns at the Top

As a starting point, consider the instructions for Form 1099-INT, which is the information return for taxable fixed income that financial institutions provide taxpayers and the IRS. Box 1 is to "include interest on bank deposits, accumulated dividends paid by a life insurance company, indebtedness (including bonds, debentures, notes, and certificates other than those of the U.S. Treasury)." In other words, taxable interest income is a broad bucket that comprises many different categories of assets delivering fixed income to owners.

How different are the fixed income portfolios of top and non-top households? Figure 4A uses the 2013 SCF to decompose all fixed income holdings into broad categories, including liquid assets and deposits, bonds, fixed income mutual funds excluding money market funds, and other fixed income assets. We present portfolio shares separately for the top 0.1%, the top 1-0.1%, the bottom 99%, and all respondents, ranked in terms of SCF total household wealth. Among fixed income assets, high net worth households have more of their fixed income assets in the form of bonds and other securities. The top 0.1% hold just 20% of their fixed income portfolio in liquid assets and bank deposits. Bonds and fixed income mutual funds account for nearly 60%. In contrast, the bottom 99% hold nearly 70% of their fixed income assets in the form of bank deposits. Bank deposits and liquid assets have significantly lower yields than longer duration and illiquid fixed income securities. Thus, portfolio differences within fixed income are large enough to generate heterogeneous returns along the wealth distribution.

Figure 4B attempts to quantify the differences in overall fixed income returns. We plot the ratio of fixed income to fixed income assets in the SCF along the wealth distribution.[15] The return on fixed income for the bottom 90% is approximately flat but grows significantly within the top decile, rising from 1% at P90 to as high as 6% at the top.

[IN PROGRESS Figure 4C provides further evidence of heterogeneous returns by plotting the ratio of interest income to fixed income assets in estate tax filings. The income flow data come from matching the estate tax filings to the income tax filing for the year prior to death.[16]]

Figure 4D replicates the analysis in Figure 4B, while ranking households by fixed income. We do this in order to map the heterogeneous returns observed in the SCF to the tax data, where we do not observe wealth but can rank people by fiscal fixed income. To smooth returns, we estimate a spline approximating the return gradient along the fixed income

[15] We follow Bricker, Henriques and Hansen (2018) in defining fixed income assets to include liquid assets, CDs, and all taxable bonds and mutual funds comprised of taxable bonds. In addition, it includes half of the value of mutual funds with a mix of stocks and bonds and half of the value of annuities and trusts.

[16] Saez and Zucman (2016) present a related analysis with earlier data in their Figure VB. In 2011, the aggregate interest rate is 1.2%, whereas the interest rate for estates with greater than $20M is 1.9%.

distribution within the SCF. The resulting estimate provides the basis for a fixed-income-rank-specific capitalization factor.

4.2 Capitalization with Unequal Returns

Evidence of unequal fixed income returns motivates alternative approaches to capitalizing fixed income flows. We follow Bricker, Henriques and Hansen (2018) in exploring the effect of applying different fixed income rates, drawn from capital markets data, for capitalization at the top relative to other groups:

$$\hat{W}^T = y^T \times \frac{1}{r^T}, \tag{6}$$

where r^T is either the 10-year Treasury constant maturity rate, the Moody's seasoned Aaa-rated corporate bond yield, or the Moody's seasoned Baa-rated corporate bond yield.[17] To isolate the effect of different assumptions on estimated wealth levels, we fix the top group using ranks generated under the equal returns assumption.

Figure 5A plots these interest rates and compares them to $\bar{r}_{fix,t}$ (Baseline), and Figure 5B plots the corresponding capitalization factors over time. All interest rates reached a peak in the 1980s during the Volcker tightening and have been falling since then. The Baseline yield fell from 8.8% to 0.89% in 2014. Consistent with the Baseline yield reflecting a mix of high-yield fixed income assets and low-yield deposits, the Baseline yield is always considerably lower than the other yields. Notably, the capitalization factors show this gap is especially relevant in the low interest rate environment of the 2000s. The difference in factors rapidly rises as aggregate interest rates approach zero from 2000 through 2014. In contrast to a Baseline factor of 113 in 2014, the Baa, Aaa, and Treasury series imply factors of $\frac{1}{4.85\%} = 20.6$, $\frac{1}{4.16\%} = 24.0$, and $\frac{1}{2.54\%} = 39.4$. When interest rates were further from zero in the 1990s, the Baseline factor ranged from 16.1 to 29.8, whereas the most conservative Moody's Baa factor ranged from 9.7 to 13.8.

Figure 5A also compares these interest rates to the top 0.1% SCF rate, estimated using the spline approach in Figure 4D. In the years since 1989, this rate has hovered between the Aaa and Baa rates and exceeded the equal returns baseline in all years and the 10-year Treasury rate in all but one year.[18] This fact supports using the corporate bond rates to approximate the returns to top fixed income wealth.

[17] The respective series codes in FRED are DGS10, AAA, and BAA.

[18] During the post-crisis period, the Federal Reserve conducted significant intervention in the US Treasury market through Quantitative Easing, which may have depressed rates on Treasuries relative to what top fixed income portfolios would have experienced. Given we do not observe actual portfolios, we also present estimates using the alternative factors.

Figure 6A shows the impact on $\hat{W^T}_{fix}$ for the top 0.1% under different assumptions for r^t_{fix}. The left panel focuses on levels in 2014, and the right panel shows the evolution over time relative to total household wealth. The Baseline factor delivers an estimate in 2014 of \$4.7T. Alternative factors deliver much lower estimates, ranging between \$1.7T and \$0.9T. With the Baseline factor, top 0.1% fixed income wealth hovered around 2% of total household wealth between 1965 and 2000, rising modestly from the 1980s into the 1990s, but then surged dramatically since 2000 to a peak of nearly 7.6% of total household wealth in 2012. Top estimates using other factors show a significantly attenuated rise to 4.8% of total household wealth since 2000. Consistent with this result, Appendix Figure A.4 finds that capitalizing top fixed income in the SCF overstates actual SCF top fixed income wealth and its growth.[19]

In our preferred specification below, we use the Moody's Aaa factor, which we view as a transparent and appropriate proxy for the average return earned by households at the very top of the wealth distribution. By construction, a lower top wealth estimate under unequal returns implies a higher bottom wealth estimate; our preferred approach results in an abrupt jump in capitalization factors below the top 1%. In some analyses, we use the SCF returns instead, which gives a more gradual capitalization factor gradient below the top 1%. This approach is helpful for improving cross-sectional estimates of P90-99 wealth relative to the Aaa approach. However, it is only available every three years and since 1989, so we do not use it in our preferred time series.

5 Public Equity with Less Weight on Capital Gains

This section shows the effect of refining the assumption for capitalizing dividends and capital gains because capital gains often do not reflect the sale of C-corporation equity. We then show the effects of our proposed refinement on top C-corporation equity wealth estimates.

[19]Our analysis of heterogeneity in SCF fixed income returns differs from the SCF analysis in Saez and Zucman (2016). We investigated the sources of difference. Appendix Figure A.4 replicates Figure IV.B. of Saez and Zucman (2016), which they use to test the capitalization approach within the SCF. We first successfully replicate their figure in panel A. Panel B shows that capitalizing fixed income within the SCF, however, results in overstated fixed income concentration, but Panel C shows this overstatement is masked by understated private business wealth concentration. Moreover, this exercise does not hold the ranks fixed when comparing actual to capitalized wealth. In addition, it applies SCF-based capitalization factors, which differ from the factors used in the tax data (e.g., the SCF-based capitalization factor in 2013 is 75, 38% lower than the tax-based capitalization factor of 121). Our analysis in Appendix Figure A.4 removes these degrees of freedom by holding ranks fixed and using the tax-based capitalization factors.

5.1 Evidence on the Composition of Capital Gains

As the IRS acknowledges in its instructions for reporting realized capital gains, the sale of capital assets comprises sales for a broad class of assets: "most property you own and use for personal purposes or investment is a capital asset. For example, your house, furniture, car, stocks, and bonds are capital assets" (Instructions for Form 1040, Schedule D, 2018, p.2). In their analysis of the composition of reported capital gains, the IRS SOI division lists 22 distinct categories. While sale of corporate stock is one of the largest categories, in recent years it usually accounts for only 20% to 30% of total realized capital gains. Smith, Yagan, Zidar and Zwick (2019) highlight that the largest category of realized capital gains is pass-through gains or losses, which refers to distributed gains from pass-through entities owned by taxpayers, for which the IRS has not compiled additional information about the underlying transactions.[20]

While it is possible pass-through gains represent the sale of corporate stock as well, they likely also reflect sales in other categories and "carried interest" compensation to investment managers. The latter source of compensation is an important source of income for high-wealth individuals working as general partners in hedge funds, venture capital, and private equity. Using a combination of information returns from the population of partnerships and SOI's Sale of Capital Assets study, we (provisionally) estimate that general partner distributed gains range from 15% to 35% of top 0.1% capital gains in recent years, or $50B to $100B per year between 2012 and 2016.[21] This result supports excluding a significant share of pass-through gains from the capitalization formula, because carried interest does not map to current or future ownership of C-corporation stock. Carried interest can be thought of as reflecting deferred risky compensation treated as capital gains for tax purposes.

In any case, we can say with certainty that a significant share of realized capital gains do not reflect the sale of corporate stock. This fact motivates exploring alternative capitalization assumptions that diminish the weight placed on realized capital gains when inferring C-

[20] See `https://www.irs.gov/pub/irs-pdf/i1040sd.pdf` for the Instructions for Form 1040, Schedule D, and `https://www.irs.gov/pub/irs-soi/soi-a-inca-id1604.pdf` for SOI's Sale of Capital Assets study for tax years 2007–2012. We reproduce the relevant figure from Smith, Yagan, Zidar and Zwick (2019) in Appendix Figure A.9.

[21] Appendix Figure A.11 presents evidence supporting our estimate. We combine the realized capital gains flows used in our capitalized income estimates with data from SOI's Sale of Capital Assets study and information returns from different population-level databases. Fund managers are identified via the General Partner checkbox on information returns. We first validate that SOCA capital gains closely track the SOI realized capital gains in our capitalized income estimates. We then show that the pass-through component of SOCA gains is large relative to SOI realized gains and the gains derived from different information return databases are comparable in magnitude and time series. General partners consistently receive 20% of all distributed gains and 60% of all distributed ordinary income, which strongly supports our approach to identifying active managers.

corporation ownership.

5.2 Capitalization with Less Weight on Capital Gains

Dividends and capital gains both provide information about C-corporation ownership. While dividends derive exclusively from C-corporation ownership, realized capital gains do not. Therefore, it is useful to consider alternative assumptions that adjust for the relative informativeness of capital gains versus dividends when estimating how much capital gains to use to infer C-corporation ownership.

Our estimate of top C-corporate equity wealth is

$$\hat{W}^T_{Ccorp} = \left(y^T_{div} + \alpha y^T_{capgains}\right) \times \frac{1}{\bar{r}_{Ccorp}}, \tag{7}$$

where y^T_{div} is the top wealth group's taxable dividend income from C-corporations, $\alpha \in [0, 1]$ is the share of realized capital gains that represent C-corporation equity income, $y^T_{capgains}$ is the top wealth group's realized capital gains, and $\bar{r}_{Ccorp} = \left(y_{div} + \alpha y_{capgains}\right) / W_{C-corp}$ is the average yield on household C-corporation equity wealth.[22] Rearranging equation (7) provides another way to see the effect of alternative values of α:

$$\hat{W}^T_{Ccorp} = \frac{\left(y^T_{div} + \alpha y^T_{capgains}\right)}{\left(y^T_{div} + \alpha y^T_{capgains} + y^B_{div} + \alpha y^B_{capgains}\right)} \times W_{Ccorp}, \tag{8}$$

where $\frac{\left(y^T_{div} + \alpha y^T_{capgains}\right)}{\left(y^T_{div} + \alpha y^T_{capgains} + y^B_{div} + \alpha y^B_{capgains}\right)}$ is the top share of C-corporation equity income and W_{Ccorp} is aggregate household C-corporation equity wealth. In other words, total household C-corporation wealth is allocated in proportion to income for dividends and a portion of realized capital gains.[23]

We consider three possibilities: $\alpha \in \{1, .25, 0\}$. We refer to $\alpha = 1$ as the Baseline case since it is the main approach Saez and Zucman (2016) use. The $\alpha = .25$ case matches the share of realized gains that represent public stock sales, and $\alpha = 0$ is the dividends only case, which Saez and Zucman (2016) also consider in robustness analysis.

Figures 2B and 3 show why the choice of α can have a material effect on top equity wealth estimates. Figure 2B shows that capital gains are substantially larger than dividends from C-corporations.[24] Consequently, the concentration of realized capital gains heavily influences

[22] As above, we define the top group either using ranks generated under the equal returns assumption.

[23] The effective capitalization factor is α-specific since $\bar{r}_{Ccorp}$ in equation (7) is a function of α. This feature makes sense since a different income concept (e.g., dividends vs dividends plus capital gains) generates a different aggregate yield and thus requires a different capitalization factor.

[24] Indeed Appendix Figure A.9 shows realized capital gains are so large that they often exceed total retained

the top equity income share in equation (8) and thus the top equity wealth estimate. Figure 3 shows that realized capital gains are more concentrated than dividends. In recent years, the top 1% share of dividends hovered around 50% whereas the top 1% share of realized capital gains fluctuated around 80% and reached shares as high as 89%. The choice of α can affect by 30 percentage points or more how aggregate household C-corporation equity wealth is allocated to top wealth groups.

Figures 6C and 6D quantify the effects of different assumptions about the value of α on top C-corporation equity wealth estimates. The baseline assumption of $\alpha = 1$ yields \$5.4T for the top 0.1% in 2014. Using $\alpha = .25$ and $\alpha = 0$ result in \$0.9T and \$1.9T less, respectively. Figure 6D plots how top C-corporation equity wealth estimates evolve over time relative to national income. Putting positive weight on capital gains implies a much larger increase in top equity wealth and higher volatility through the stock market boom and bust in the 1990s. Since dividends are less volatile and less concentrated, the dividends-only series (i.e., $\alpha = 0$) is more stable and lower. Our preferred specification is $\alpha = .25$ since it better captures movements in the stock market, and also reflects the empirical composition of realized capital gains.

6 Pass-Through Equity with Unequal Returns

This section shows the effect of refining the assumption for capitalizing pass-through income to reflect heterogeneous returns across industries. We also show the effect of departing from the Financial Account totals, which likely understate the value of private business wealth. We consider this exercise for four reasons. First, SCF total private business wealth considerably exceeds the Financial Accounts totals. Second, within the SCF, private business is the largest category of wealth at the top, whereas the baseline capitalization approach suggests a much smaller contribution. Third, pass-through business income features prominently for top incomes, yet pass-through business wealth in the baseline approach only modestly contributes to top wealth. Fourth, this analysis responds to the call in Saez and Zucman (2016) to improve estimates of S-corporation and partnership wealth by matching owners to their firms.

6.1 Evidence on Heterogeneous Returns across Industry

We first develop simple valuation models for mapping private business income to a wealth estimate. Private business returns are harder to estimate than fixed income returns because

earnings accruing to households in macroeconomic aggregates.

private business wealth is harder to observe than fixed income wealth. A sound valuation model is a necessary ingredient for the process of taxing business wealth, whether via an estate or wealth tax. Thus, this challenge is not only relevant for our measurement purposes, but also for implementing tax policy.

We use Compustat data on public company market values, income statements, and balance sheets for the years from 1994 to 2014. We focus on multiple-based valuation models, where the model takes either an income flow or a balance sheet variable and relates it to the value of the company's equity. Equity values are defined as the price of common stock (PRCC_C) times the number of common shares outstanding (CSHO). We consider multiples based on assets (AT), capital (PPENT), sales (SALE), profits before tax (IB + XIDO + TXT), and EBITD (profits before tax + XINT + DP). We define industry-specific multiples for all NAICS 4-digit industry-by-year cells for which Compustat has at least five firms and apply the market aggregate multiple otherwise.[25]

In our analysis of heterogeneous returns, we focus on three multiples of value to sales, capital, and EBITD, respectively. For each 4-digit industry-year, we aggregate S-corporation sales, capital, and EBITD drawn from the SOI corporate sample files, then apply that industry's respective multiple to the aggregate flow. For example, in 2014 auto dealers (NAICS 4411) have \$580B, \$13B, and \$12B dollars of sales, capital, and EBITD, respectively, and the corresponding multiples are 0.4X, 3.5X, and 8.7X. We then average the three values to estimate private business wealth in that industry. In the case of auto dealers, this estimate amounts to \$130B in 2014. Note our method accounts for the relatively low profit margins in this industry (i.e., $\$13B/\$580B = 2\%$) by averaging the high sales-based valuation with the low EBITD-based valuation. This overall valuation implies a per-firm valuation of \$4M, in line with industry approaches to valuing auto dealerships.[26]

Before analyzing industry returns, consider the aggregate private business valuation implied by applying this methodology to S-corporations, partnerships, and private C-corporations. Figure 8A plots these aggregates by year and compares them to analogous measures from the baseline US Financial Accounts categories and from the SCF.[27] We plot a long time series from 1994 through 2016 that applies the model average method to S-corporation and private C-corporation activity from the SOI corporate sample without allowing heteroge-

[25] We also impose bounds on multiples to avoid bias from outliers: the allowed range of multiples is 0 to 5 for assets and sales, 0 to 20 for capital, 0 to 40 for EBITD, and 0 to 50 for profits before tax. In each case, these correspond approximately to the 95th percentile of the distribution of multiples across industries. Outlier cells then receive the market aggregate multiple.

[26] See `https://www.forbes.com/2009/06/30/auto-dealership-valuation-entrepreneurs-finance-taulli.html` for an example analysis and discussion by an industry practitioner.

[27] The US Financial Accounts series includes non-corporate business wealth and S-corporation equity wealth.

neous returns across industry. We also plot a series from 2002 through 2014 that applies heterogeneous multiples by industry to S-corporation and partnership flows measured in the population of pass-through businesses linked to their owners via 1065 K-1 information returns.[28]

The figure shows the range of disagreement between the Financial Accounts-based measure and the SCF-based measure. This disagreement will tend to de-emphasize private business wealth in the baseline capitalization series. Our series more closely aligns with the SCF totals relative to the Financial Accounts. Overall, our aggregates fall in between the Financial Accounts and SCF series in recent years and track the time series reasonably well, though by construction our series more closely tracks the stock market.

Figure 8B plots the aggregate S-corporation return between 2002 and 2016 and compares it to different percentiles of the distribution across industries. To compute industry-level returns, we divide aggregate industry profits before tax from the SOI files by our estimate of industry-specific wealth. The figure shows substantial dispersion in returns across industries. The aggregate return hovers around 7%, implying a capitalization factor of 14.3. The 5th percentile and the 95th percentile returns of 2% and 20% respectively imply capitalization factors of 50 and 5. Thus, industries with returns far from the aggregate return will correspond to wealth estimates that can be understated or overstated by a factor of 3.

Figure 8C plots these returns for the thirty largest industries in aggregate S-corporation wealth and compares them to the aggregate S-corporation return. High return industries tend to be the industries in which we think the primary input is human capital, broadly defined, rather than non-human capital, including architects, engineers, lawyers, and doctors (Smith, Yagan, Zidar and Zwick, 2019). This fact implies that these industries will have lower valuations compared to the equal returns benchmark. Conversely, pass-through owners with significant capital (e.g., real estate) should be capitalized more because of low relative returns. This adjustment can affect wealth concentration and tilt the composition away from low capital to high capital firms.[29]

[28]Data on capital and EBITD are not available for the population data, so we use assets and profits and their respective multiples when working with these data.

[29]Smith, Yagan, Zidar and Zwick (2019) document heterogeneous returns within industry as well. Our interpretation of this fact is that these excess returns within industry may reflect labor characterized as profits for tax reasons, which should not to be capitalized into wealth estimates.

6.2 Capitalization with Unequal Returns

Our estimate of top pass-through wealth is

$$\hat{W}^T_{Pthru} = \sum_I 1/3 \left(M_{Sales,I} \times y^T_{Sales,I} + M_{Assets,I} \times y^T_{Assets,I} + M_{Profits,I} \times y^T_{Profits,I} \right), \quad (9)$$

where I denotes NAICS 4-digit industry, $M_{X,I}$ denotes the valuation multiple for factor $X \in \{Sales, Assets, Profits\}$ for industry I, and $y^T_{X,I}$ is the top wealth group's aggregate pass-through factor X for industry I. For example, $M_{Profits,I}$ is the valuation multiple for profits and $y^T_{Profits,I}$ is aggregate profits in industry I apportioned to owners in the top wealth group. We define industry-specific multiples as above for all NAICS 4-digit industries using data from Compustat. Industries with insufficient data or outlier multiples are assigned the market aggregate multiple for that factor.[30]

Unlike for fixed income and C-corporation equity, we depart from the simple capitalization approach in the case of pass-through equity. An alternative approach would be to derive and apply industry-specific capitalization factors for pass-through income. This alternative would only use the profits multiple, in which $1/M_{Profits,I}$ is the rate of return for industry I. However, certain industries have techniques that reduce profits relative to the value of the firm, for example, due to interest and depreciation deductions in the real estate sector. Our approach incorporates assets and sales to make valuations more accurate for these industries. We apply this method to estimate S-corporation and partnership wealth and follow the baseline approach for valuing proprietors, as we do not have industry information for these firms. Proprietors income accounts for a small share of pass-through income at the top.

How do the baseline capitalization values compare to our alternative approach? The baseline approach yields \$1.8T of pass-through wealth for the top 0.1% in 2013, of which \$0.7T is S-corporation wealth, \$0.9 is partnership wealth, and \$0.2T is proprietor wealth.[31] Our approach increases top 0.1% pass-through wealth by 90% to \$3.4T, of which S-corporations, partnerships, and proprietors account for \$1.7T, \$1.4T, and \$0.2T, respectively. The results are similar for the top 1%. The baseline approach yields \$3.8T, of which \$1.3T is S-corporation wealth, \$1.8T is partnership wealth, and \$0.7 is proprietor wealth. Our approach increases top 1% pass-through wealth by 70% to \$6.5T, of which S-corporations, partnerships, and proprietors account for \$3.2T, \$2.6T, and \$0.7, respectively.

The primary source of difference between the baseline approach and ours is the increased

[30] Outlier multiples are below 0 or above 5 for assets and sales, and above 50 for profits before tax. In cases with negative apportioned profits, we set the implied profits-based value to zero.

[31] We focus on estimates for 2013 to aid comparison to the SCF.

aggregate level of pass-through wealth, which rises from $8.9T in the baseline to $14T in our adjusted series in 2013. Because S-corporation and partnership wealth are concentrated at top and proprietor wealth is less important for the very top, we observe a larger impact of our adjustment for the top 0.1% relative to the still large impact for the top 1%. However, our adjustment has only a modest effect on the concentration of top 1% and top 0.1% pass-through wealth relative to the aggregate. One can infer from this result that the industry adjustment mostly allocates wealth across people within the top groups, consistent with the high concentration of pass-through income at the top.

To provide more texture on which industries contribute to top pass-through wealth, Table 2 presents characteristics of top-0.1%-owned pass-through equity for the largest thirty 4-digit industries.[32] The largest five industries are other financial investment activity (5239, $743B), lessors of real estate (5311, $329B), legal services (5411, $296B), activities related to real estate (5313, $187B), and security contracts broker (5231, $184B). More capital-intensive industries in real estate, finance, and oil and gas have high value per firm and are worth less than $1M per owner. In contrast, less capital-intensive industries such as law firms and consultancies are worth $5M per owner on average but are smaller and more numerous.

7 Housing Wealth

This section shows the effect of relaxing the assumption for capitalizing property taxes that property tax rates—the source of income flows used to estimate housing wealth—are the same across state. Saez and Zucman (2016) focus on national trends and invite future extensions that produce more accurate measures of the geographic distribution of wealth within the United States.

7.1 Evidence on Unequal Property Tax Rates

Figure 7 presents evidence of unequal property tax rates across state and what these imply for wealth estimates based on capitalizing property tax flows. Figure 7A plots a map of average state-level effective property tax rates collected from deeds data and computed by ATTOM. Property tax rates vary across the United States, from below 0.5% in the Southwest and Deep South to more than 2% in the Midwest and some states in the Northeast.

We estimate housing assets by capitalizing property tax deductions reported on tax

[32]For this table, we are using data that ranks owners by fiscal income, not wealth. These estimates include firms with both non-top and top owners, so the aggregate values will exceed those based on the apportioned data. TODO: build by wealth and with apportionment. See Appendix Tables A.1 and A.2 for top 1% owned and all firm analogues.

returns. Under an equal rates assumption, Figure 7B plots the capitalization factor implied by dividing aggregate housing assets by aggregate property tax payments. The factor varies between 90 and 120 over time but hovers around 100 from 1977 to 2014. Recall that a factor of 100 implies an average property tax rate of approximately 1%. Because property tax rates are low, small departures from the national average can lead to large bias in wealth estimates across state. Given the variation in actual rates between 0.4% and 2.3%, the equal rates assumption allocates more than twice the amount to high tax states and less than half to low tax states. This issue is analogous to the bias for fixed income wealth estimated under an equal returns assumption during low interest rate periods.

7.2 Capitalization with Unequal Property Tax Rates

Allowing for unequal property tax rates across state permits a more accurate estimate of housing wealth relative to the equal rate baseline. To derive capitalization factors based on unequal rates over time, we combine state-level data from four sources: (1) effective property tax rate data from ATTOM, (2) property tax assessor data from 2012 from DataQuick, (3) CoreLogic state-level house price indexes, and (4) state-level property tax revenues and population from the US Census of States. We estimate wealth at the state-level using the formula,

$$\hat{W}^S_{hou,t} = y_{hou,t} \times \frac{1}{r^S_t}, \tag{10}$$

where r^S_t is the effective state-level property tax rate in year t and $y_{hou,t}$ is the observed flow of property tax deductions, scaled up to account for non-itemizing taxpayers. To estimate r^S_t, we separately estimate the numerator—state-level property tax revenues—and denominator—state-level housing asset values—each year.

State-level property tax revenues $\tilde{R}^S_t$ are given by,

$$\tilde{R}^S_t = R^S_{Census,t} \times \theta_{R,2012} \tag{11}$$

$$\tag{12}$$

where $R^S_{Census,t}$ is state-level property tax revenues from the Census of States, and $\theta_{R,2012}$ equals $R^S_{DataQuick,2012}/R^S_{Census,2012}$ is a time-invariant factor equaling 0.64 used to scale down Census revenues to remove commercial property taxes from the Census figures. We use 2012 as a baseline year because, for this year, we have the assessed property tax amounts from DataQuick.

State-level housing asset values are given by,

$$\tilde{W}_t^S = \tilde{W}_{2012}^S \times \frac{p_{CoreLogic,t}}{p_{CoreLogic,2012}} \times \frac{pop_t^S}{pop_{2012}^S}, \tag{13}$$

where $\tilde{W}_{2012}^S$ equals $r_{ATTOM}^S \times R_{DataQuick,2012}^S$ and provides an estimate in 2012 of property values underlying assessed tax amounts, $p_{CoreLogic,t}$ is the state-level CoreLogic house price index based on a repeat-sales methodology, and pop_t^S is state-level population from the Census. We use population to proxy for the number of households and hence housing units. Adjusting the value of housing for growth in housing units allows us to apply the price index to the approximately correct underlying stock of housing units. Finally, we estimate the state-level property tax rate over time as

$$r_t^S = \frac{\tilde{R}_t^S}{\tilde{W}_t^S}. \tag{14}$$

We validate this approach in two ways. First, we compare the cross-sectional property tax rates from ATTOM to those based on the Census. Second, we compare aggregate real estate values to the US Financial Accounts.

Figure 7B shows the effect of our unequal property tax rate estimates by comparing the implied California capitalization factor over time to the equal rate benchmark. Three facts stand out. First, the factor we apply to property tax deductions in California in 2014 doubles relative to the equal rate benchmark, implying that California owns significantly more real estate under the unequal rate assumption. Second, our estimate reveals the amplified exposure of California to the housing boom and bust in the mid-2000s, as the California factor rises and falls much more dramatically than the national factor. Third, the passage of Proposition 13, which was passed in 1978 and capped future property tax increases, causes a sharp and immediate increase in the California factor. This increase reflects house prices immediately capitalizing the value of reduced future property taxes.

Table A.3 presents statistics on housing assets, liabilities, and wealth in 2014 under equal property taxes and state-specific property taxes. The assets vary across the two approaches, but we leave the allocation of debt unchanged.[33] The table also includes asset and wealth per capita estimates to enable more informative comparisons across states.

Continuing with the example of California, under equal property tax rates, California has \$2.6T of housing assets, \$1.6T of debt, and net housing wealth of \$1T, or 10% of total

[33]The level of mortgage rates is higher on average than property tax rates, which attenuates the bias caused by assuming an equal capitalization factor for mortgage interest. In addition, Hurst et al (2017) show that mortgage rates do not vary with geographic differences in risk due to the national scope of the mortgage market.

housing wealth. These figures imply $110K and $42K of housing assets and wealth per capita. Adjusting for California's below average property tax rates significantly increases net housing wealth by a factor of 2.5 in 2014. With unequal property tax rates, per capita wealth is $119K and California has more than 25% of total net housing wealth in the US. By construction, total housing wealth does not change. Consequently, this correction comes at the expense of relatively high tax states like New York, Illinois, New Jersey, the total wealth of which fall by $530B, $250B, $250B, respectively. Overall, the pattern of housing wealth per capital more closely matches cross-state differences in income and house prices. In the adjusted series, New Jersey has the highest net housing wealth per capita at $122K, followed by Massachusetts and California at $110K and $109K, respectively.

8 New Top Wealth Estimates

This section analyzes the level, composition, trends, and geographic distribution of top wealth under alternative capitalization assumptions.

8.1 The Level and Composition of Top Wealth

Table 1 shows the number of individuals in each wealth group and the wealth thresholds defining each group when determining ranks using the baseline equal returns assumptions. We then report average wealth and the share of total wealth for these groups when altering the assumptions for the same group of people.

Panel A focuses on top wealth groups. The full population includes 234 million individuals whose average wealth is $291K in 2014. The top 1% includes 2.3 million individuals with baseline wealth of at least $3.2M and average baseline wealth equal to 38 times average wealth in the full population. In our preferred specification, the average wealth for this group falls to 31 times the full population average. In terms of shares, this group's share of total wealth falls from 38.4% to 30.9%. Similarly, for the top 0.1%, who have baseline wealth exceeding $16M, the unequal returns assumptions reduce their share from 20.4% to 15.1%. Thus, the combined effect of accounting for heterogeneity and adjusting the private business aggregates materially affects the estimated concentration of top wealth. These adjustments are increasingly important within the very top group, as the top 1% share falls by 20% (7.5/38.4), the top 0.1% share falls by 26% (5.3/20.4), and the top 0.01% share falls by 33% (3.5/10.6).

Panel B focuses on intermediate wealth groups, which helps illustrate how the unequal returns assumptions affect the distribution of wealth. A key result is that the group within

the top decile but below the top 1% receives 80% (6.0/7.5) of the reallocated wealth. This "P90-99" class, a group with more than $550K in baseline wealth but less than $3M in baseline wealth, hold 40.5% of total wealth, more than either the bottom 90% or the top 1%.[34]

Figure 10 focuses on the composition of top wealth by component to introduce additional moments for evaluating different assumptions. We compare the baseline series to our preferred series, the SCF, and the recently developed Distributional Financial Accounts (DFA) in 2013 for top wealth groups. The DFA series shows how mapping SCF categories onto the Financial Accounts affects the level and composition of top wealth.[35] To decompose C-corporation equity into public and private components, we estimate the average share of C-corporation profits and dividends accruing to public companies using the SOI corporate sample. Both shares average around 80% and show appear stable over the period from 1994 to 2016 (see Appendix Figure A.10A). We apply this share to decompose estimated C-corporation wealth into public and private components in the baseline and preferred capitalization series. The private business category includes 20% of estimated C-corporation wealth, all S-corporation wealth, partnership wealth, and proprietorship wealth.

When compared to the baseline estimates, fixed income wealth is significantly lower for both groups in both our preferred series and the SCF, as well as for the top 1% in the DFA.[36] Public equity wealth is also amplified in the baseline series relative to our estimate, the SCF, and the DFA, though the differences are smaller than for fixed income.[37] Private business wealth in the baseline series is well below our preferred series, as well as the SCF and DFA. In the baseline, private business wealth is $5.2T versus $7.7T, $10.5T, and $6.7T in our preferred series, the SCF, and the DFA, respectively. Our housing adjustment increases net housing wealth by approximately $140B, though both the baseline and our preferred series remain below the SCF and somewhat below the DFA.

In the SCF, the total top 1% wealth share is similar to the baseline share. However, this apparent similarity reflects a very different underlying composition. First, the SCF's

[34] Appendix Figure A.1, described below, explores whether this result changes when using the SCF returns distribution without a discontinuous change in fixed income capitalization factors. The P90-99 share in 2013 falls somewhat but the same qualitative patterns hold.

[35] The DFA series is not available for the top 0.1%.

[36] When adding the Forbes 400 to the SCF, we allocate total wealth in proportion to the observed portfolio shares for the SCF's top 0.01% households. For example, in 2013, this allocates $700B of the group's overall $2T in wealth to fixed income and $600B to C-corporation equity.

[37] The DFA series is currently not available separately for C-corporations and S-corporations. We use their published "Corporate equities and mutual fund shares" category and assign 20% to S-corporations, which is the share of S-corporation equity wealth in total household corporate equity wealth in the Financial Accounts. We then assign 80% of C-corporation wealth to public equity and the remainder to private equity. The private business category for the DFAs combines their published "Equity in non-corporate business" series with the assigned S-corporation and private C-corporation equity.

top group has substantially more private business wealth ($10.5T versus $5.2T), and less fixed income wealth relative to the baseline series ($3.7T versus $7.8T). Second, the SCF's public equity wealth is $600B lower and net housing wealth is $1.5T higher. Thus, it is unclear whether the SCF's similar top 1% share validates the equal returns assumption in the baseline series.

Within the SCF top 0.1%, both the levels and composition depart significantly from the baseline series. Furthermore, our preferred estimate for fixed income wealth closely aligns with the reported amount in the SCF, which is $3.6T below the baseline series estimate. Thus, adjusting fixed income wealth estimates for unequal returns considerably improves the alignment between the capitalization approach and the SCF.

Figure 10C presents portfolio shares for the top 0.1% across different series. Our preferred estimates result in a fixed income portfolio share (15%) well below the baseline series (40%). This shift is largely offset in private business wealth, which increases from 22% to 42%. Relative to the baseline series, the public equity share, housing, and pension shares rise modestly. In our preferred series, illiquid private equity and pension wealth account for half of top wealth and housing accounts for an additional 5%. Thus, liquid securities with clear market values account for less than half of top wealth after accounting for our adjustments. This fact underscores the importance of precise compositional estimates for evaluating and administering top capital tax policies.

Our preferred shares match the SCF well. The fixed income share is very close, while the public equity share is somewhat higher than in the SCF. Private business wealth is considerably larger in the SCF (48%) relative to the baseline capitalization estimate (22%). Our preferred private business estimate of 42% comes much closer to the SCF composition. Asset composition figures from estate tax returns fall in between the baseline series and the other estimates, though fixed income remains a significantly less important asset class than the baseline suggests. This result holds despite the life-cycle profile of estate tax filers that may have a higher allocation to fixed income assets than the typical high net worth individual.[38]

Using aggregates from the Financial Accounts is an important factor for the difference across these series. Baseline totals for private business wealth in the US Financial Accounts are likely low because of data limitations.[39] Bhandari, Birinci, McGrattan and See (2018)

[38]Appendix Figure A.13 plots the evolution of fixed income portfolio shares over time for each series. The fixed income share in the baseline series rapidly increases since 2000 to levels not seen in the post-war period. In contrast, the SCF and our preferred series remain stable during this time and closer to historical averages of 20% in the post-war period.

[39]Based on conversations with economists who produce the Financial Accounts, closely-held business is likely understated in the accounts for several reasons. First, closely held C-corporations with less than $1-2B in revenues are not included because of data limitations. Second, S-corporation equity is estimated using

raise additional concerns with the quality of measurement for private business wealth in the SCF. We hope our new data and alternative market-based method of valuing private business can help shed light on these measurement considerations and help improve the Financial Accounts.

8.2 The Growth of Top Wealth

Figure 9 plots top wealth shares for groups within the top 1%, defined as above using the equal returns ranks for all specifications. We plot the baseline and preferred shares with yellow squares and dark blue circles, respectively.[40] Relative to the baseline series, the unequal return series not only show a lower level in recent years but much less growth since 1980. The baseline top 1% series grew from 23% in 1980 to 38.4% in 2014; the unequal return series grew by half as much from 21% to 28.7%. The differences in growth are similar higher in the distribution, with the growth in the top 0.1% and top 0.01% falling from 13 to 7.6 and from 7.7 to 4.1 percentage points, respectively.[41]

We plot three additional series reflecting alternative assumptions for fixed income and equity capitalization. For fixed income, we plot series using Moody's Baa corporate bond yield series instead of the Aaa series, which generates more conservative fixed income wealth estimates. For equities, we plot a series using dividends only to allocate C-corporate wealth, which tends to lower top equity wealth, and a series using 100% of realized capital gains, which allows us to isolate the importance of fixed income assumptions relative to equity assumptions. The message from these graphs is that minor changes in assumptions can have meaningful impacts on estimated levels and trends. For example, the range of possible top 1% wealth shares in 2014 varies by 11.6 percentage points, or $7.9T.

We also plot two series based on the SCF, with ranks defined using household net worth within the SCF. The first series plots reported wealth within the SCF and the second adds the Forbes 400. The levels and trends for the top 0.1% and top 0.01% are closer to the unequal returns series than to the equal returns baseline. However, the top 1% wealth share shows a higher level and flatter trend throughout the period and lines up more closely

ratios of market value equity to book value of assets at the 2-digit sector level, which may understate firm value in the asset-light service sector firms that predominate among S-corporations. Third, non-corporate business equity is estimated using a mix of market values for real estate and fixed income assets and book values for other assets, which may understate the value of these firms. Fourth, financial partnerships are not currently included in the accounts, which are among the largest 4-digit industries in our data.

[40] Time series analysis do not yet include our adjustment for private business, which is only available in recent years. We plan to extend these adjustments back to 2002, when reliable firm-owner links with consistent industry data first become available.

[41] Appendix Figures A.6 and A.7 decompose the 1993–2000 growth in concentration by asset class for the top 0.1% and top 1%, respectively. Equity wealth accounts for most of the growth in that period.

to the top 1% baseline series in recent years. As we have noted, this similarity in recent years obscures considerable differences in the underlying asset composition, with the baseline driven by fixed income and the SCF driven by private business wealth.

In Figure 12, we follow Saez and Zucman (2016) and combine wealth estimates with asset price indices to estimate implied savings rates by wealth group. We follow their methodology and smooth out fluctuations in yearly savings rates by aggregating flows and rates by decade. Savings in decade t are defined as flows of wealth for a particular group from t to $t+1$ after removing asset price gains for each asset class.

In the baseline series, savings disparities across the top 1%, the P90-99, and the bottom 90% widened significantly in recent years. Our updated series considerably attenuates savings rate disparities across groups, even reversing relative savings rates such that the P90-99 rate now exceeds that of the top 1%. As a consequence, asset price growth is more important for understanding wealth growth in our adjusted series relative to the baseline.

This exercise is relevant for tax policy for three reasons. First, differences in rates of time preference and thus in savings rates across groups can provide a theoretical basis for taxing capital income (Atkinson and Stiglitz, 1976; Saez, 2002). Moreover, the magnitude of savings rate disparities can affect the magnitude of optimal capital tax rates in these models. Second, if the recent rise of wealth inequality is mostly due to asset prices and not new savings, then forecasting future asset prices becomes more important for the question of whether the recent growth in wealth concentration will continue. Indeed, if recent asset price changes reflect a transition from a high interest rate environment to a low one, then extrapolating into the future the trend in wealth concentration to measure the capital tax base may not be justified. Third, to the extent that wealth growth depends more on asset price growth, the magnitude of unrealized capital gains and corresponding potential tax revenues are larger than if savings are more important. This consideration matters for evaluating capital tax proposals, such as repealing the "step-up" in basis at death for inheritances.

While suggestive, we note a few limitations of this savings rate exercise. First, by construction, conclusions about savings rates are sensitive to assumptions about asset prices, which are difficult to measure given unobserved differences in portfolio composition. Second, the graphs are based on repeated cross-sections in the underlying data, but imply conclusions that may be better suited for a panel analysis. To the extent that who is in the top 1% changes across decades, it may be difficult to draw conclusions about individual savings rates.

8.3 The Geography of Wealth Inequality

Income and opportunity vary substantially across regions (Chetty, Hendren, Kline and Saez, 2014; Kline and Moretti, 2014).[42] Yet we know relatively little about regional disparities in wealth, despite its potential importance in enabling intergenerational mobility. Differences in income are insufficient to measure differences in consumption across people and regions, if wealth accumulation plays an important role. These considerations also matter for policies that seek to address regional disparities in well-being.

In this section, we provide state-level estimates of wealth and explore the evolution of wealth-to-income ratios. These statistics are a key input into growth accounting exercises, which decompose output into contributions from capital accumulation, labor, and productivity growth. Further decomposing changes in measured capital accumulation into savings versus asset price growth can shed light on the importance of capital flows and the causes and consequences of wealth disparities. Moreover, the extent to which differences across region in wealth growth are driven by asset prices versus savings matters for interpreting wealth differences as reflecting differences in current and future consumption.

Figure A.12A plots the change in wealth-to-income ratios from 1980 to 2014 for each state.[43] The coastal states have experienced substantial wealth growth, with wealth-to-income ratios increasing by between 100% and 300% of national income, while inland states have much more modest growth. Figure A.12B shows this disparity in per capita terms (in 2014 dollars) by comparing wealth per capita in 1980 to the change in wealth per capita from 1980 to 2014. For example, Wisconsin had $155K in wealth per capita in 1980 and experienced an increase in wealth per capita of $120K over the subsequent thirty-five years. In contrast, coastal states like Washington and Massachusetts that had the same per capita wealth in 1980 have seen more than twice as much growth over the same period. Wealth per capita in Massachusetts now exceeds $450K, whereas Mississippi and West Virginia have less than $200K in wealth per capita. Thus, the period of aggregate wealth growth in the United States has coincided with striking regional divergence.

[42] See also Chetty and Hendren (2018*a*,*b*).

[43] Income is imputed national income, as in Piketty, Saez and Zucman (2018) and Smith, Yagan, Zidar and Zwick (2019).

9 Implications for Income Inequality and Top Taxation

9.1 Top Capital Income and Income Inequality

Our adjustments to top wealth estimates have important implications for understanding the evolution of top incomes. Recent work attempts to allocate income not observed on tax returns in proportion to wealth estimates. Piketty, Saez and Zucman (2018) use the wealth estimates from Saez and Zucman (2016) to allocate components of national income not observed on tax returns, such as fixed income earned in non-taxable accounts, the retained earnings of C-corporations, and taxes whose statutory incidence does not fall on individual owners. Auten and Splinter (2017) use observed income flows and other survey data to perform the same exercise, leading to different conclusions than Piketty, Saez and Zucman (2018), reflecting in part the uncertainy inherent in these calculations.

In Figure 11, we use our new wealth estimates and follow the methodology of Piketty, Saez and Zucman (2018) to allocate national income. Figure 11A shows the effect of adjusting top 1% income in the form of interest income for the lower estimate of top 1% fixed income wealth.[44] This adjustment results in $262B less fixed income accruing to this group of people relative to the baseline series. As a share of national income, top 1% fixed income has been trending up over time in the baseline series, whereas it has remained stable in the adjusted series. Moreover, the adjusted series more closely tracks the aggregate fixed income wealth and flow series in recent years (Figure 2).

Figure 11B shows the effect of adjusting the allocation of C-corporation retained earnings and corporate taxes to reflect ownership estimated using a 25% or 0% weight on realized capital gains. The 25% adjustment results in $57B less C-corporation income accruing to the top 1% group. A dividends only allocation doubles the size of this adjustment.

Figure 11C combines these adjustments to show the effects on the top 1% capital share. In the baseline series, the top 1% capital share bounced back from its low in 2000 to 55%. Combining the wealth adjustments from Figures 11A and 11B reduces the capital share to [49%] in 2014 with the 25% weight on capital gains and to [48%] with the 0% weight on capital gains. The gap between the baseline series and the adjusted series is larger in recent years, reflecting the low interest rate environment.

[NEXT TO EXPLORE:

- What happens to the level and composition of top income?
  - Top share is somewhat lower, but still increased since 1980s

[44] As in our wealth analysis, we fix the ranks of the top 1% to isolate the effect of different assumptions on allocated amounts. TODO: reranking analysis

  - Top shares for different scenarios and ranks

- Top capital share is somewhat lower
  - DINA capital share vs SZZ capital share
- Composition is more private, less fixed income, how much is retained earnings vs dividends?
- Compare the effective capital and labor income tax rates before and after the adjustment. Capital tax rate is still quite low, but the gap is smaller. Mechanical revenue estimate from closing the gap?]

9.2 Wealth Taxation

This section analyzes two wealth tax proposals: a 1% tax on the wealth of the top 0.1% and an Ultra-millionaire tax that taxes wealth above $50M at 2% and adds an additional 1% surcharge on wealth above $1B. *Mechanical tax revenue calculations presented below include no behavioral response and should not be construed as a true revenue estimate.*

Wealth Tax on the Top 0.1% The tax base for the top 0.1% in 2014 is $11.1T, so the mechanical tax revenue from a 1% tax on all wealth would amount to $111B per year. If the tax restricted the base to marketable securities (i.e., fixed income assets and C-corporation equity wealth), which amounts to $5.0T for the top 0.1%, then the mechanical tax revenue would be $50 B per year.

Ultra-Millionaire Wealth Tax Senator Warren proposed an Ultra-Millionaire Wealth Tax on those with more than $50 in wealth and a billionaire surtax. The mechanical tax revenue depends on which assumptions are used for capitalization. Under equal returns assumptions in 2014, there are 52,000 individuals with more than $50 in wealth and 930 billionaires.[45] Collectively, under equal returns assumptions, $50+ millionaires have $9.1T

[45]The counts of ultra-millionaires in the baseline scenario are somewhat lower than the numbers from a recent analysis of Saez and Zucman `https://eml.berkeley.edu/~saez/saez-zucman-wealthtax-warren-online.pdf`. Our current understanding is that our analysis of the baseline differs for a few reasons. They focus on a more recent year of 2016 in the raw data, so population counts and wealth will be higher. They also inflate counts and wealth to match Financial Accounts totals for 2019, which means that our 2014 estimates should be lower. In addition, it also may be the case that the unit of analysis is at the tax unit level following Saez and Zucman (2016), rather than the equal split across individuals approach that we use following Piketty, Saez and Zucman (2018). Using tax units would increase wealth at the top as well.

of wealth, of which \$2.5T is owned by billionaires. The annual mechanical tax revenue is thus:

$$.02 \times (\$9.1T - 52000 \times \$50M) + .01 \times (\$2.5T - 930 \times \$1B) = \$146B. \tag{15}$$

Using alternative assumptions affects both the number of billionaires and \$50+ millionaires, as well as the level of their collective wealth.[46] Using the Aaa yields and $\alpha = 25\%$ for capital gains, there are 32.7K \$50+ millionaires and 436 billionaires and their wealth collectively amounts to \$5.1T, of which \$1.1T is owned by billionaires. The annual mechanical tax revenue under these assumptions from the ultra-millionaire wealth tax is

$$.02 \times (\$5.1T - 32650 \times \$50M) + .01 \times (\$1.1T - 436 \times \$1B) = \$76B. \tag{16}$$

Based on wealth estimates and ranks using Aaa yields and $\alpha = 25\%$ for capital, the ultra-millionaire threshold would need to be lowered from \$50M to \$11M to raise the mechanical tax revenue target of \$146B. There are 296,000 individuals with \$11M+ of wealth and they collectively own \$10.3T of wealth. Taxing their wealth in excess of \$11M would raise \$140B in mechanical tax revenue, and the billionaire surtax would amount to the remaining \$6B.

Implementing an ultra-millionaire tax using the capitalization method would effectively introduce additional category-specific income taxes on capital income. For example, consider someone whose capitalized income amounts to \$60M of wealth. If she earned \$1 more dollar of fixed income, her wealth would increase by \$113 under the equal returns assumption since the capitalization factor in 2014 is 113. The 2% tax would amount to \$2.26, which is a 226% marginal tax rate on fixed income for Ultra-millionaires (and a 339% tax rate for billionaires) under the equal returns assumptions. This marginal rate would be in addition to the existing income tax schedule, so the all-in marginal tax rate would be even higher.

Under heterogeneous returns, these effective marginal tax rates would be lower. Recall that the Aaa capitalization factor in 2014 was 24. Therefore, this 60 millionaire's marginal tax rate on a dollar of fixed income would be 48% (in addition to the existing marginal income tax rate). Furthermore, because higher yield categories such as public and private equity are more important in our adjusted series than fixed income wealth, the effective marginal tax rates on capital income from a 2% tax would be lower than implied by the baseline asset composition.

[46] Updated calculations that incorporate private business adjustments and rankings are in progress. They will likely increase the mechanical tax revenue to roughly 90B.

References

Arrow, Kenneth J. 1987. "The demand for information and the distribution of income." *Probability in the Engineering and Informational Sciences*, 1(1): 3–13.

Atkinson, Anthony Barnes, and Joseph E Stiglitz. 1976. "The design of tax structure: direct versus indirect taxation." *Journal of Public Economics*, 6(1-2): 55–75.

Auten, Gerald, and David Splinter. 2017. "Income Inequality in the United States: Using Tax Data to Measure Long-Term Trends."

Bach, Laurent, Laurent E Calvet, and Paolo Sodini. 2016. "Rich pickings? Risk, return, and skill in the portfolios of the wealthy."

Batty, Michael M. Batty, Jesse Bricker, Joseph S. Briggs, Elizabeth Holmquist, Susan Hume McIntosh, Kevin B. Moore, Eric R. Nielsen, Sarah Reber, Molly Shatto, Kamila Sommer, Tom Sweeney, and Alice Henriques Volz. 2019. "Introducing the Distributional Financial Accounts of the United States."

Bhandari, Anmol, Serdar Birinci, Ellen R McGrattan, and Kurt See. 2018. "What Do Survey Data Tell Us about US Businesses?" Federal Reserve Bank of Minneapolis.

Bricker, Jesse, Alice Henriques, and Peter Hansen. 2018. "How much has wealth concentration grown in the United States? A re-examination of data from 2001-2013."

Bricker, Jesse, Alice Henriques, Jacob Krimmel, and John Sabelhaus. 2016. "Measuring income and wealth at the top using administrative and survey data." *Brookings Papers on Economic Activity*, 2016(1): 261–331.

Chetty, Raj, and Nathaniel Hendren. 2018*a*. "The impacts of neighborhoods on intergenerational mobility I: Childhood exposure effects." *Quarterly Journal of Economics*, 133(3): 1107–1162.

Chetty, Raj, and Nathaniel Hendren. 2018*b*. "The impacts of neighborhoods on intergenerational mobility II: County-level estimates." *Quarterly Journal of Economics*, 133(3): 1163–1228.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez. 2014. "Where is the land of opportunity? The geography of intergenerational mobility in the United States." *Quarterly Journal of Economics*, 129(4): 1553–1623.

Cooper, Michael, John McClelland, James Pearce, Richard Prisinzano, Joseph Sullivan, Danny Yagan, Owen Zidar, and Eric Zwick. 2016. "Business in the United States: Who Owns It, and How Much Tax Do They Pay?" *Tax Policy and the Economy*, 30(1): 91–128.

Fagereng, Andreas, Luigi Guiso, Davide Malacrino, and Luigi Pistaferri. 2016. "Heterogeneity and persistence in returns to wealth."

Gabaix, Xavier, Jean-Michel Lasry, Pierre-Louis Lions, and Benjamin Moll. 2016. "The Dynamics of Inequality." *Econometrica*, 84(6): 2071–2111.

Garbinti, Bertrand, Jonathan Goupille-Lebret, and Thomas Piketty. 2018. "Income inequality in France, 1900–2014: Evidence from Distributional National Accounts (DINA)." *Journal of Public Economics*, 162: 63–77.

Giffen, Sir Robert. 1913. *Statistics.* Macmillan.

Guvenen, Fatih, Gueorgui Kambourov, Burhan Kuruscu, Sergio Ocampo, and Daphne Chen. 2017. "Use it or lose it: Efficiency gains from wealth taxation."

IRS. 2001-2017. "Estate Tax Statistics."

Kline, Patrick, and Enrico Moretti. 2014. "People, places, and public policy: Some simple welfare economics of local economic development programs." *Annual Review of Economics*, 6(1): 629–662.

Kopczuk, Wojciech. 2015. "What do we know about the evolution of top wealth shares in the United States?" *Journal of Economic Perspectives*, 29(1): 47–66.

Kopczuk, Wojciech, and Emmanuel Saez. 2004. "Top wealth shares in the united states: 1916-2000: Evidence from estate tax returns." *National Tax Journal*, 57(2, part 2): 445–488.

Mallet, Bernard. 1908. "A method of estimating capital wealth from the estate duty statistics." *Journal of the Royal Statistical Society*, 71(1): 65–101.

Piketty, Thomas. 2014. *Capital in the 21st Century.* Cambridge, MA:Harvard University Press.

Piketty, Thomas, Emmanuel Saez, and Gabriel Zucman. 2018. "Distributional national accounts: methods and estimates for the United States." *Quarterly Journal of Economics*, 133(2): 553–609.

Saez, Emmanuel. 2002. "The desirability of commodity taxation under non-linear income taxation and heterogeneous tastes." *Journal of Public Economics*, 83(2): 217–230.

Saez, Emmanuel, and Gabriel Zucman. 2016. "Wealth inequality in the United States since 1913: Evidence from capitalized income tax data." *Quarterly Journal of Economics*, 131(2): 519–578.

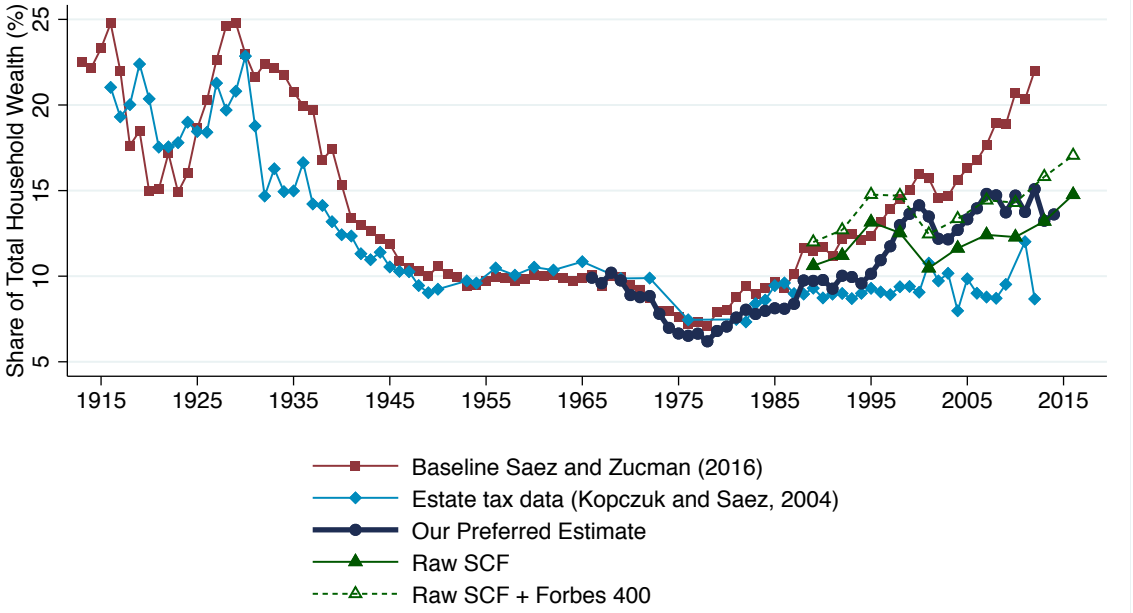
Smith, Matthew, Danny Yagan, Owen M Zidar, and Eric Zwick. 2019. "Capitalists in the Twenty-first Century." NBER Working Paper No. 25442.

Stewart, Charles. 1939. "Income Capitalization as a Method of Estimating the Distribution of Wealth By Size Groups." In *Studies in Income and Wealth, Volume 3.* 95–146. NBER.

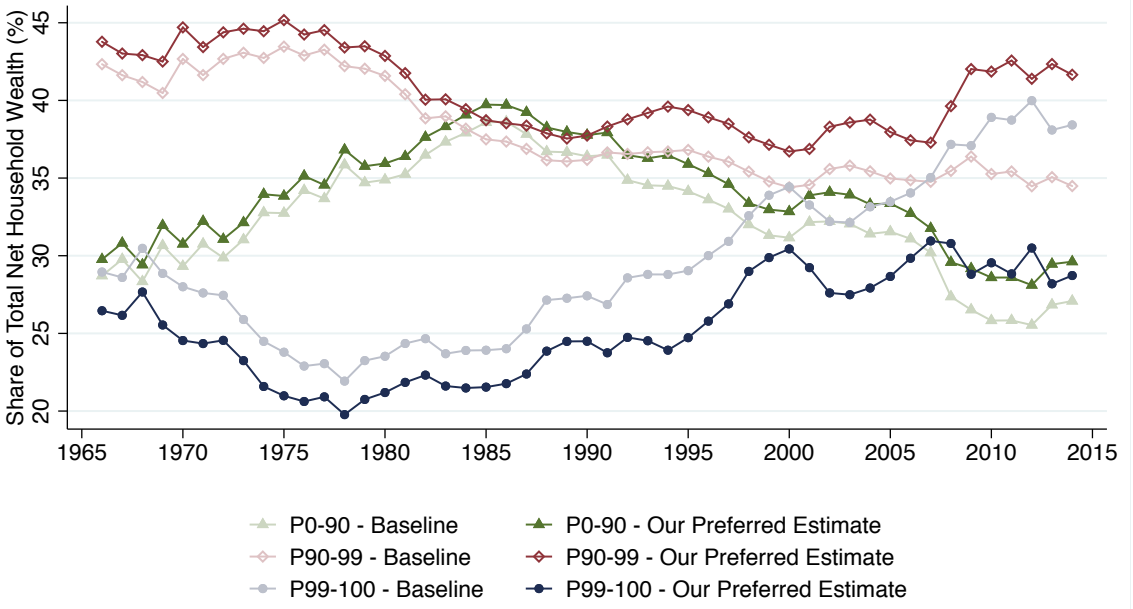
Zucman, Gabriel. 2013. "The missing wealth of nations: Are Europe and the US net debtors or net creditors?" *Quarterly Journal of Economics*, 128(3): 1321–1364.

Figure 1: Wealth Concentration in the United States

A. Top 0.1% Share of Total Wealth



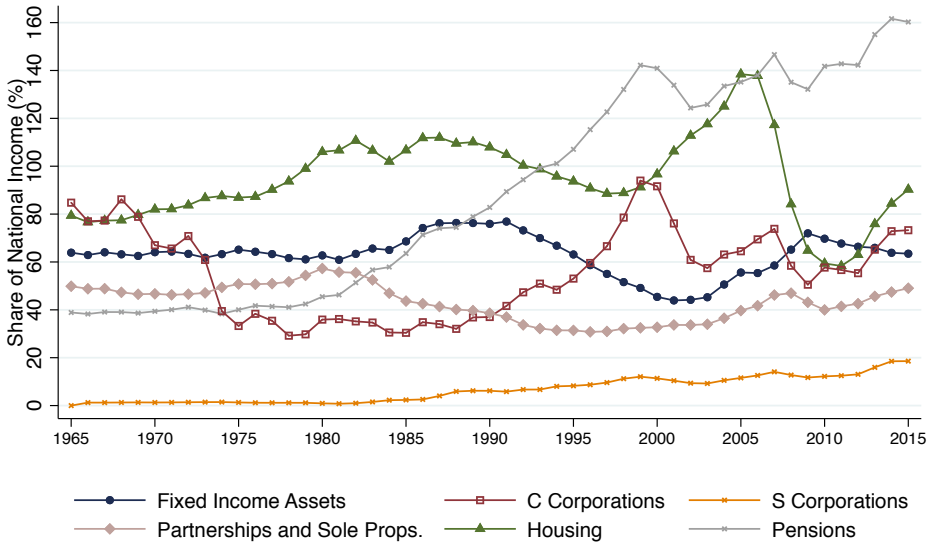
B. Wealth Shares of the Bottom 90%, P90-99, and Top 1%



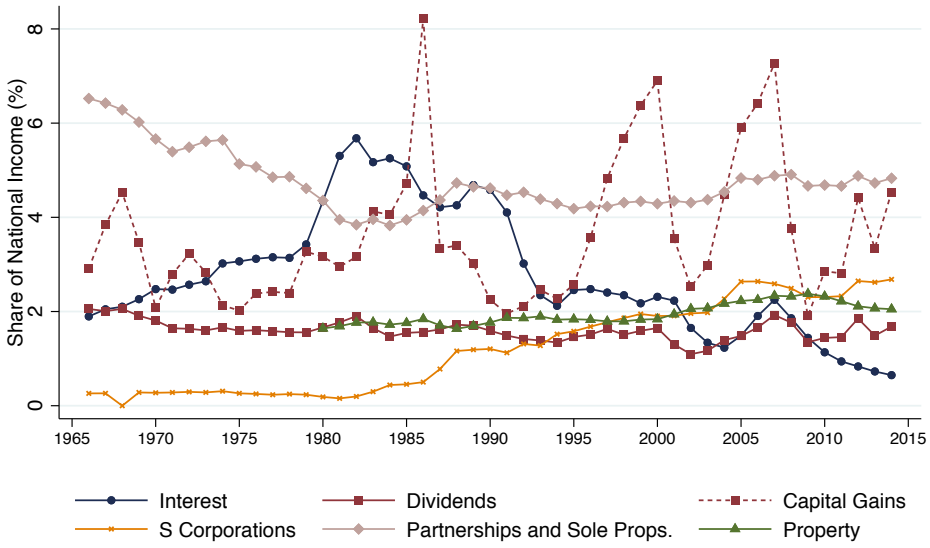
Notes: This figure plots the share of total household wealth for different wealth groups. Panel A graphs the top 0.1% share of net household wealth from Saez and Zucman (2016), Kopczuk and Saez (2004), and the SCF, as well as our preferred specification. Panel B plots the share of net household wealth of the bottom 90%, P90-99, and the top 1% of the wealth distribution under the baseline and our preferred alternatives.

Figure 2: Aggregate Household Wealth and Fiscal Income Components

A. Components of Aggregate Household Wealth

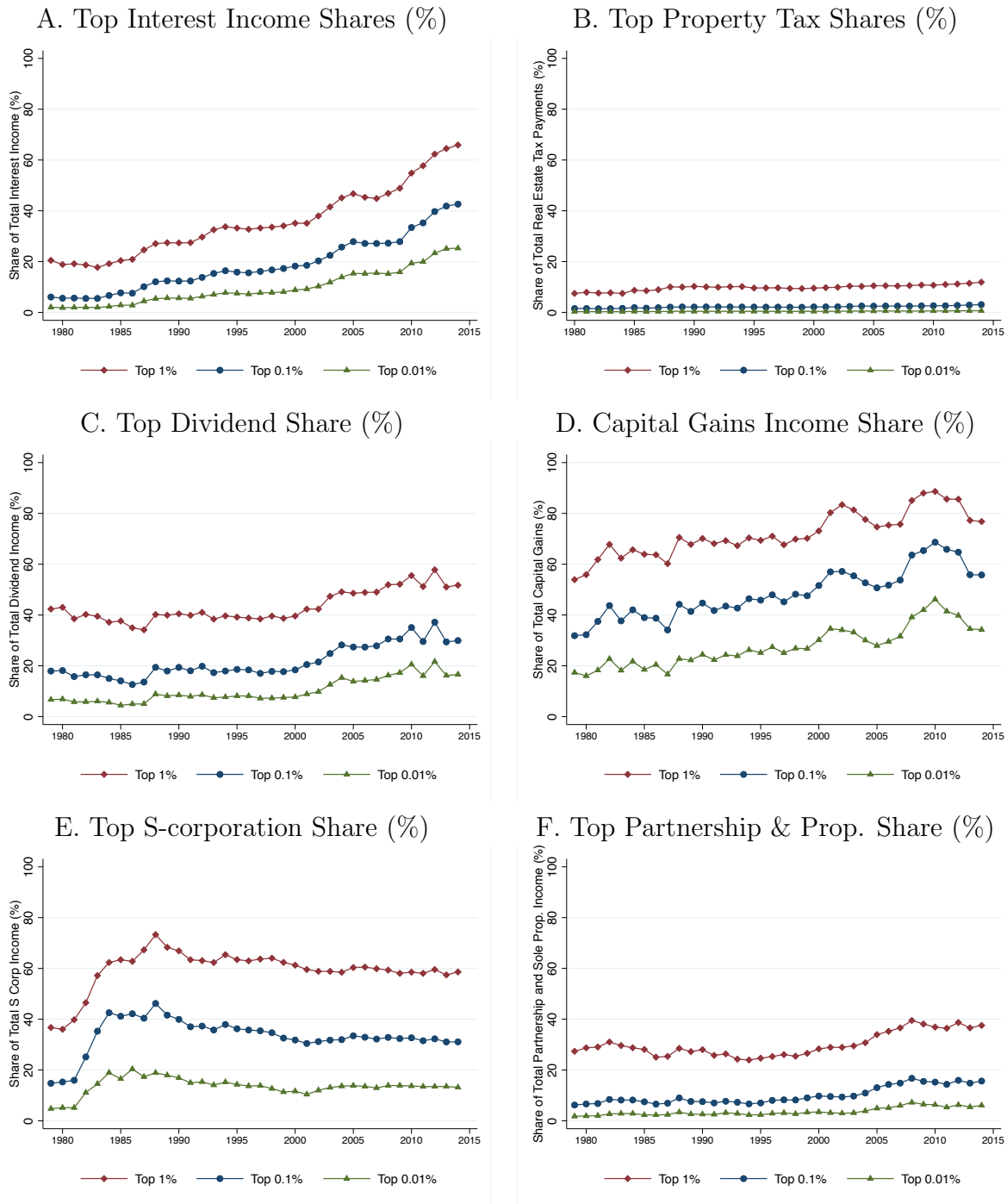


B. Components of Aggregate Fiscal Capital Income



Notes: This figure plots the main components of aggregate national household wealth and fiscal capital income. Panel A plots net household wealth components relative to national income. Fixed income assets include taxable bonds, municipal bonds, currencies, and deposits. Corporate and non-corporate equities include C- and S-corporation equities, as well as wealth in sole proprietorships and partnerships. Housing denotes housing wealth net of mortgages. Panel B graphs the ratio of components of fiscal income relative to national income.

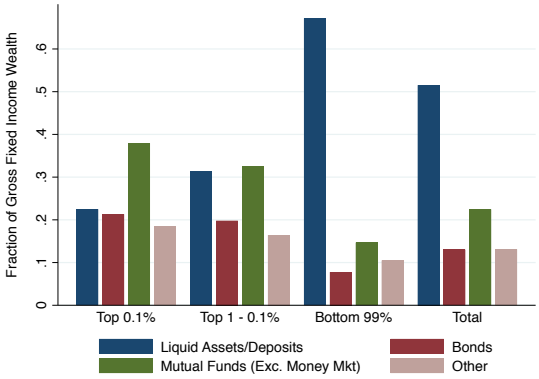
Figure 3: Concentration of Fiscal Capital Income



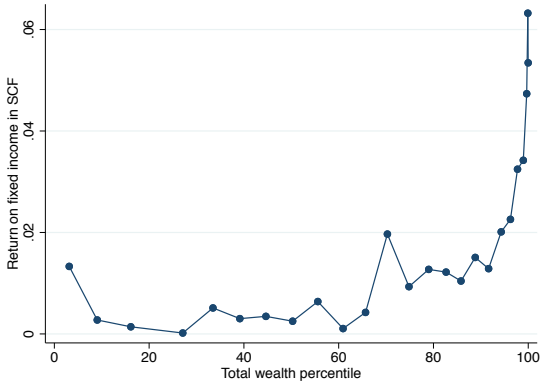
Notes: This figure describes the top share of fiscal income from different asset groups. Panel A plots the evolution of top shares of interest income. Panel B, C, D, E, and F provide analogous series for property taxes, dividends, realized capital gains, S-corporation income, and partnerships and sole proprietorship income, respectively.

Figure 4: Returns to Fixed Income Portfolios Vary across Wealth Groups

A. Fixed Income Portfolio Composition

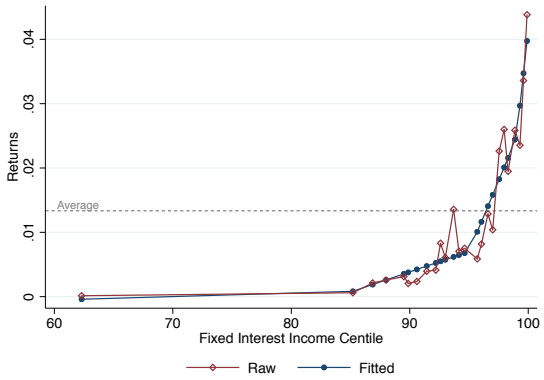


B. Rates of Return for Fixed Income Assets



C. Returns in Estate Tax Data

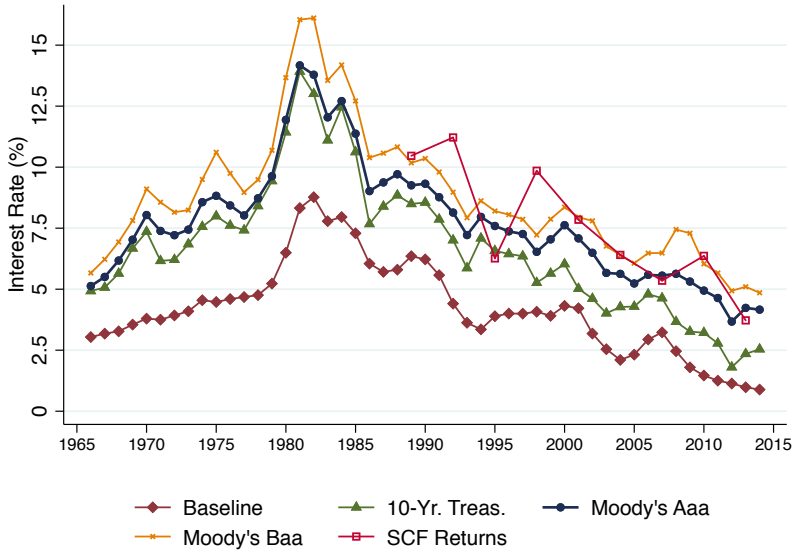
D. Fitted Returns by Splined Centile



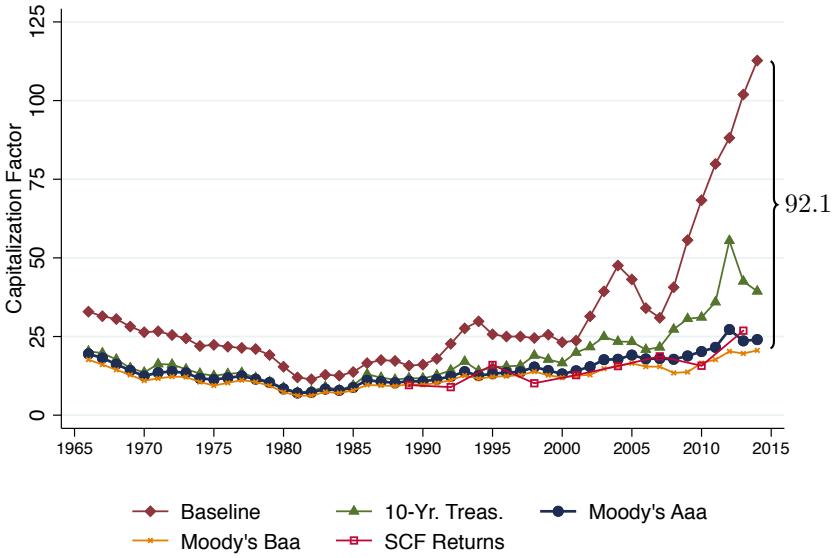
Notes: Panel A decomposes fixed income wealth into asset subclasses by wealth group. Panel B plots the returns to fixed income assets by total wealth percentile. Both graphs use data from the SCF and reported household wealth to define wealth ranks. Panel C (will) plot average returns to fixed income assets by gross estate size in the estate tax data. Panel D compares the raw returns to fixed income returns fitted using a four-piece linear spline with cut points at the 75^{th}, 95^{th}, 99^{th} and 100^{th} percentiles.

Figure 5: The Fall of Interest Rates and the Rise of Capitalization Factors

A. Interest Rate, $\bar{r}_{fix}$

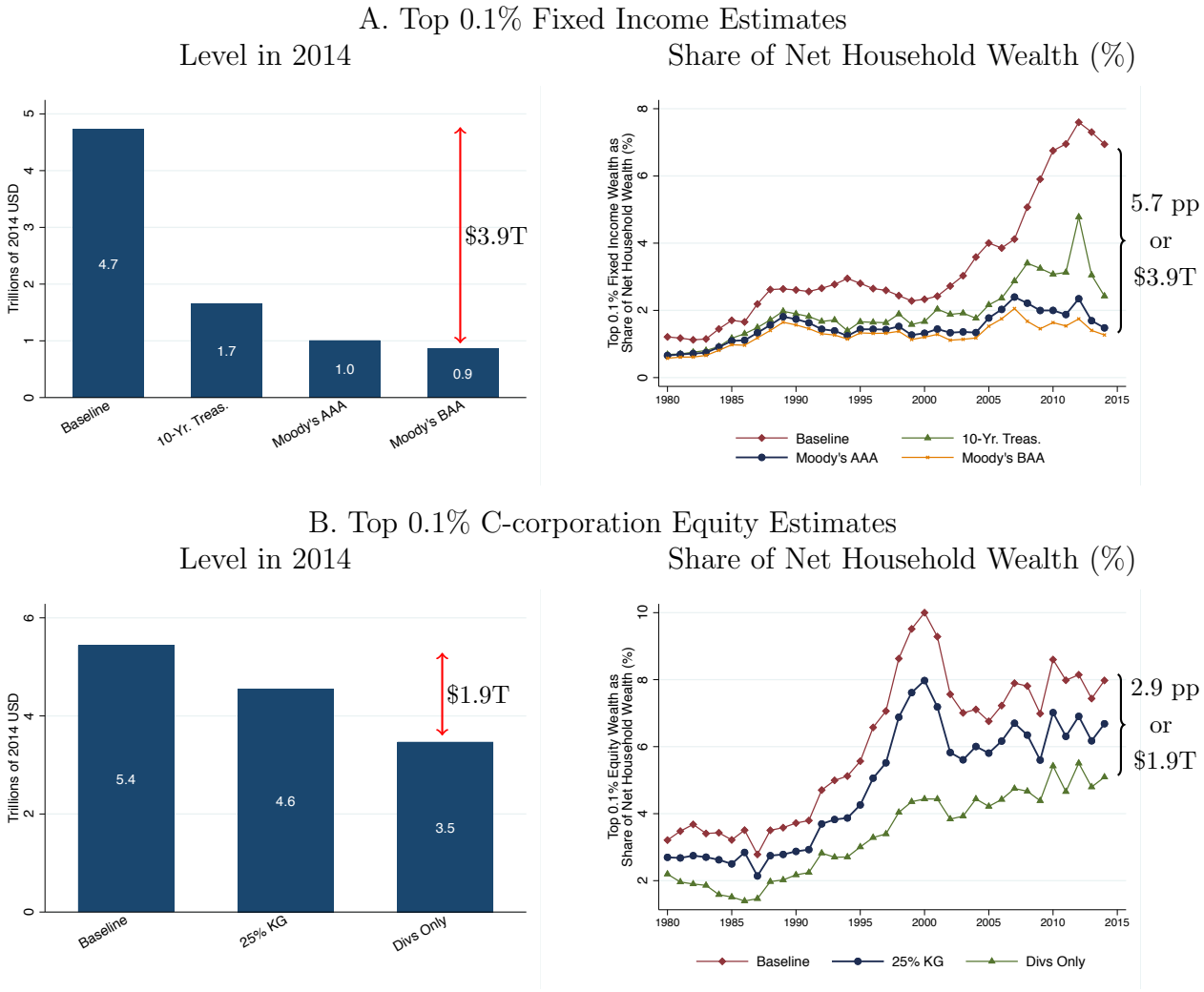


B. Capitalization Factor, $1/\bar{r}_{fix}$



Notes: This figure compares interest rates and capitalization factors under alternative assumptions of average returns to fixed income wealth. Panel A plots the rates of return on wealth, $\bar{r}_{fix}$. Baseline allocates Fixed Income wealth following the capitalization in Saez and Zucman (2016). 10-Yr. Treas., Moody's Aaa, and Moody's Baa refer to ten-year treasury yields, Moody's Aaa yields, and Baa yields, respectively, downloaded from FRED. SCF Returns plots returns to fixed income assets held by the top 0.1% of the SCF wealth distribution. Panel B plots capitalization factors, i.e., the reciprocal of these interest rates.

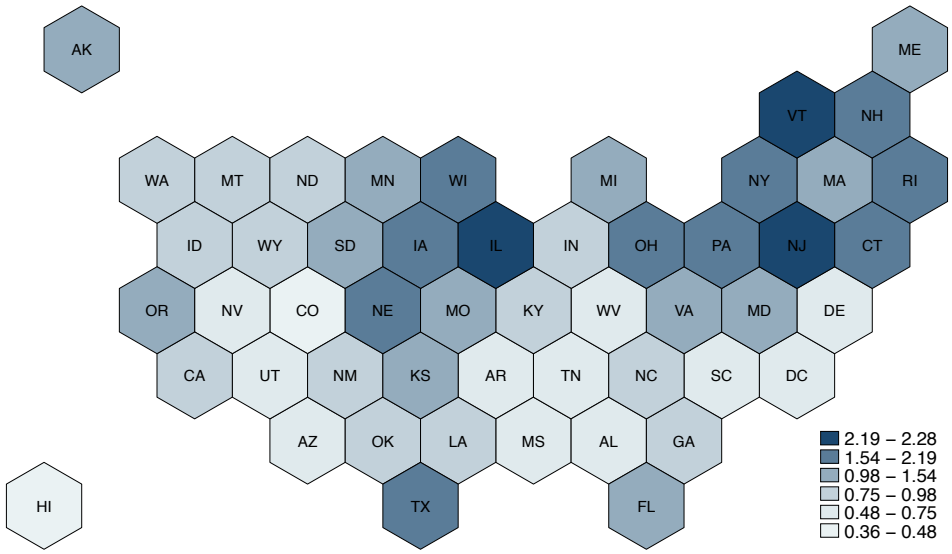
Figure 6: Refining Capitalization Yields Lower Estimates of Top Wealth



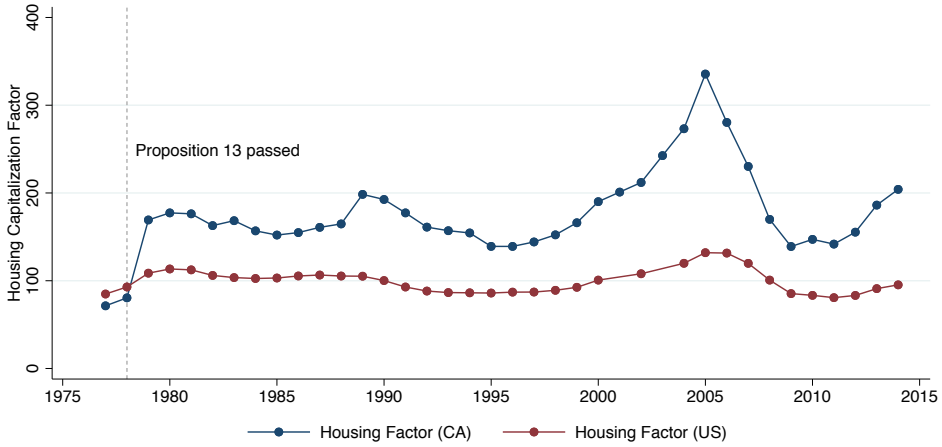
Notes: This figure calculates top wealth by asset type under alternative capitalization scenarios. Panel A presents fixed income estimates and Panel B presents C-corporation equity wealth estimates. Baseline allocates wealth following the equal returns capitalization in Saez and Zucman (2016). For fixed income, the other bars use alternative interest rates: the 10-year Treasury yield, Moody's Aaa, and Moody's Baa, respectively. For C-corporation wealth, Divs Only allocates C-corporation equity wealth using dividends only, and 25% KG allocates C-corporation equity wealth using dividends plus 25% of realized capital gains.

Figure 7: Regional Variation in the Returns to Housing Assets

A. Geographic Variation in Property Tax Rates



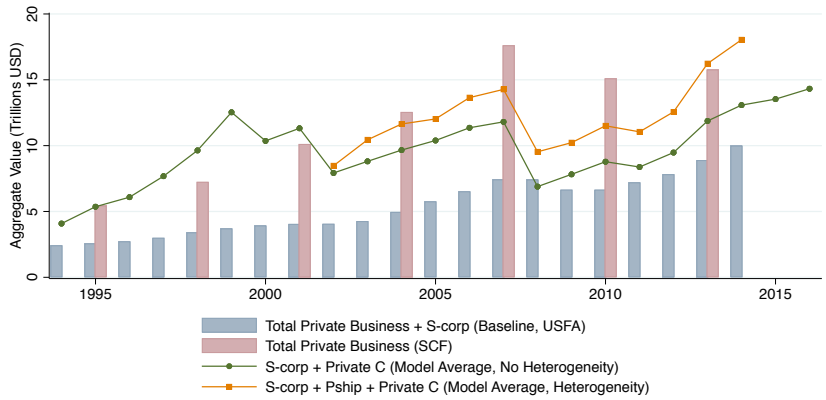
B. Evolution of Housing Capitalization Factors in California



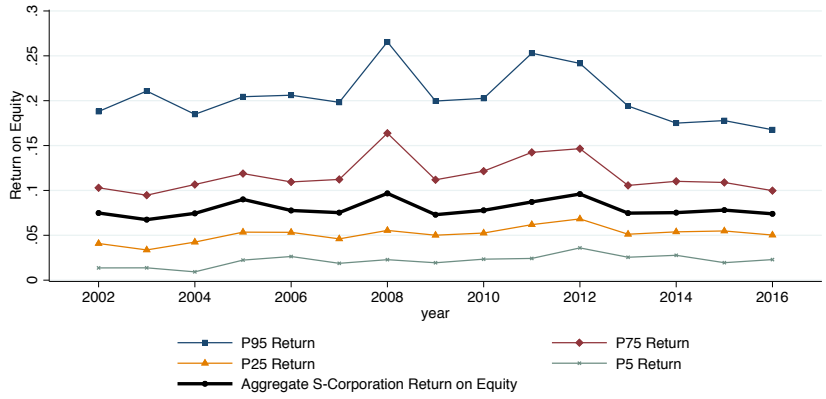
Notes: Panel A provides a map of state property tax rates from ATTOM. Panel B shows how the housing asset capitalization factor, equal to the reciprocal of the state property tax rate, has evolved in California versus an equal returns benchmark pooling all states.

Figure 8: Industry Variation in the Returns to Private Business Equity

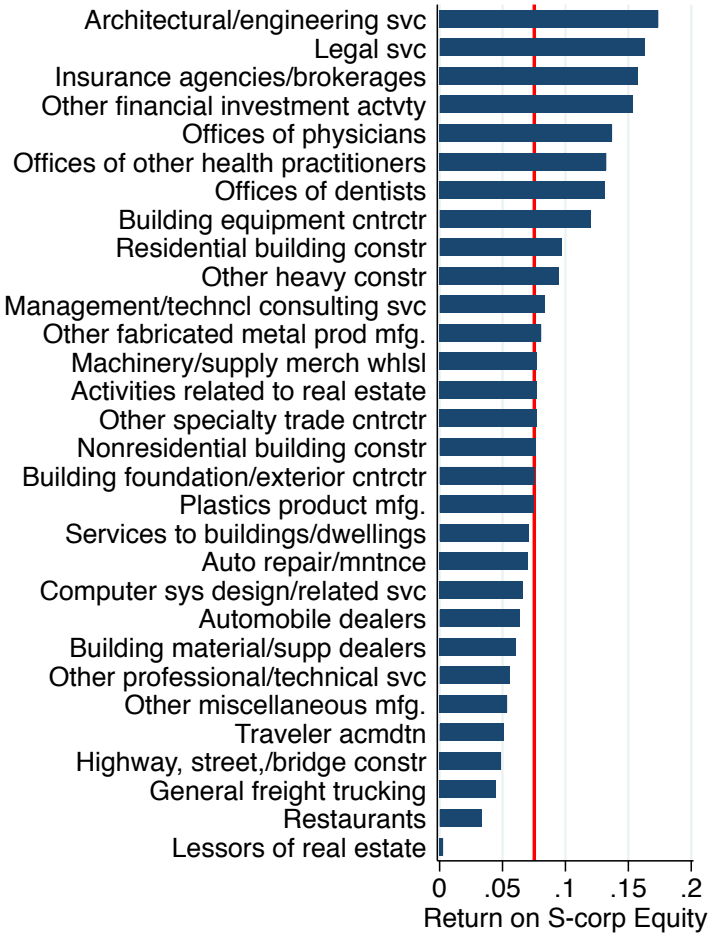
A. Aggregate Private Business across Data Source [PRELIM]



B. S-corporation Return Distribution by Year

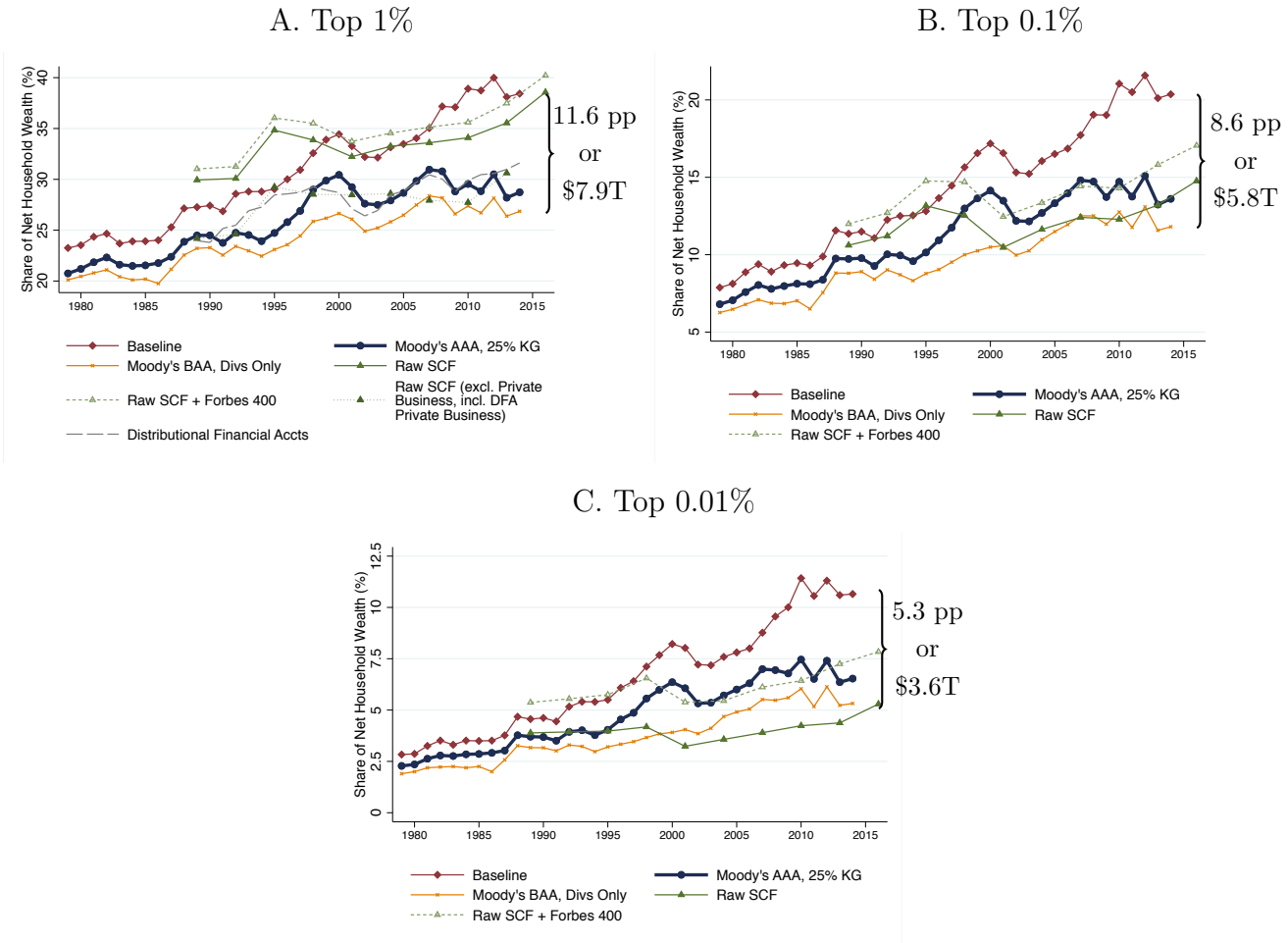


C. Industry Return Heterogeneity (2014)



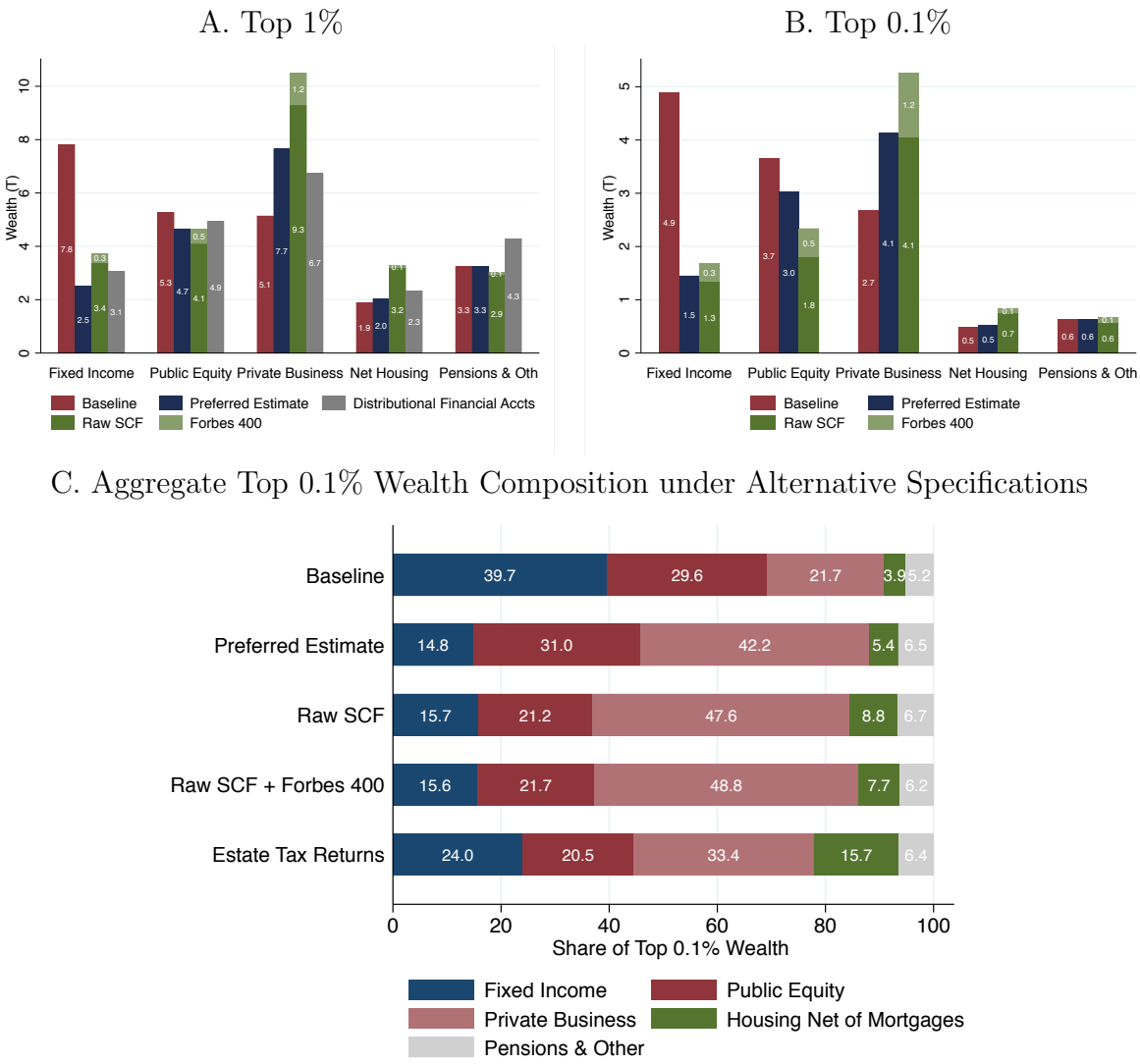
Notes: This figure documents heterogeneity in effective returns on equity across industries within the private business sector, as well as the differences in aggregate private business value across data source. Panel A compares the aggregate private business values from the Survey of Consumer Finances (SCF) to an analogous concept from the capitalization approach based on the US Financial Accounts, which combines non-corporate business wealth with S-corporation equity wealth. The panel also plots (1) multiple-based valuations for private C-corporation wealth plus S-corporation wealth assuming homogeneous returns across industry; and (2) multiple-based valuations for private C-corporation wealth as in (1) plus S-corporation and partnership valuations assuming heterogeneous returns across industry. Panel B and C focus on the distribution of implied returns from our valuation models within the S-corporation sector. Panel B plots the aggregate return and different quantiles across 4-digit industry from 2002 to 2016. Panel C plots the return by industry in 2014 for the thirty largest industries in terms of aggregate S-corporation value, ordered by return on equity. The red line corresponds to the aggregate return on equity within the S-corporation sector.

Figure 9: Top Share of Wealth under Alternative Specifications



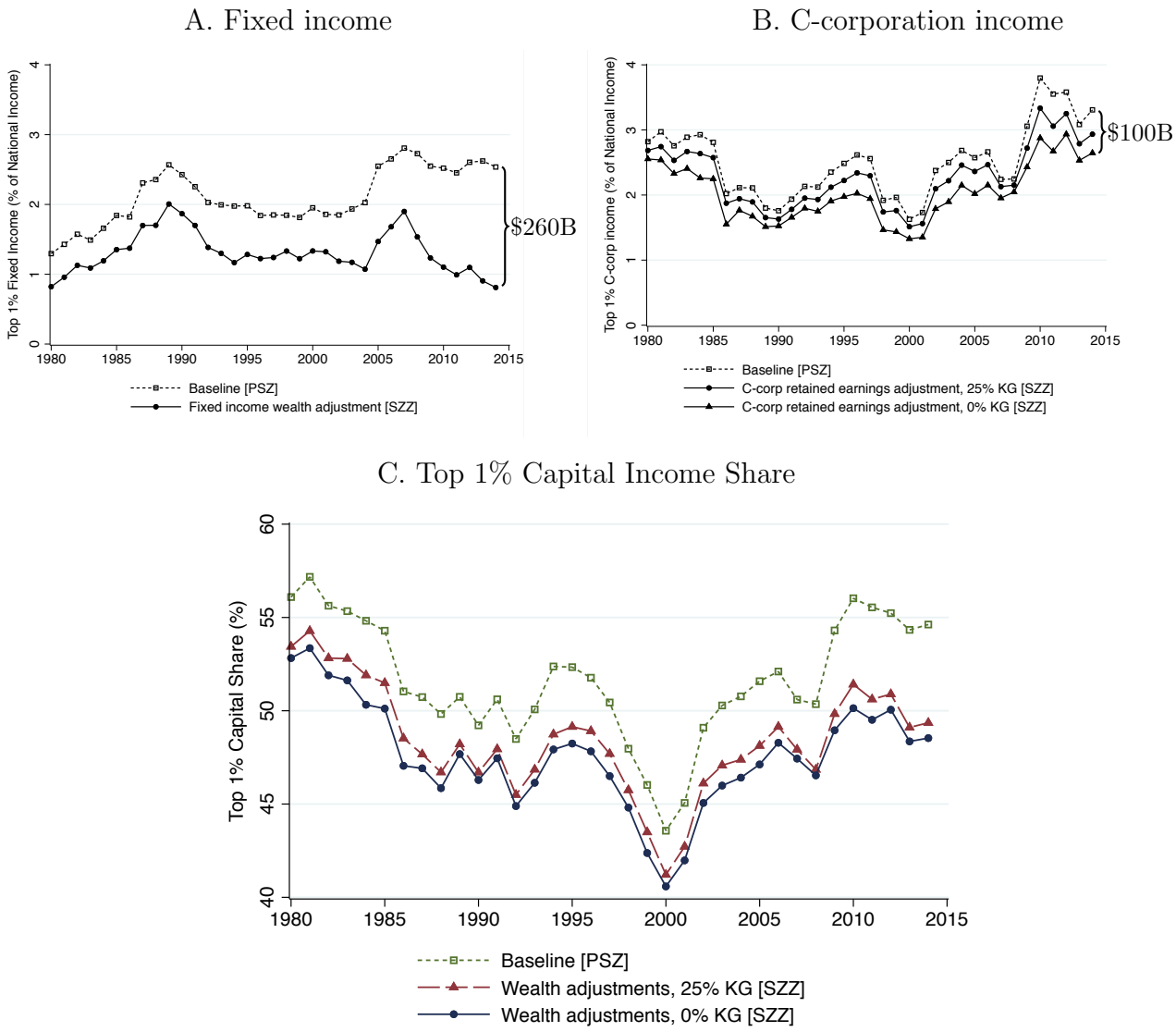
Notes: This figure plots the top share of net household wealth under alternative scenarios. Baseline allocates wealth following the capitalization in Saez and Zucman (2016). Baseline, Divs Only allocates C-corporation equity wealth using dividends only. Moody's Aaa, 25% KG allocates fixed income asset wealth assuming top wealth holders get Moody's Aaa yields, and C-corporation equity wealth using dividends plus 25% of realized capital gains. Moody's Baa, Divs Only allocates fixed income asset wealth assuming top wealth holders get Moody's Baa yields, and C-corporation equity wealth using dividends only. 10-Yr. Treas. allocates fixed income asset wealth assuming top wealth holders get 10-year Treasury yields, and allocates C-corporation wealth according to the baseline capitalization method. Raw SCF plots the wealth allocation in SCF, and Raw SCF + Forbes 400 adds Forbes 400 wealth to the raw SCF series. Distributional Financial Accounts plots top 1% net worth from the Distributional Financial Accounts (DFA) series (see Batty, Bricker, Briggs, Holmquist, Hume McIntosh, Moore, Nielsen, Reber, Shatto, Sommer, Sweeney and Henriques Volz, 2019). Raw SCF (excl. Private Business, incl. DFA Private Business) adjusts the raw SCF series as follows: it subtracts private business wealth from total net household wealth, and adds private business wealth from the DFA series.

Figure 10: Top Wealth Composition in 2013 under Alternative Specifications



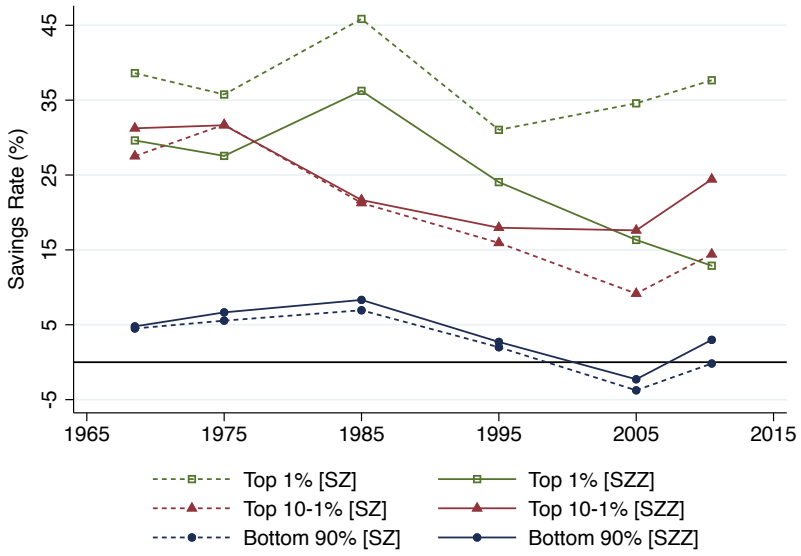
Notes: This figure presents top wealth in 2013 under alternative scenarios and for the SCF and Distributional Financial Accounts. Baseline allocates wealth following the capitalization in Saez and Zucman (2016). Preferred Estimate allocates fixed income asset wealth assuming top wealth holders get Moody's Aaa yields, C-corporation equity wealth using dividends plus 25% of realized capital gains, housing by state-specific capitalization factors, and pass-through equity using industry-specific market-based valuation models. For the baseline, preferred, estate tax, and DFA series, 20% of C-corporation wealth is reallocated to the private business category to account for private C-corporations. Raw SCF plots the wealth allocation in the SCF, and Raw SCF + Forbes 400 adds Forbes 400 wealth to the raw SCF series. Estate Tax Returns uses data from the SOI Estate Tax Statistics (IRS, 2001-2017). The threshold for the top 0.1% in 2013 is $14.4M, so the estate tax cross-section only includes returns whose size of gross estate is at least $10M.

Figure 11: Top Capital Share Implications



Notes: This figure shows the effect of alternative wealth assumptions for the allocation of capital income to top earners. Panel A and B plot top 1% fixed income and equity share of national income, respectively. Panel C compares the capital share of top 1% income under alternative assumptions regarding allocation of wealth.

Figure 12: Evolution of Savings Rates by Wealth Group



Notes: This figure plots the savings rates for different wealth groups for two different wealth estimates following the savings rate analysis of Saez and Zucman (2016). Savings in decade t defines as flows of wealth from t to $t+1$ that are not due to price-adjusted returns to assets for the top 1%, next 9%, and bottom 90% of the wealth distribution. The dashed lines show the estimates from Saez and Zucman (2016), while the solid lines show the rates in the Moody's Aaa, 25% KG specification.

Table 1: Thresholds and Average Wealth in Top Wealth Groups (2014)

Wealth group	Count	Threshold	Average wealth		Wealth share	
			Baseline	Preferred	Baseline	Preferred
Panel A. Top wealth groups						
Full population	234,239,000		$291,000	$314,000	100.0%	100.0%
Top 10%	23,424,300	$553,000	$2,121,000	$2,244,000	72.9%	71.4%
Top 1%	2,342,400	$3,160,000	$11,179,000	$9,705,000	38.4%	30.9%
Top 0.1%	234,600	$15,997,000	$59,155,000	$47,473,000	20.4%	15.1%
Top 0.01%	23,400	$92,354,000	$310,028,000	$222,959,000	10.7%	7.1%
Panel B. Intermediate wealth groups						
Bottom 90%	210,814,700		$88,000	$100,000	27.1%	28.6%
Top 10-1%	21,081,900	$553,000	$1,115,000	$1,415,000	34.5%	40.5%
Top 1-0.1%	2,107,800	$3,160,000	$5,839,000	$5,502,000	18.1%	15.8%
Top 0.1-0.01%	211,200	$15,997,000	$31,337,000	$28,014,000	9.7%	8.0%
Top 0.01%	23,400	$92,354,000	$310,028,000	$222,959,000	10.7%	7.1%

Notes: This table provides summary statistics on the distribution of wealth across individuals in 2014. Average wealth and wealth shares are calculated under the baseline specification and our preferred capitalization alternative. Baseline allocates wealth following the capitalization in Saez and Zucman (2016). Preferred allocates fixed income asset wealth assuming top wealth holders get Moody's Aaa yields, C-corporation equity wealth using dividends plus 25% of realized capital gains, housing by state-specific capitalization factors, and pass-through equity using industry-specific market-based valuation models.

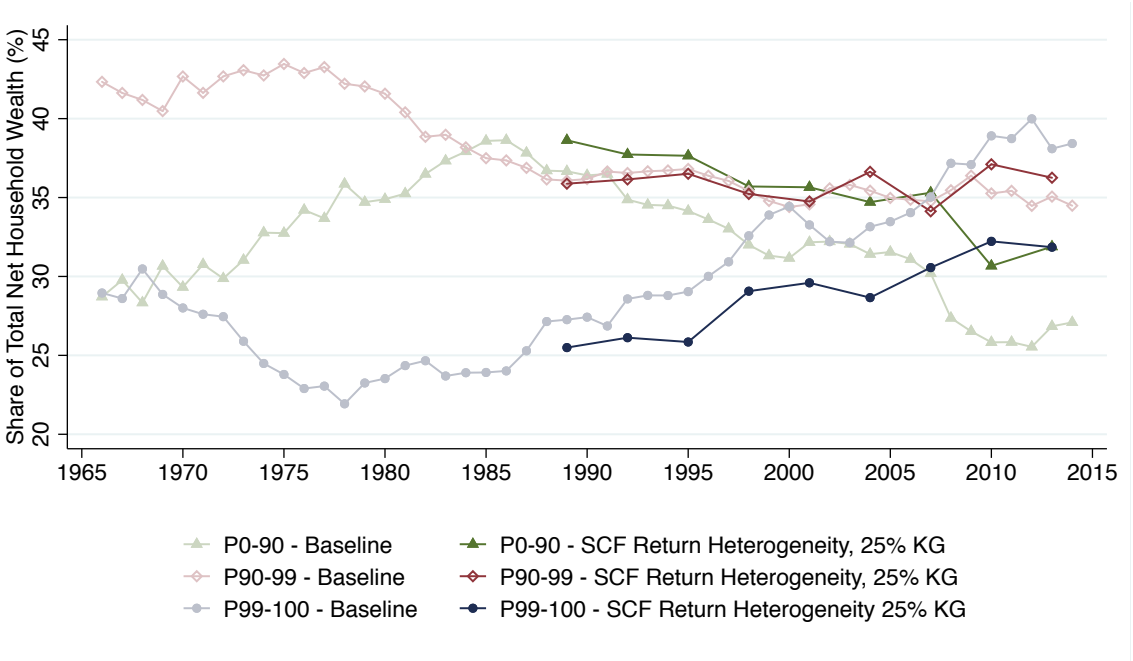
Table 2: Industrial Composition of Top-0.1-Owned Pass-through Firm Value (2014)

Rank	Industry (NAICS)	S+P Value ($B)	Returns (%)	Value/Firm ($M)	Value/Owner ($M)	S Value	P Value
1	Other financial investment actvty (5239)	743	7.9	11.3	0.3	134	634
2	Lessors of real estate (5311)	329	0.7	2.6	0.4	26	302
3	Legal svc (5411)	296	14.0	83.7	4.9	24	272
4	Activities related to real estate (5313)	187	4.3	3.2	0.4	29	158
5	Security contracts broker (5231)	184	3.0	103.7	0.8	9	174
6	Other pipeline trnsprt (4869)	174	-0.1	1518.6	0.2	0	173
7	Other investment pools/funds (5259)	169	2.7	14.5	0.9	4	164
8	Oil/gas extraction (2111)	145	9.4	17.3	0.1	39	106
9	Other professional/technical svc (5419)	138	5.9	15.9	3.0	84	54
10	Management/techncl consulting svc (5416)	126	5.3	21.4	4.8	73	53
11	Automobile dealers (4411)	114	6.8	17.1	7.4	94	19
12	Restaurants (7225)	93	3.8	8.2	1.3	53	39
13	Computer sys design/related svc (5415)	90	4.7	28.2	4.2	70	19
14	Misc. durable goods merch whlsl (4239)	87	5.8	33.0	9.6	72	15
15	Offices of physicians (6211)	81	11.6	13.5	2.4	37	43
16	Other heavy constr (2379)	80	5.2	112.8	32.0	73	6
17	Accounting/bookkeeping svc (5412)	69	9.1	79.5	3.9	6	63
18	Depository credit intrmd (5221)	68	2.9	149.6	3.7	63	5
19	Other miscellaneous mfg. (3399)	68	6.7	32.4	4.0	52	15
20	Petroleum merch whlsl (4247)	57	3.6	119.8	0.1	23	34
21	Nondepository credit intrmd (5222)	55	6.8	19.0	1.7	28	26
22	Other specialty trade cntrctr (2389)	54	7.9	20.2	7.9	47	7
23	Plastics product mfg. (3261)	49	5.8	71.0	14.2	43	5
24	Other fabricated metal prod mfg. (3329)	45	9.0	32.8	9.0	40	5
25	Traveler acmdtn (7211)	43	3.7	7.5	1.0	14	28
26	Building material/supp dealers (4441)	37	5.6	67.2	19.8	35	2
27	Alcoholic bev merch whlsl (4248)	37	4.7	57.1	10.1	32	4
28	Misc. nondrbl gds merch whlsl (4249)	36	11.4	21.5	5.3	27	8
29	Other miscellaneous store retailers (4539)	35	5.5	22.3	7.6	28	7
30	Other motor vehicle dealers (4412)	35	4.2	41.1	15.5	30	5
	Aggregate	**5487**	**6.5**	**11.9**	**0.6**	**2519**	**3004**

Notes: This table presents statistics on the value of top 0.1%-owned pass-through businesses by 4-digit industry. The rows are sorted by the level of top pass-through value for S-corporations and partnerships.

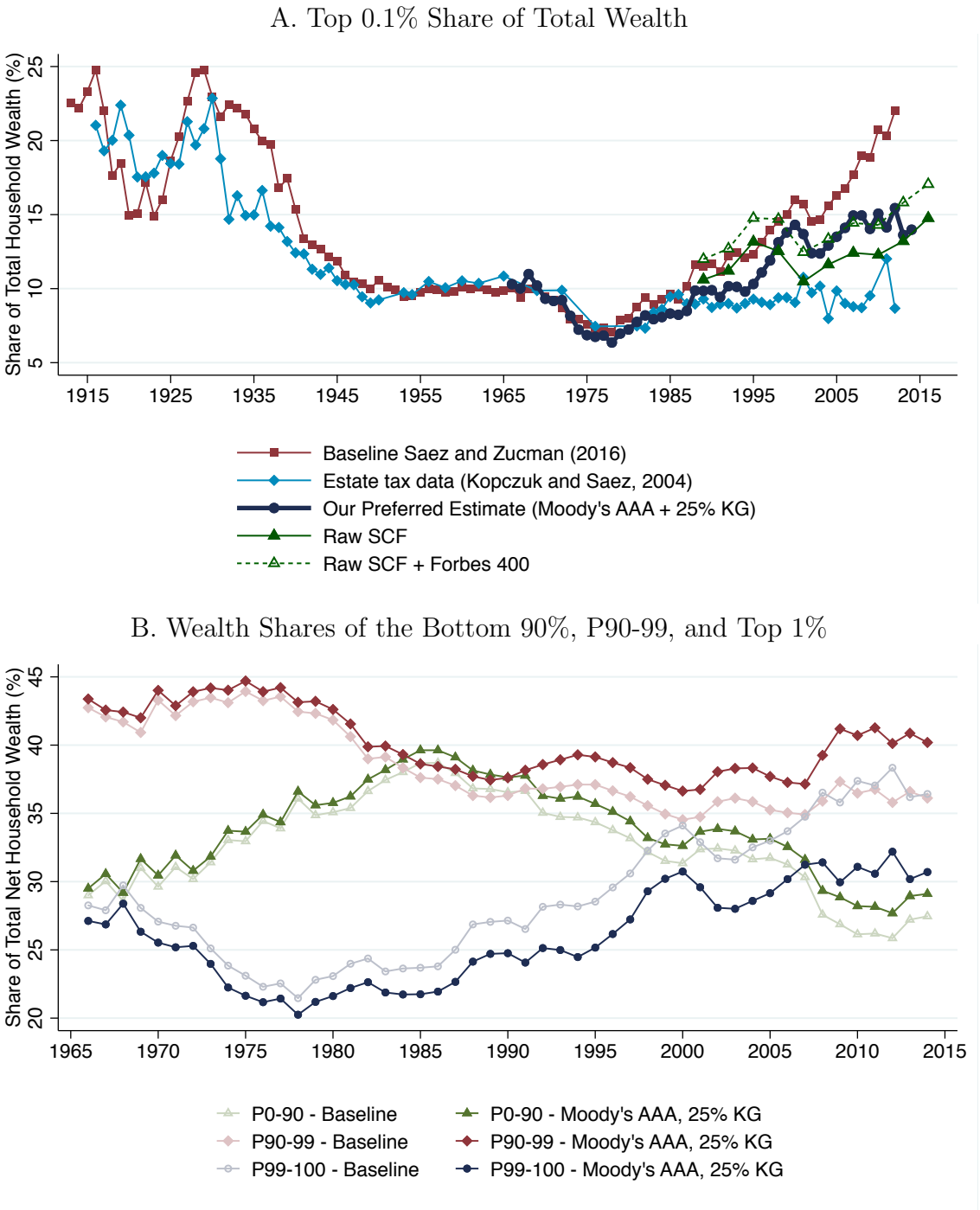
A Appendix Figures

Figure A.1: Wealth Shares of the Bottom 90%, P90-99, and Top 1%, SCF Heterogeneous Returns



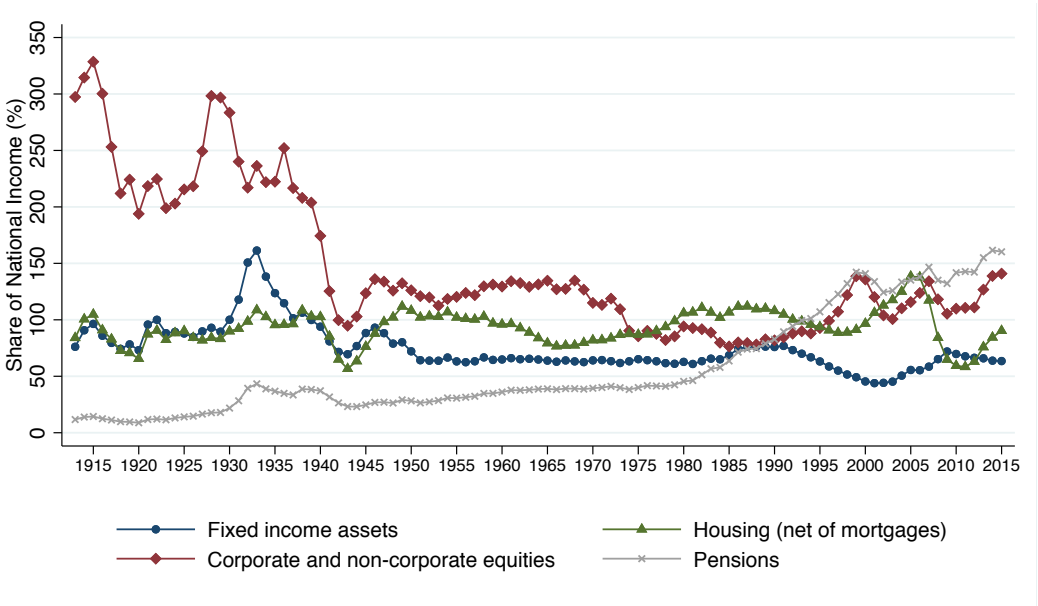
Notes: This figure replicates Figure 1B using SCF Hetereogeneous Returns to capitalize fixed income.

Figure A.2: Wealth Concentration in the United States, Ranked Using Preferred Capitalization Method



Notes: This figure plots the share of total household wealth for different wealth groups. We define ranks in the wealth distribution using our preferred capitalization method. See Figure 1 for definitions.

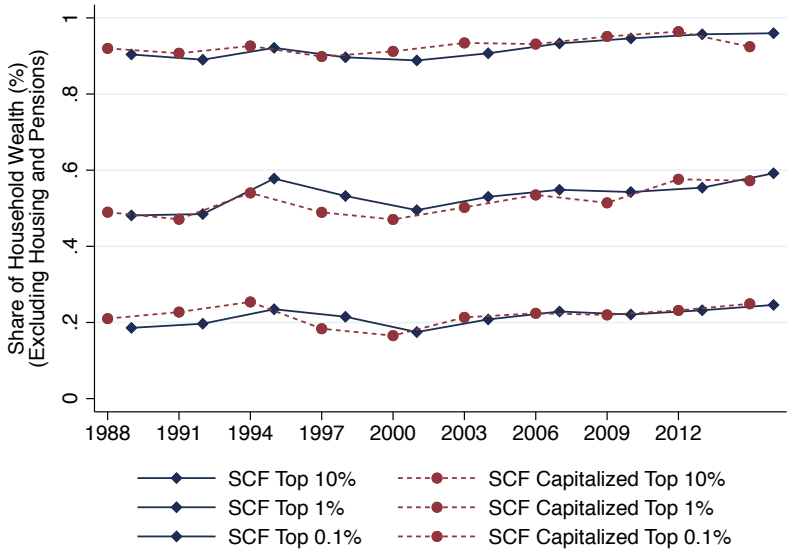
Figure A.3: Components of Aggregate Household Wealth (1912-2013)



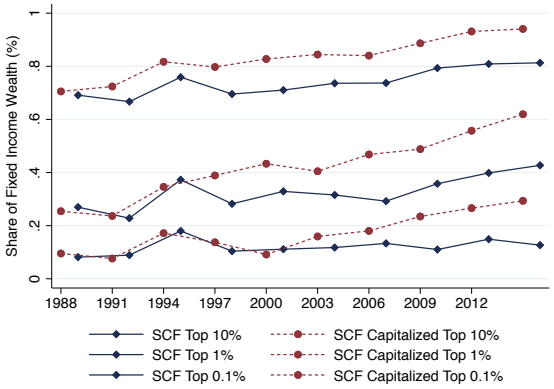
Notes: This figure replicates Figure 2A from 1912 to 2015, using data from the Financial Accounts. Fixed income assets include tax bonds, municipal bonds and currency deposits. Corporate and non-corporate equities include C- and S-corporation equities, as well as wealth in sole proprietorships and partnerships. Housing denotes housing wealth net of mortgages.

Figure A.4: Top Wealth Shares vs. Capitalized Income Shares in SCF

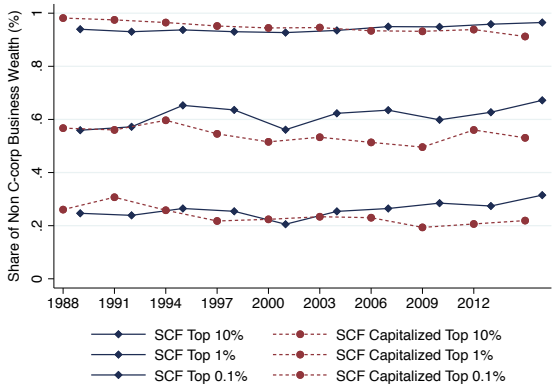
A. Replicating Figure IV.B. of Saez and Zucman (2016)



B. Actual vs. Capitalized Fixed Income

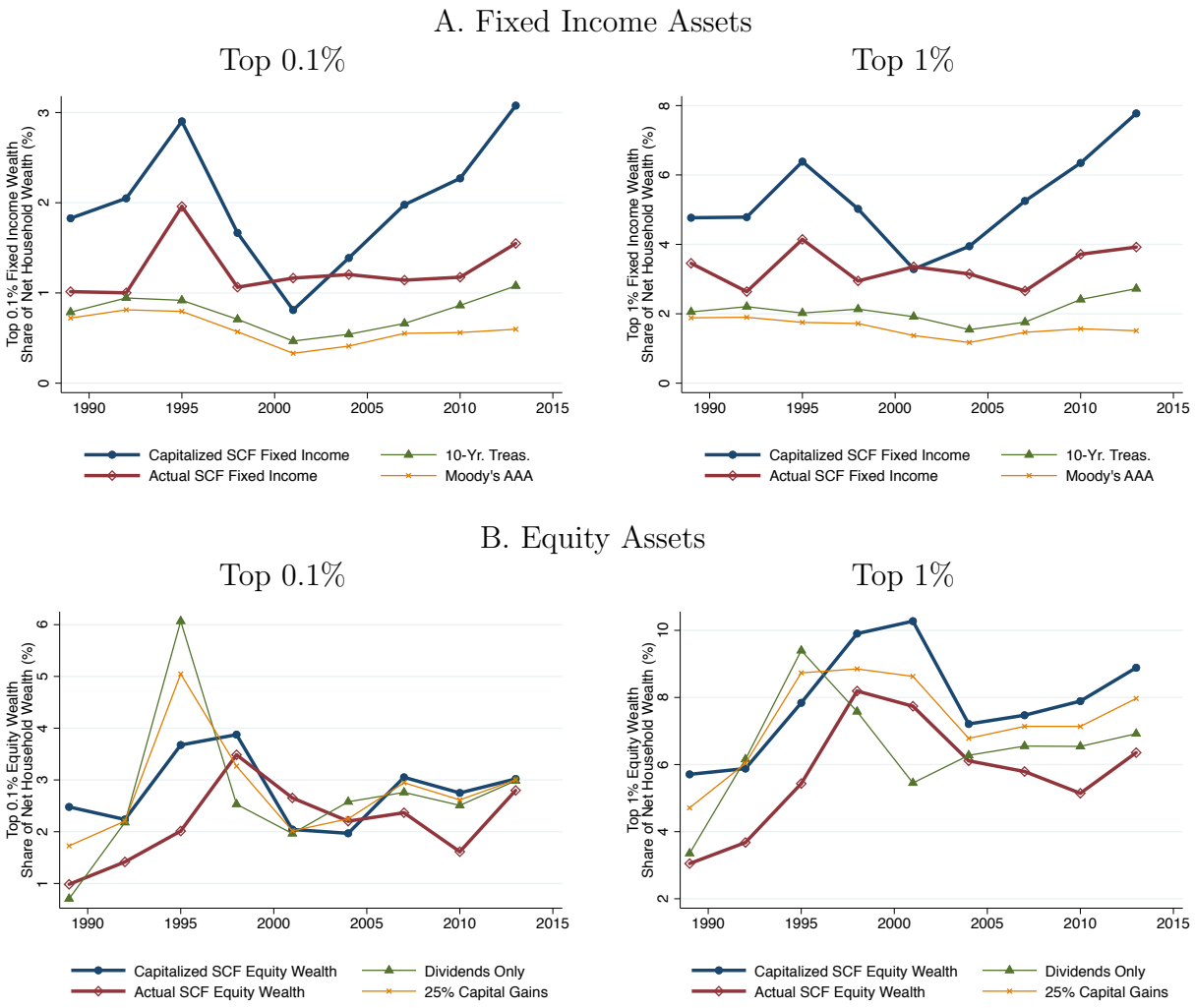


C. Actual vs. Capitalized Private Business Income



Notes: This figure plots the fraction of wealth (excluding housing and pensions) held by the top 10%, 1%, and 0.1% in the SCF using actual SCF wealth and capitalized income wealth. We exclude housing and pensions to exactly replicate Figure IV.B. of Saez and Zucman (2016). Panel A replicates Figure IV.B and plots two series. The solid line plots actual SCF wealth, while the dashed line plots SCF capitalized income. The composition of a given income group differs across the two measures as top 10% is defined using the each series own ranking. For example, the share of wealth held by households that are in the top 10% of actual SCF wealth (excluding housing and pensions) are plotted in the solid blue series in Panel A, whereas the dashed series corresponds to a different group of top 10% households who have top 10% wealth based on ranking households using a wealth measure from capitalizing SCF income by category. Panel B and C show that the similarity in shares in Panel A masks substantial differences in actual versus capitalized wealth by category. Panel B shows that plotting the shares of fixed income wealth using the same overall wealth rankings as panel A reveals that the capitalized series overstates fixed income wealth concentration relative to the actual. In contrast, Panel C shows that capitalized private business income understates actual private business wealth concentration in the SCF.

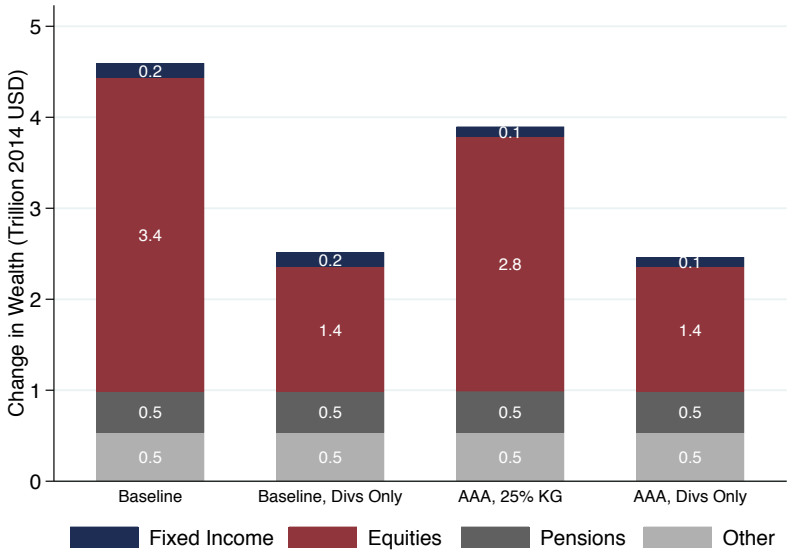
Figure A.5: Within-SCF Capitalization [Preliminary and in progress]



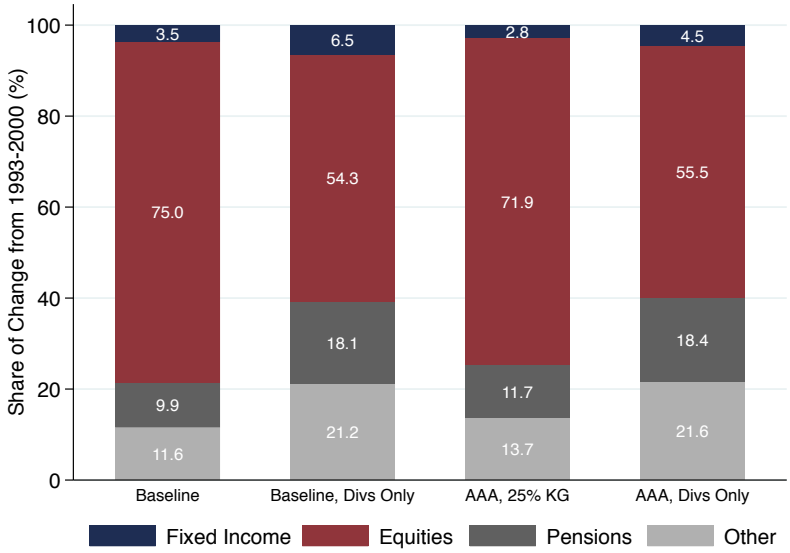
Notes: This figure compares the allocation of top equity wealth in the SCF dataset under alternative capitalization assumptions. **Actual SCF Equity Wealth** reflects the actual allocation of equity wealth in the SCF dataset. **Capitalized SCF Equity Wealth** capitalizes equity wealth to match the Financial Accounts totals. **Dividends Only** and **25% KG** follow the capitalization in the **Capitalized SCF Equity Wealth** scenario using dividends, and dividends plus 25 percent of capital gains to allocate SCF equity wealth. Data sources described in Section 2.

Figure A.6: Decomposition of Change in Top 0.1% Wealth from 1993-2000

A. Trillions of 2014 Dollars



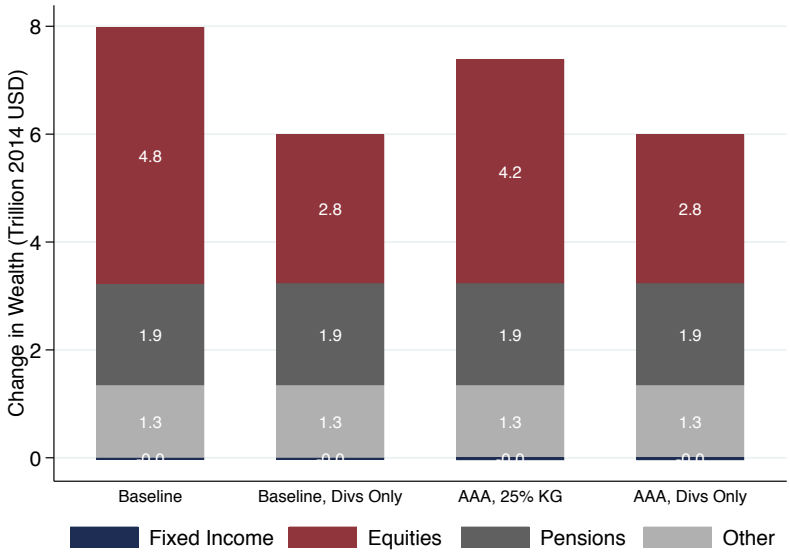
B. Share of Total Change



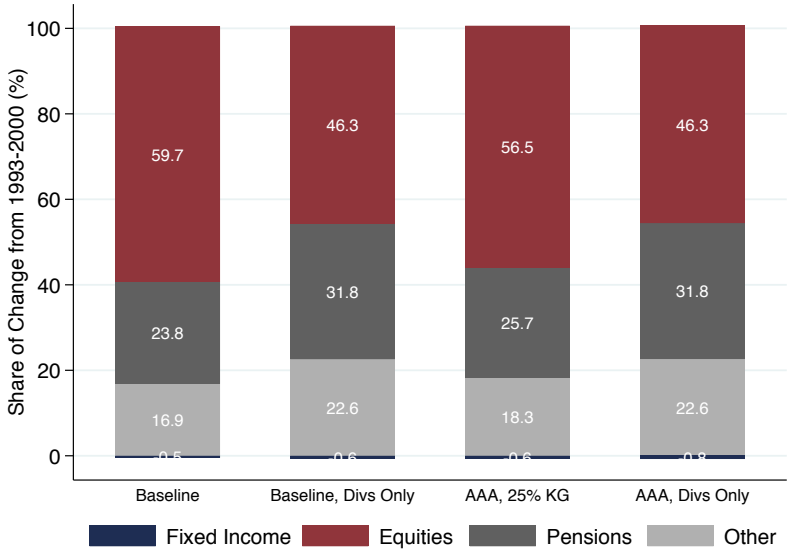
Notes: This figure decomposes the change in top 0.1% net household wealth from 1993 to 2000 into changes in fixed income, equity, pension and other wealth in the same period. Panel A plots the level changes, and Panel B plots changes as share of the change top 0.1% net household wealth.

Figure A.7: Decomposition of Change in Top 1% Wealth from 1993-2000

A. Trillions of 2014 Dollars

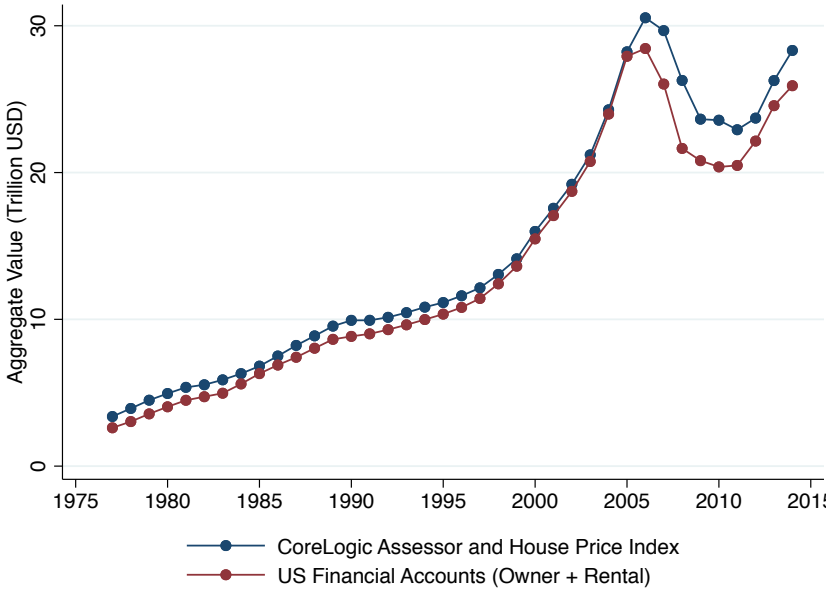


B. Share of Total Change



Notes: This figure decomposes the change in top 1% net household wealth from 1993 to 2000 into changes in fixed income, equity, pension and other wealth in the same period. Panel A plots the level changes, and Panel B plots changes as share of the change top 1% net household wealth.

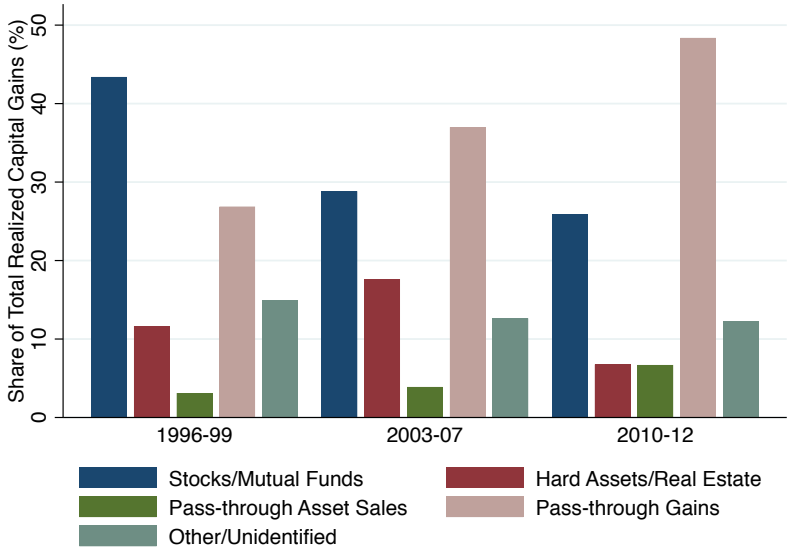
Figure A.8: Aggregate Housing Asset Values Match Financial Accounts



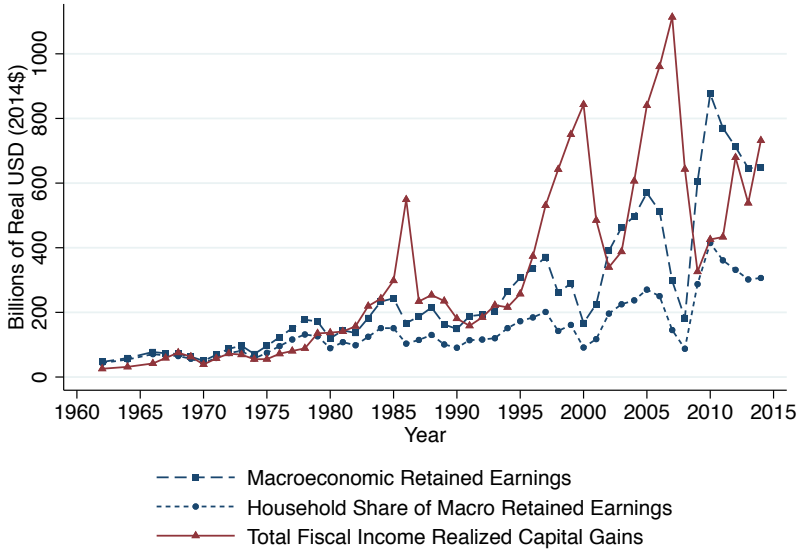
Notes: This figure compares the aggregate value of housing wealth using two alternative capitalization methods: using owner and renter-occupied wealth allocated to match Financial Accounts, and using CoreLogic and Housing Price Index assessments.

Figure A.9: Realized Capital Gains, C-Corporation Stock, and Retained Earnings

A. Realized Capital Gains Composition

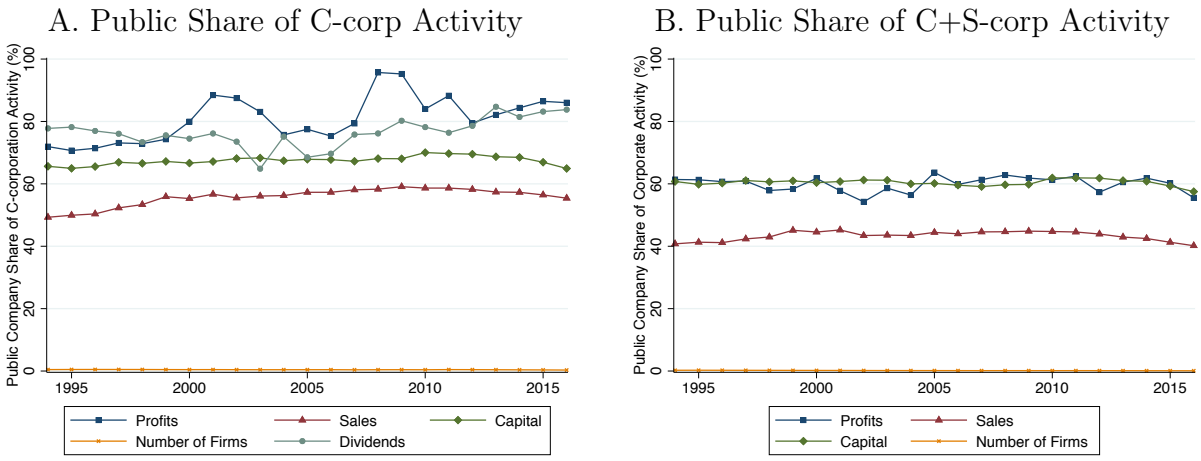


B. Realized Capital Gains vs. Retained Earnings



Notes: This figure replicates Appendix Figure I.16 from Smith, Yagan, Zidar and Zwick (2019). Panel A plots the share of total realized capital gains accrued to stocks/mutual funds, hard assets, pass-through asset sales, pass-through gains, and other assets in 1996-1999, 2003-2007, and 2010-2012. Hard assets includes net gains/losses for depreciable business personal property, depreciable business real property, farmland and other land, livestock, timber, residential rental property, and all residences. The graph focuses on non-recession years, as the cyclicality of realized gains can cause components of net gains to turn negative during downturns. Data comes from the Statistics of Income (SOI) Tax Stats table "Sales of Capital Assets Reported on Individual Tax Returns." Panel B plots macroeconomic retained earnings, the household sector's share of macroeconomic retained earnings (defined using C-corporation wealth estimates in the US Financial Accounts), and total fiscal realized capital gains over 1962-2014 (all in 2014 dollars). See Appendix E of Smith, Yagan, Zidar and Zwick (2019) for more detail.

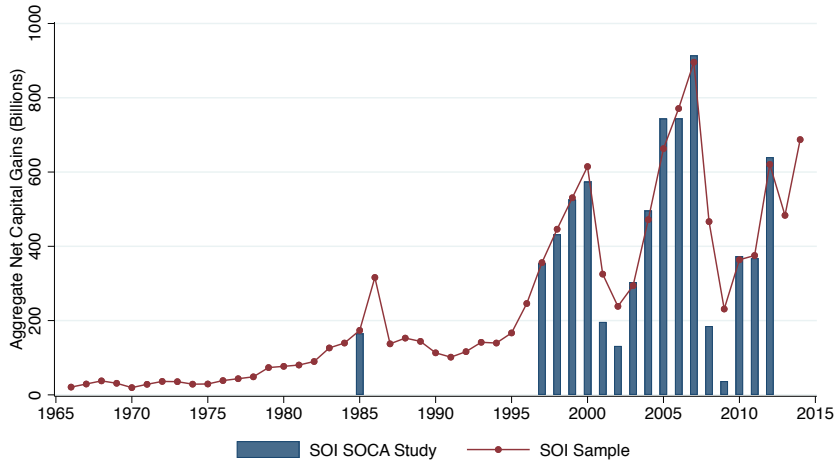
Figure A.10: Public Company Share of Corporate Activity



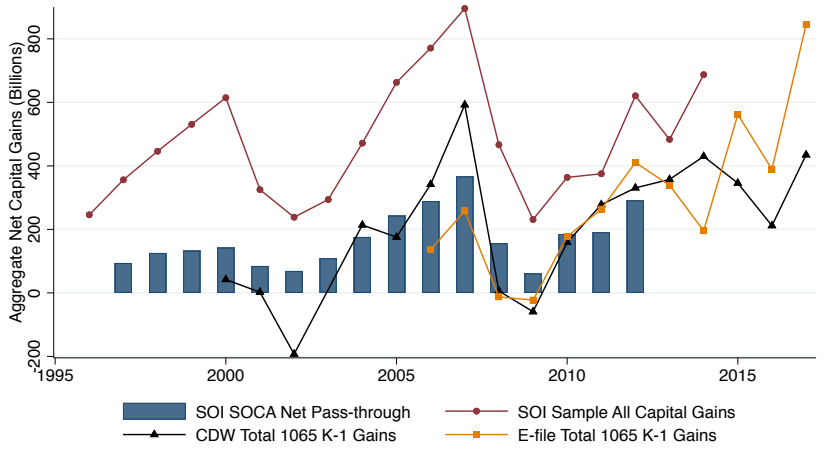
Notes: This figure uses the SOI corporate sample to divide corporate activity between non-public companies and public companies, defined as having shares listed on a public stock exchange such that the company's financial disclosures are available in the Compustat database. Panel A restricts to C-corporations. Panel B includes S-corporations. We use these data to assign a share of allocated C-corporate wealth to private companies.

Figure A.11: Identifying Carried Interest Compensation among Realized Capital Gains

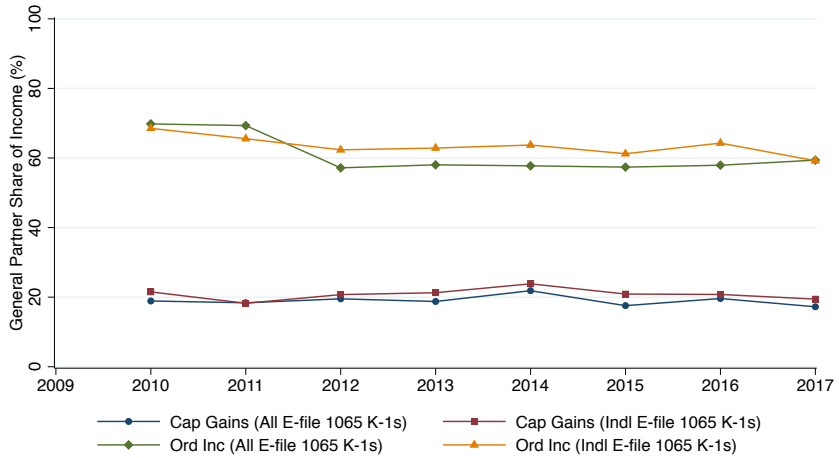
A. SOI's SOCA Totals Track the SOI Sample Capital Gains



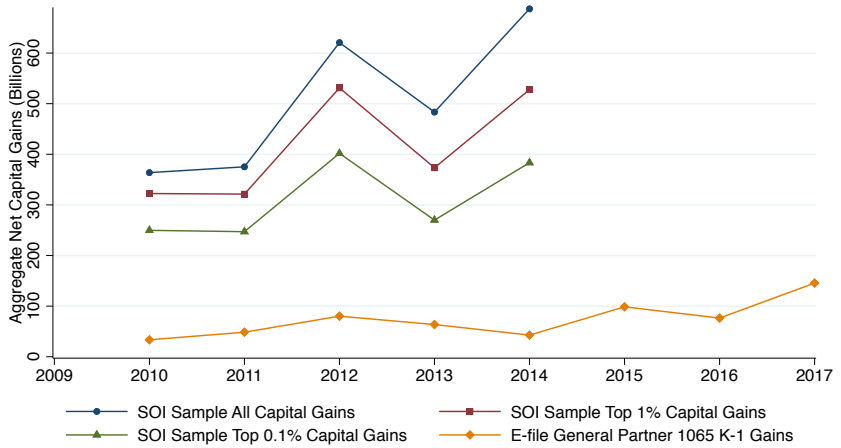
B. Pass-Through Share of Gains Tracks 1065 K-1 Gains



C. General Partners Receive 20% of Distributed Gains



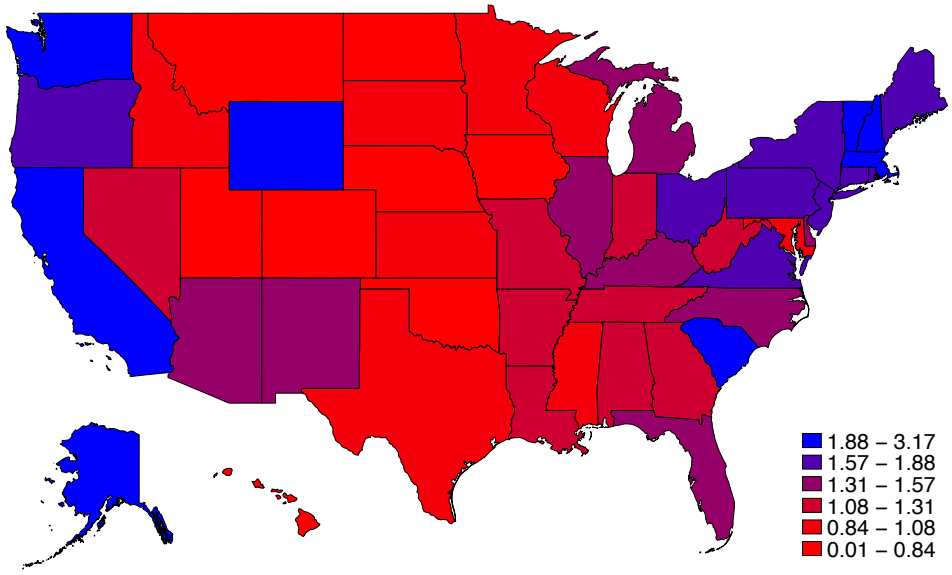
D. General Partner Gains versus Total and Top Capital Gains



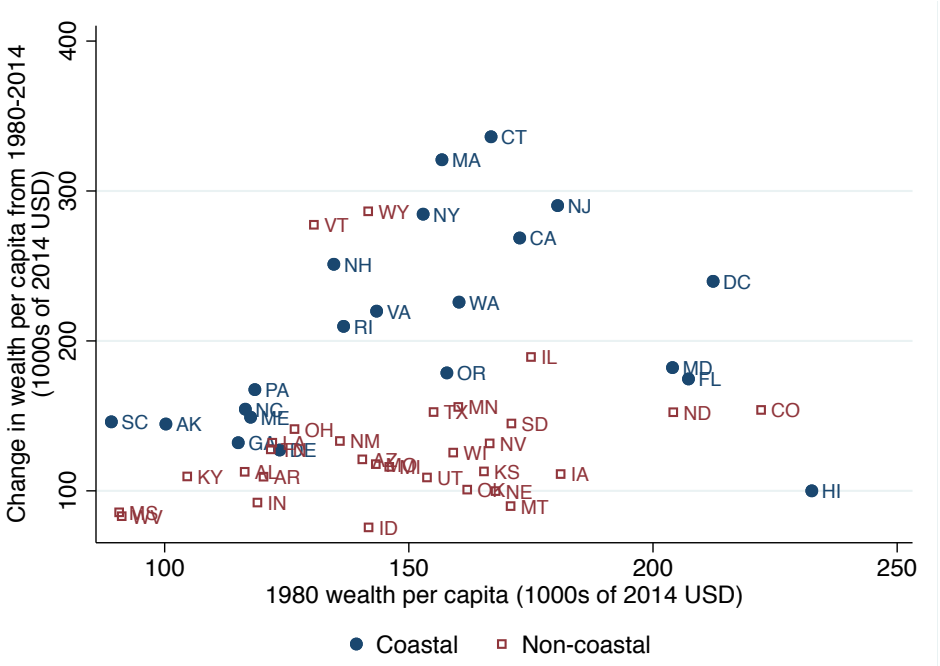
Notes: This figure presents evidence supporting our attempt to estimate the share of top realized capital gains that reflects carried interest compensation for financial services general partners (e.g., hedge fund, venture capital, private equity managers). We combine the realized capital gains flows used in our capitalized income estimates with data from SOI's Sale of Capital Assets (SOCA) study and information returns from different IRS databases. Fund managers are identified via the General Partner checkbox on information returns available in the e-file database.

Figure A.12: Coastal States Drive Growth in Wealth and Wealth per Capita

A. Change in Wealth-to-Income Ratio from 1980 to 2014

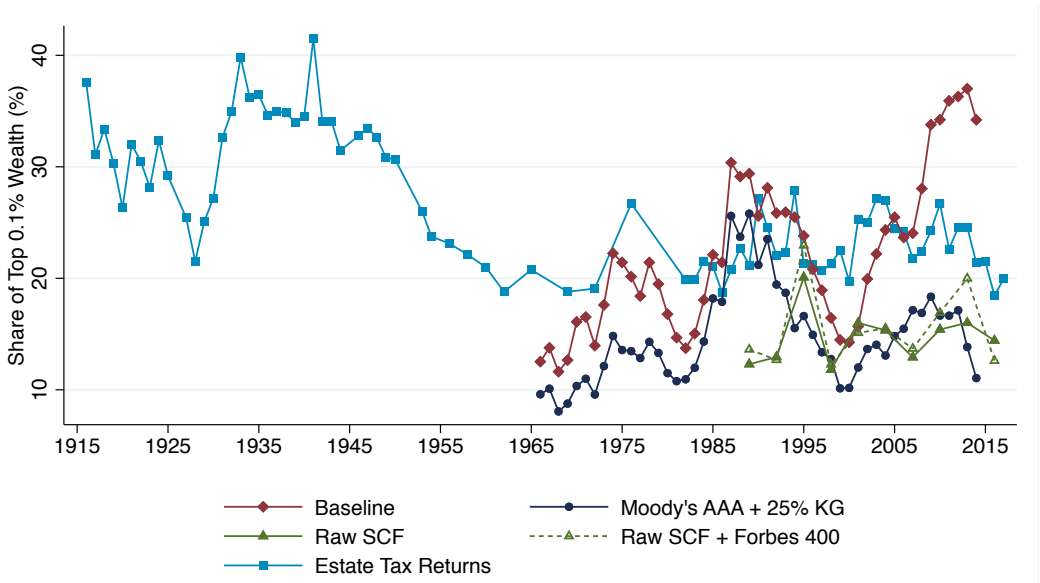


B. Change in Wealth per Capita



Notes: Panel A maps the change in wealth-to-income ratio from 1980 to 2014 across states. Panel B compares the level of wealth per capita by state in 1980 (measured in thousands of 2014 USD) to the change in wealth per capita from 1980 to 2014.

Figure A.13: Portfolio Composition of the Top 0.1%: Fixed Income Assets



Notes: This figure plots the share of top 0.1% wealth that is attributed to fixed income assets under alternative assumptions. **Baseline** allocates fixed income wealth following the capitalization in Saez and Zucman (2016). **Moody's AAA, 25% KG** allocates fixed income asset wealth assuming top wealth holders get Moody's AAA yields, and C-corporation equity wealth using dividends and 25% of realized capital gains. **Raw SCF** plots the wealth allocation in SCF, and **Raw SCF + Forbes 400** adds Forbes 400 wealth to the raw SCF series. **Estate Tax Returns** allocates wealth using estate tax returns, using data from Kopczuk and Saez (2004). We extend the Kopczuk and Saez (2004) series using the SOI Estate Tax Statistics (IRS, 2001-2017). Since the top 0.1% threshold changes from year to year, we do not attempt to roughly define the top 0.1% using the cuts available in the public SOI Estate Tax Files. From 2001 on, the estate tax series includes all returs, without taking size of gross estate into account.

Table A.1: Industrial Composition of Top-1-Owned Pass-through Firm Value (2014)

Rank	Industry (NAICS)	S+P Value ($B)	Returns (%)	Value/Firm ($M)	Value/Owner ($M)	S Value	P Value
1	Other financial investment actvty (5239)	807	8.0	6.0	0.3	152	678
2	Legal svc (5411)	403	13.8	15.7	3.3	55	348
3	Activities related to real estate (5313)	277	4.2	1.5	0.3	49	227
4	Other professional/technical svc (5419)	256	5.8	5.8	1.9	167	89
5	Offices of physicians (6211)	206	11.2	3.7	1.5	124	82
6	Security contracts broker (5231)	204	2.8	36.2	0.8	14	189
7	Other investment pools/funds (5259)	198	2.7	7.2	0.8	6	191
8	Restaurants (7225)	196	3.6	4.9	1.3	121	75
9	Management/techncl consulting svc (5416)	194	5.2	7.4	2.6	114	79
10	Oil/gas extraction (2111)	192	9.6	8.9	0.2	50	142
11	Other pipeline trnsprt (4869)	176	-0.1	752.8	0.2	1	175
12	Computer sys design/related svc (5415)	160	4.6	9.3	2.6	125	34
13	Automobile dealers (4411)	153	6.3	12.3	5.6	125	28
14	Misc. durable goods merch whlsl (4239)	128	5.6	12.1	4.6	105	23
15	Other specialty trade cntrctr (2389)	123	7.5	8.1	3.8	106	16
16	Accounting/bookkeeping svc (5412)	111	8.6	12.7	2.8	21	90
17	Other miscellaneous mfg. (3399)	104	6.2	14.2	3.0	78	26
18	Other heavy constr (2379)	102	5.2	40.8	14.7	93	9
19	Depository credit intrmd (5221)	91	2.6	88.2	2.8	85	5
20	Traveler acmdtn (7211)	80	3.7	4.9	0.9	29	51
21	Lessors of real estate (5311)	75	4.6	0.2	0.0	47	54
22	Other fabricated metal prod mfg. (3329)	71	8.4	15.2	5.2	62	8
23	Nondepository credit intrmd (5222)	71	6.2	9.0	1.4	36	34
24	Petroleum merch whlsl (4247)	67	3.7	47.6	0.1	31	36
25	Insurance agencies/brokerages (5242)	66	10.2	4.2	1.6	49	17
26	Plastics product mfg. (3261)	63	5.6	29.1	7.7	55	7
27	Building material/supp dealers (4441)	58	5.3	18.3	6.9	52	5
28	Residential building constr (2361)	57	8.8	3.3	1.3	35	21
29	Other miscellaneous store retailers (4539)	55	5.4	7.6	3.1	44	11
30	Business support svc (5614)	53	4.8	7.6	2.4	38	15
	Aggregate	**7688**	**6.8**	**4.7**	**0.6**	**4111**	**3634**

Table A.2: Industrial Composition of All Individual-Owned Pass-through Firm Value (2014)

Rank	Industry (NAICS)	S+P Value ($B)	Returns (%)	Value/Firm ($M)	Value/Owner ($M)	S Value	P Value
1	Other financial investment actvty (5239)	852	8.0	3.4	0.3	167	711
2	Legal svc (5411)	456	13.5	3.8	1.8	87	369
3	Activities related to real estate (5313)	409	3.3	0.7	0.2	86	322
4	Other professional/technical svc (5419)	389	5.3	1.4	0.8	271	117
5	Restaurants (7225)	355	2.8	1.7	0.8	238	117
6	Other investment pools/funds (5259)	271	2.0	4.9	0.8	9	261
7	Management/techncl consulting svc (5416)	247	5.1	1.9	1.1	154	92
8	Offices of physicians (6211)	242	10.9	2.0	1.1	155	87
9	Other telecommunications (5179)	238	9.1	19.1	9.4	15	222
10	Security contracts broker (5231)	235	2.4	14.8	0.9	18	216
11	Oil/gas extraction (2111)	232	9.2	4.7	0.2	64	168
12	Computer sys design/related svc (5415)	228	4.5	1.6	0.9	184	44
13	Other specialty trade cntrctr (2389)	227	6.5	1.3	0.8	196	30
14	Other pipeline trnsprt (4869)	183	-0.2	358.3	0.2	1	181
15	Automobile dealers (4411)	173	5.7	4.3	2.5	140	32
16	Accounting/bookkeeping svc (5412)	159	8.4	1.8	1.0	55	104
17	Misc. durable goods merch whlsl (4239)	154	5.1	2.6	1.5	126	28
18	Other miscellaneous mfg. (3399)	125	5.5	3.7	1.5	94	31
19	Other heavy constr (2379)	120	5.0	8.6	4.6	105	15
20	Traveler acmdtn (7211)	117	2.9	2.3	0.7	47	70
21	Residential building constr (2361)	116	7.5	0.7	0.4	79	36
22	Insurance agencies/brokerages (5242)	106	10.1	1.1	0.7	81	24
23	General freight trucking (4841)	95	5.1	1.0	0.7	81	13
24	Depository credit intrmd (5221)	94	2.6	48.4	2.7	89	5
25	Building foundation/exterior cntrctr (2381)	94	6.6	0.8	0.6	81	12
26	Other fabricated metal prod mfg. (3329)	90	7.6	4.9	2.4	76	13
27	Offices of dentists (6212)	89	10.2	1.2	1.0	79	10
28	Building equipment cntrctr (2382)	87	10.5	0.8	0.5	78	8
29	Other miscellaneous store retailers (4539)	87	4.6	1.3	0.7	71	16
30	Lessors of real estate (5311)	86	4.1	0.1	0.0	77	60
	Aggregate	**10700**	**6.2**	**1.5**	**0.5**	**5953**	**4814**

Table A.3: Total Housing Wealth under Alternative Property Tax Capitalization (2014)

State	2014 Equal Property Taxes					2014 Unequal Property Taxes			
	Assets (B)	Debt (B)	Wealth (B)	Asset per capita	Wealth per capita	Assets (B)	Wealth (B)	Asset per capita	Wealth per capita
AL	117.5	103.5	14.0	41,499	4,941	155.2	51.6	54,781	18,223
AK	41.4	25.0	16.4	79,598	31,474	27.4	2.3	52,630	4,506
AZ	237.9	175.7	62.1	59,993	15,674	251.4	75.7	63,408	19,089
AR	77.4	55.2	22.2	43,714	12,523	71.8	16.6	40,577	9,387
CA	2,626.7	1,623.2	1,003.5	110,293	42,137	4,211.9	2,588.7	176,854	108,698
CO	230.8	205.2	25.6	65,991	7,323	475.0	269.8	135,805	77,137
CT	429.7	136.8	293.0	183,275	124,946	278.2	141.4	118,644	60,316
DE	39.3	31.1	8.2	66,794	13,872	23.3	-7.8	39,693	-13,229
DC	33.5	27.2	6.2	88,645	16,507	34.0	6.7	89,944	17,805
FL	1,092.9	524.0	569.0	84,684	44,085	1,225.7	701.8	94,974	54,375
GA	382.5	253.8	128.7	65,217	21,946	399.8	146.0	68,169	24,898
HI	48.0	57.7	-9.6	49,005	-9,848	130.0	72.4	132,704	73,850
ID	59.0	42.1	16.9	57,579	16,470	44.1	1.9	43,006	1,898
IL	1,113.4	368.0	745.4	134,639	90,133	866.5	498.5	104,785	60,279
IN	225.5	127.3	98.3	53,475	23,302	207.2	80.0	49,135	18,961
IA	154.2	66.1	88.2	76,961	43,990	83.3	17.3	41,587	8,616
KS	137.7	64.3	73.4	72,779	38,773	86.5	22.2	45,733	11,727
KY	149.7	87.7	62.0	55,351	22,938	99.4	11.7	36,747	4,335
LA	134.6	94.3	40.3	49,502	14,811	88.6	-5.7	32,589	-2,103
ME	71.4	29.8	41.6	82,394	47,975	75.7	45.9	87,363	52,944
MD	427.9	257.1	170.7	111,447	44,471	597.7	340.6	155,694	88,717
MA	657.1	271.3	385.8	141,493	83,080	781.0	509.7	168,165	109,751
MI	507.1	222.8	284.3	80,264	44,997	354.5	131.7	56,119	20,852
MN	316.6	176.8	139.8	84,385	37,264	297.0	120.2	79,162	32,041
MS	68.5	43.1	25.4	43,230	16,031	40.5	-2.6	25,554	-1,645
MO	255.3	140.1	115.2	65,203	29,422	197.2	57.1	50,365	14,584

(cont'd)	2014 Equal Property Taxes					2014 Unequal Property Taxes			
State	Assets (B)	Debt (B)	Wealth (B)	Asset per capita	Wealth per capita	Assets (B)	Wealth (B)	Asset per capita	Wealth per capita
MT	44.6	27.5	17.1	62,689	24,086	32.6	5.1	45,746	7,142
NE	95.4	37.9	57.4	76,697	46,184	49.5	11.6	39,833	9,321
NV	111.9	81.1	30.8	61,391	16,896	133.1	52.0	72,988	28,493
NH	131.4	41.3	90.0	143,499	98,354	91.4	50.1	99,839	54,694
NJ	1,279.1	330.4	948.7	221,343	164,160	1,034.1	703.6	178,946	121,764
NM	71.1	47.5	23.6	59,476	19,751	74.5	27.0	62,258	22,532
NY	1,947.0	594.5	1,352.5	154,312	107,197	1,422.1	827.6	112,711	65,595
NC	396.7	257.2	139.5	66,711	23,464	538.2	281.0	90,500	47,252
ND	27.5	16.1	11.4	55,545	23,068	14.9	-1.2	30,117	-2,360
OH	624.9	253.6	371.3	83,895	49,845	485.0	231.4	65,112	31,062
OK	133.1	79.8	53.3	56,471	22,623	134.5	54.7	57,067	23,219
OR	246.3	137.8	108.5	94,574	41,669	320.8	183.0	123,162	70,257
PA	865.4	342.1	523.2	101,142	61,154	461.3	119.2	53,916	13,928
RI	86.7	33.2	53.4	119,274	73,557	75.5	42.3	103,870	58,153
SC	159.1	112.5	46.6	53,855	15,760	176.5	63.9	59,740	21,645
SD	38.7	18.2	20.5	63,102	33,397	18.4	0.2	30,035	330
TN	230.9	146.3	84.6	57,383	21,018	272.2	125.9	67,644	31,279
TX	1,591.5	627.0	964.5	96,082	58,228	1,144.2	517.2	69,080	31,226
UT	106.7	89.3	17.3	59,570	9,684	144.4	55.1	80,659	30,774
VT	61.9	18.1	43.9	139,813	98,974	57.6	39.5	130,074	89,234
VA	532.3	350.7	181.7	98,687	33,677	663.3	312.7	122,975	57,965
WA	455.2	289.4	165.8	97,175	35,400	626.6	337.2	133,770	71,995
WV	48.7	30.2	18.6	43,163	16,458	39.3	9.1	34,806	8,101
WI	404.2	148.7	255.5	100,899	63,779	294.1	145.4	73,415	36,295
WY	27.2	19.7	7.5	68,246	18,893	18.7	-1.0	46,887	-2,467
Total	19,353.3	9,339.5	10,013.8	4,282,403	2,056,511	19,425.9	10,086.4	4,029,336	1,803,444
Average	379.5	183.1	196.3	83,969	40,324	380.9	197.8	79,007	35,362

Notes: This table summarizes total housing assets and wealth under alternative assumptions for capitalizing property taxes. The left-most panel assumes uniform property tax rates across states, while the right-most panel allows for state-specific capitalization of housing income based on unequal property taxes. Debt is estimated using a constant capitalization factor in both panels. Assets, debt, and wealth are measured in billions of USD.

Table A.4: Detailed Breakdown of SCF Wealth Components: Private Business

Component	SCF Code(s)	2013 Value ($ B)
	Private business wealth = bus + nnresre	**15,828**
Actively managed businesses:	**bus =**	**13,482**
business net value	max(0,X3129) + max(0,X3229)	10,263
money business owes household	+ max(0,X3124) + max(0,X3224)	318
money household owes business	- (max(0,X3126) * (X3127 = 5)) - (max(0,X3226) * (X3227 = 5))	16
household wealth used as collateral for business loans	+ max(0,X3121) * (X3122 in (1 6)) + max(0,X3221) * (X3222 in (1 6))	43
value of remaining business	+ max(0,X3335)	720
farm wealth	+ Farmbus	340
Non-actively managed businesses:		
limited partnerships and other partnerships	+ max(0,X3408) + max(0,X3412)	700
s corporations and LLCs	+ max(0,X3416) + max(0,X3452)	834
other corporations and other types	+ max(0,X3420) + max(0,X3428)	279
Non-residential real estate	**nnresre =**	**2,347**
household's share of the value of certain classes of real estate (see note)	+ (X1703 IN (1 2 3 4 5 6 7 10 11 13 15 24 45 46 47 48 51 53 -7)) * max(0,X1706) * (X1705/10000) + (X1803 IN (1 2 3 4 5 6 7 10 11 13 15 24 45 46 47 48 51 53 -7)) * max(0,X1806) * (X1805/10000)	2,106
hh share of the value of remaining properties	+ max(0,X2012)	941
household's share of the loans on certain classes of real estate (see note)	- (X1703 IN (1 2 3 4 5 6 7 10 11 13 15 24 45 46 47 48 51 53 -7)) * X1715 * (X1705/10000) - (X1803 IN (1 2 3 4 5 6 7 10 11 13 15 24 45 46 47 48 51 53 -7)) * X1815 * (X1805/10000)	382
hh share of the loans on remaining properties	- X2016	318
Non-residential real estate correction		
consumer loans obtained for "investment real estate"	if (nnresre!=0) then nnresre = nnresre - X2723*(X2710=78) - X2740*(X2727=78) - X2823*(X2810=78) - X2840*(X2827=78) - X2923*(X2910=78) - X2940*(X2927=78)	0

Notes: This table provides detailed information about the components of SCF private business wealth. Note that the exact categories are not entirely constant over time in the SCF; the components and SCF codes shown are from the equations used for the 2013 survey. The classes of real estate included in nnresre include all real estate except "the principal residence, properties coded as 1-4 family residences, time shares, and vacation homes net of mortgages, and other loans taken out for investment real estate." (However, that these loans are added back in via the non-residential real estate correction section above.)