THE DISTRIBUTION OF CAPITAL GAINS IN THE UNITED STATES*

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Abstract

Booming stock, housing, and private business markets have driven large capital gains in the United States, averaging 20% of national income over the past two decades. Using internal IRS tax return data, this paper studies the distribution of these gains, and their contribution to income inequality and tax progressivity. We find capital gains to be highly concentrated, with 75.7% flowing to the richest 10% and 45.3% to the top 1%. Capital gains substantially increase inequality, raising the top 1% share of income to 21.0%, compared to 18% in their absence. Due to low realization levels, effective tax rates on capital gains are only 5%. Accounting for capital gains reduces the progressivity of the tax system, with flat rates across the Haig-Simons distribution. We document evidence of substantial heterogeneity in returns and cap rates across income groups. Richer individuals have higher owner and tenant occupied housing returns, own businesses that sell for higher multiples, and lower property tax rates.

Keywords: capital gains, inequality, Haig-Simons income, wealth inequality, tax progressivity, heterogeneous returns

JEL Classification: E12, E21, E52

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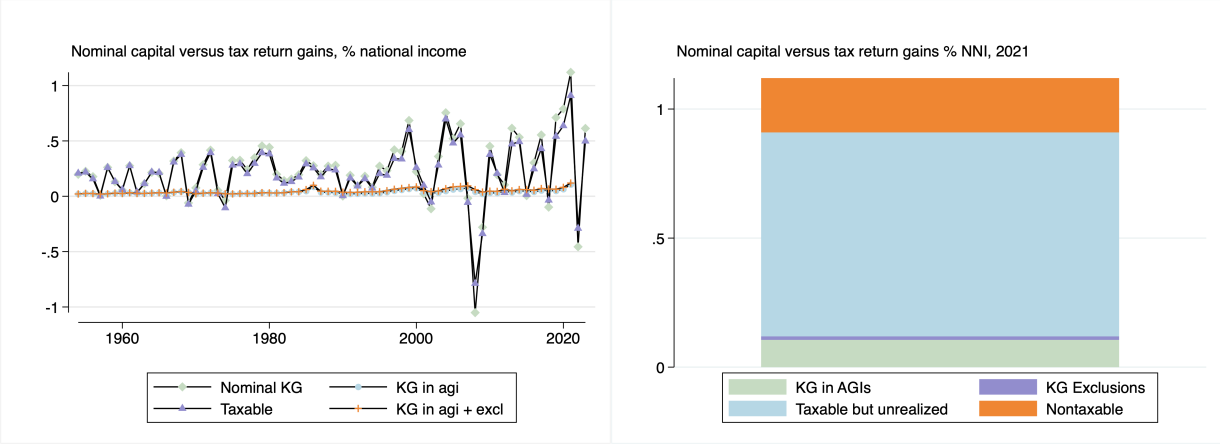
1 Introduction

The year 2021 yielded $16.2 trillion in aggregate capital gains on assets held by households in the United States — 94% of net national income, and an amount larger than wages, dividends, or interest income.[1] While 2021 returns were unusually massive, economically significant gains are not uncommon: over the past two decades, real asset appreciation averaged 20% of national income. This paper studies the distribution of capital gains, and how they contribute to broad measures of income inequality and tax progressivity. Most measures of income inequality, including the Distributional National Accounts (DINAs) of Piketty, Saez and Zucman (2018) (henceforth PSZ), do not include price appreciation as part of their income measure.

We do so using internal tax data from 2002-2021. The advantage of tax data is its comprehensiveness, spanning the entire income and wealth distribution. The disadvantage is that only *realized* sales of assets directly show up on tax forms, which are only a small fraction of total appreciation (the sum of unrealized and realized).



(a) (b)

Figure 1: (a) Measures of capital gains, 1954-2021 (b) measures of capital gains, 2021. 'Nominal KGs' are total realized and unrealized aggregate capital gains. 'Taxable' gains exclude pension and nonprofit gains. 'KG in agi + Excl' are capital gains reported on tax returns *plus* an estimate of capital gains on certain categories that are excluded by law (described in section 4). 'Nominal KGs' estimated from Financial Accounts data. 'KG in AGI' estimated from individual tax files.

Estimating total capital gains is necessary because most have never been realized on tax returns. Figure 1 presents data on aggregate nominal capital gains, compared to realized. From 1954-2021, $116 T in total capital gains were ac-

[1] Real capital gains were $5.97 trillion, or 39.2% of national income.

crued, but less than 20% of that was reported on tax returns.[2] Total capital gains are poorly proxied by tax realizations for three reasons: (i) a growing share of realized capital appreciation is not subject to tax (ii) individuals can delay selling assets, sometimes indefinitely[3] (iii) capital gains reported to tax authorities are nominal, and combine income over many periods rather than annual amounts.

We overcome these limitations to estimate total capital gains by following a three step procedure: (i) link individuals to their specific portfolio holdings (ii) capitalize income (using heterogeneous capitalization factors when available) to estimate wealth (iii) estimate capital appreciation by multiplying wealth by asset class specific returns (using heterogeneous returns when available).

For step (i), we develop new methods to capitalize private business wealth, tenant occupied housing, and owner occupied housing, exploiting tax form data that has become available through electronic filing. Matching individuals to their specific portfolio of assets is important because it allows for accurate valuation. Knowing a property's location and type or a business's industry and size is crucial for estimating its market value. Our work linking individuals to their assets allows the use of heterogeneous capitalization factors that vary based on the specific characteristics of the asset. For private business wealth, we estimate the businesses' market values using price-to-earnings and price-to-sales multiples that vary by industry, firm size, and legal form of organization. For rental and owner occupied real estate, we capitalize property tax payments using type of property and location specific tax rates.

Business and real estate wealth is shrouded through opaque ownership structures, with individuals holding stakes in partnerships and trusts that themselves own partnerships, tangled together in an immense ownership web.[4] We develop new methods to cut through the chain of ownership and assign wealth to the underlying controlling stakes, using techniques from the network economics literature. We successfully trace 90% of total partnership assets to their ultimate holders.

We document new evidence of substantial differences in capitalization rates across the income distribution. Richer individuals own businesses that sell for higher multiples: the average S-corp Enterprise Value (EV) to EBITDA ratio for the top 1% is 9.0 , compared to 5.8 for the middle 40; for partnerships, the top 1% EV/EBITDA is 8.6 compared to 5.9 for the middle 40. The rich also live in areas with lower property tax rates, leading to higher wealth estimates for this group. The average owner-occupied property tax rate is 1.02% for the

[2]This finding is in line with Bailey (1969), who estimate more than two thirds of accrued gains on corporate securities were never realized during their holders' lifetimes. Poterba and Weisbenner (2001) find that for the richest estates in 1998, over half of the value is due to unrealized capital gains.

[3]Three common strategies for avoiding realizations are (1) borrowing again assets rather than selling them (Ensign and Rubin (2021)) (2) passing on assets at death, which avoids taxation through a loophole, the 'step-up basis at death' (Kopczuk (2016)) (3) funneling assets into Roth IRAs which will not be subject to capital gains tax (Hemel and Rosenthal (2021)).

[4]See Hess et al. (2024) for details on these partnership networks.

middle 40, compared with 0.90% for the top 1%. This also holds for rental real estate: within property classes, richer individuals have lower property tax rates for single family, multifamily, and commercial properties.

Higher cap rates for the rich lead to markedly larger estimates of wealth concentration, relative to a baseline assumption of homogeneity. The top 1% of the income distribution owns 73% of S-corp wealth with heterogeneous cap rates compared to 64% with homogeneous; for partnerships, 81.3% compared with 64.1%. We estimate the richest 1% own 8.93% of owner-occupied housing compared with 8.30% if we assume homogeneous returns. For tenant occupied housing, even though we find evidence of heterogeneous cap rates within property classes, there is heterogeneity in portfolio shares across classes which largely cancels out the overall effect on wealth inequality.

We estimate capital gains allowing for heterogeneous returns for owner and tenant occupied real estate, while imposing homogeneous returns for public equity, private equity, and pension wealth. We find that capital gains are distributed highly unequally, and are the most concentrated form of income: the top 1% (10%) received 45.3% (75.7%) of total revaluations over our sample period.

Capital gains are so concentrated that including them in a comprehensive income measure substantially increases the level of inequality. Using a Haig-Simons income definition, which includes asset appreciation, the top 1% (10%) of individuals received 21.0% (47.9%) of the income pie; their share without capital gains is 18% (45%). Capital gains on public and private equity are the main driver of the increased concentration, while housing and pension capital gains lead to a more equal distribution.

We document new evidence of heterogeneous returns across income groups. There is a positive gradient, with returns increasing in income rank. The average capital gain yield for the top 1% for owner-occupied real estate is 2.00% compared with 1.64% for the middle 40. For tenant occupied housing, the average total return for the top 1% is 9.06% compared with 7.55% for the middle 40.

Accounting for capital gains lowers the progressivity of the tax system. Because most appreciation is either unrealized or exempt from taxation, the effective tax rate on macro capital gains is 3.0% for nominal gains and 5.2% for real gains, substantially below their statutory rates.[5] Since this income flows mostly to wealthier groups, measured tax rates decrease for the rich, causing a less progressive tax system. Overall, we find Haig-Simons tax rates that are largely flat across groups: the middle 40% pays average rates of 27.3%, the 90th-99th 27.0%, and the top 1% 26.8%.

The results of this paper are directly applicable to current policy questions related to capital gains. President elect Donald Trump's Project 2025 would lower capital gains tax rates and index them to inflation, whereas President Biden's

[5]Under current law, for married couples filing jointly, long-term capital gain rates are 0% for income less than $89,250, 15% for income between $89,250 and $555,850, and 20% for income above this level. In addition, for filers with over $250,000 in income, there is a 3.8% net investment income tax, which applies to the lesser of net investment income (which includes capital gains) and the amount by which income exceeds $250,000.

2025 budget, endorsed by Vice President and Democratic nominee Kamala Harris, would introduce a tax on unrealized capital gains,[6] as well as increase top tax rates on gains to 28%.[7] Our empirical findings highlight (i) the large magnitude of the tax base (ii) the distributive impacts, which almost entirely fall on the top 10% (iii) the current disparate treatment of capital gain income, which has a low effective tax rate. This potential revenue source motivates policies that can overcome the substantial challenge of collection and enforcement.[8]

1.1 Prior literature

This paper builds on Piketty, Saez and Zucman (2018), who study the distribution of national income, which excludes most capital gains.[9] Aside from adding capital gains to their income series, we materially modify their estimates of wealth by including heterogeneous cap rates for business, owner-occupied, and tenant occupied housing assets, which lead to higher estimates of wealth concentration.

Our work is also closely related to Smith, Zidar and Zwick (2023) (henceforth SZZ) and Smith et al. (2019), who pioneered linking individuals to private businesses using tax data. We follow their methodology for private business valuation, with three major exceptions. First, we value businesses using valuation multiples constructed from two database of private business, while SZZ use multiples from public firms, with additional adjustments for liquidity. Second, we develop a new method to link partnership networks to their ultimate owners. Finally, SZZ ultimately scale their estimates of private business wealth to totals from the Financial Accounts, while we leave ours unadjusted. As a result, our estimates of business wealth are appreciably higher, and lead to greater estimated wealth concentration.

Two categories of papers have previously studied the distribution of capital gain income. Most common are studies of realized capital gains. Piketty and Saez (2003) study the distribution of taxable income, and in some specifications include capital gains. Feenberg and Poterba (2000) also include realized capital gains in their study of top income inequality. The second category studies the distribution of capital gain income by imputing returns based on asset holdings, with early contributions from Goldsmith et al. (1954), Bhatia (1974), and McElroy (1971). Two papers closest in scope to this study are Armour, Burkhauser and Larrimore (2013), who use data from the Survey of Consumer Finances (SCF), and Larrimore et al. (2021), who also use tax data to estimate the distribution of Haig-Simons income. Our main differences with Larrimore et al. (2021) are: (i) the inclusion of a wider variety of assets, including pension and tenant occupied real estate (ii) our focus on real rather than nominal gains (iii) our inclusion of heterogeneous cap rates and returns. These make a considerable

[6] See https://taxfoundation.org/blog/harris-unrealized-capital-gains-tax/

[7] See https://taxfoundation.org/blog/harris-capital-gains-tax-rate-historical/.

[8] See discussions in Sarin et al. (2022) and Slemrod and Chen (2023).

[9] But see discussion in section 2.1 on retained earnings.

difference in the inequality series: while their top incomes shares are generally below that of the DINAs, our concentration measures are higher. Our estimation of capital gain and Haig-Simons tax rates is related to Yagan (2023) and Saez and Zucman (2019), who estimate Haig-Simons tax rates for the Forbes 400 and likewise find very low tax rates for upper income groups.

Our work on heterogeneous returns is related to the burgeoning literature that documents persistent disparities across the income distribution, as in Bach, Calvet and Sodini (2020) and Fagereng et al. (2020). SZZ show that the homogeneous returns assumption does not hold for fixed income, and that in fact richer individuals have higher returns, which leads to lower estimates of wealth concentration. Our paper provides new evidence on within-asset class heterogeneity for real estate and private business wealth, showing that richer individuals have (i) lower property tax rates, and (ii) own businesses that sell for higher multiples; this heterogeneity thus leads to *higher* estimates of wealth inequality.

Finally, we contribute to a series of papers that attempt to disentangle the ownership networks of pass-through business entities. Building on work by May (2012), Cooper et al. (2016) match partnership income to their ultimate owners using a recursive matching algorithm. They successfully allocate 77% of total income, but encounter circular ownership structures and missing data that prevent them from allocating the remainder. Love (2021), using additional data, succesfully tracks 99% of partnership income. Our paper tackles a separate but related question. Rather than trying to account for the proportion of partnership income flowing to different types of partners (which is mainly a question of identifying what entity the partners are), our problem is to track specific assets *through* the partnership networks and to their ultimate owners.

2 Data and methodology

2.1 Income and wealth concepts

National income, as defined by the Bureau of Economic Analysis, consists of the total labor and capital income earned in production.[10] This definition explicitly excludes capital gains (which are not earned by production).[11] Indirectly, however, capital gains are present through the retained earnings of corporations. Under a standard Miller and Modigliani (1961) assumption, a firm that retains a dollar of earnings increases its market value by $1. Indirectly, then, at least some capital gain income is accounted for in the national accounts income measure.

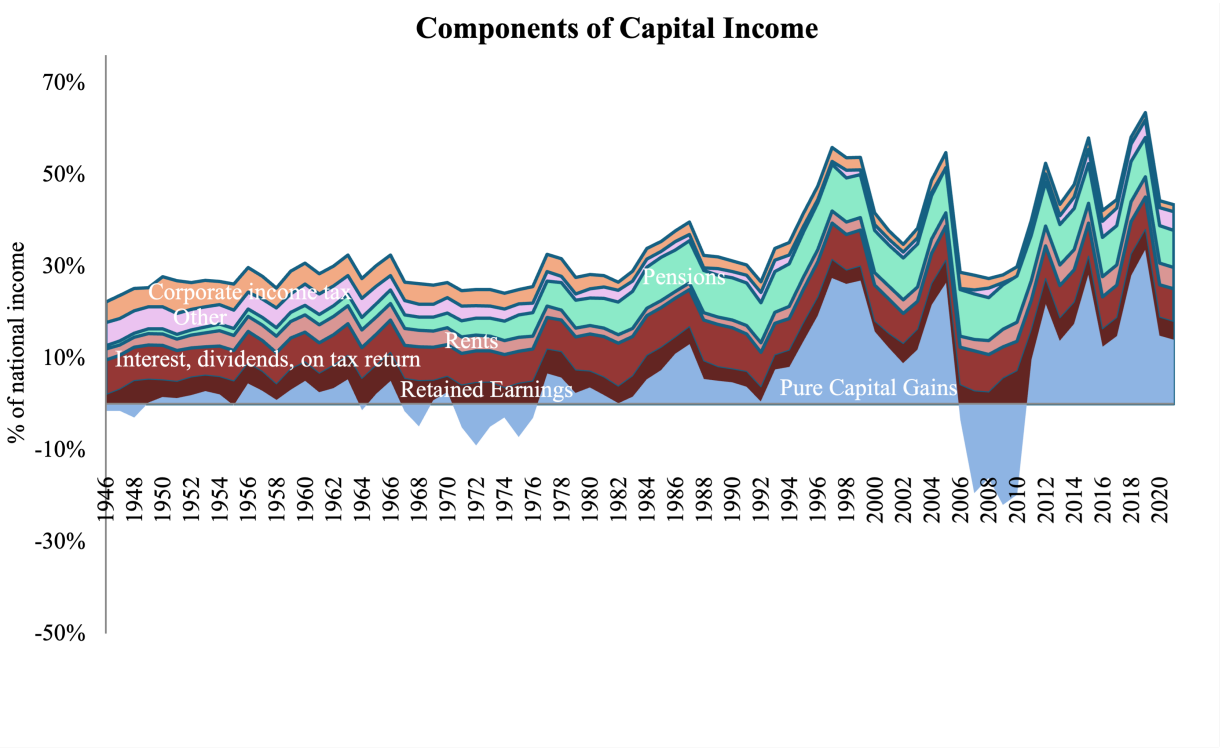
To isolate capital gains from other income flows, we define *ordinary factor income* as national income minus the retained earnings of corporations. Capital gains for year t are the real increase in the market value of an individual's

[10] In theory, this is equal to net national product, however statistical discrepancies mean in practice they are not always equal.

[11] BEA Handbook, Chapter 2, the "NIPA measures of income and savings exclude ... capital gains and losses." Fox and McCully (2009)

financial and nonfinancial assets over the period. Pure capital gains are capital gains that do not include any national income, and equal total capital gains minus retained earnings.

Figure 2 compares capital gains to other capital income sources in the post-war era. Pure capital gains are large, especially in the post-1980 period, where they average 10% of national income. Retained earnings, the component present in national income, averaged 4% of national income for the same period. The large magnitude and persistence of pure capital gains suggests that analyses that do not include this income source (such as the DINAs) provide an incomplete picture of inequality in recent times.



(a)

Figure 2: Comparison of capital income. 'Pure capital gains' are real capital gains of households after subtracting retained earnings, 5 year moving average, estimated from the Financial Accounts. Other components of capital income adopted from Piketty, Saez and Zucman (2018).

Haig-Simons income[12] equals ordinary factor income plus capital gains. As described by Hicks, Haig-Simons income "is what [one] can consume during the week and still expect to be as well off at the end of the week as at the beginning." In practical terms, it is measured as consumption plus change in wealth, or equivalently (as in this paper) factor income plus capital gains.[13]

[12] See Haig (1921), Simons (1938), and Hicks (1946).

[13] Haig (1921) wrote that income is "the money value of the net accretion to one's economic

In tax and inequality studies, Haig-Simons is often described as the "gold standard" measure (see JCT (2012) or Armour, Burkhauser and Larrimore (2013)), however some recent theoretical work raises doubts whether capital gains should be included as part of income, especially if they are driven purely by changes in interest rates. A rentier owning a consul that yields a real income stream of $100 per annum, who does not plan to sell, is neither better nor worse off if a decline in interest rates increases the security's market value.[14] The income effect of a change in interest rates may be completely independent of the change in asset value for the holders. Auclert (2019) shows that for a temporary change in interest rates, the welfare effect is proportional to a household's unhedged interest rate exposure. Fagereng et al. (2024) show for the general case that the change in welfare from an interest rate change is proportional to the present value of an individual's net asset sales. If all changes in asset prices were from changes in expected returns, it would not be appropriate to include capital gains as part of the income measure.

There are, however, three drivers of capital gains unrelated to changes in interest rates, each with broad support in the literature and strongly backed by empirical evidence. The first is the rise of markups and profits in the United States, documented in De Loecker and Eeckhout (2017) and Barkai (2016), which has lead to capital gains in the stock market. Eggertsson, Robbins and Wold (2018) and Caballero, Farhi and Gourinchas (2017) show how these changes in markups can explain a large fraction of revaluations over the period. In a recent paper, Eeckhout (2024) finds that changes in dividends can explain 80% of the rise in capital gains, while discount change explains 20%. A second force is *unmeasured* intangible investment or sweat equity (see Bhandari and McGrattan (2018), McGrattan and Prescott (2010), and Hall (2001)), which shows up in *measured* capital gains on private business assets. Intangible investment leads to capital gains on business wealth, since the value of businesses increase beyond any measured investment. Finally, hetergeneous returns on real estate by their very nature cannot be due to aggregate discount rate changes.[15] These well supported forces justify the study of the distribution of the capital gains of asset holders. To partially address remaining issues, for our main results we do not include any capital gains on directly held fixed income assets, and strip out any capital gain on indirectly held fixed income assets from ETFs and mutual funds.

Household wealth is the market value of financial and nonfinancial assets held by households, minus the market value of their liabilities. We largely follow the Financial Accounts in determining the asset and liability composition of the balance sheet, with the exception of two asset classes where we provide

power between two points of time", and Simons (1938) wrote that income is "the algebraic sum of (1) the market value of the rights exercised in consumption and (2) the change in the value of the store of property rights between the beginning and end of the period in question."

[14] See Krugman (2021) or Cochrane (2020)

[15] Demers and Eisfeldt (2022) and Kahn (2024) find substantial heterogeneity in real estate capital gains across cities. In section 5 we provide new evidence of heterogeneous returns across income groups.

bespoke estimates: private business wealth and tenant occupied real estate. Our primary measure (excepting private business and tenant real estate) is equal to the Financial Accounts net worth for households and nonprofits, minus the net worth of nonprofit organizations, minus consumer durables.[16]

Following PSZ, our basic unit of analysis is the individual, with tax-return income split equally across spouses. To allow for nonfilers, we include a sample from the Current Population Survey.

Our measure of income inequality is the *top income share*. Individuals are sorted into percentiles based on yearly income, and the fraction of total income the group receives is calculated. Our quantiles exhaust the income distribution: bottom 50%, middle 40% (50th to 90th percentile), 90th-99th%, top 1%. Within the top 1%, we further break down income to the 99th-99.9th, 99.9-99.99th, and top .01.

For Haig-Simons inequality, it is useful to estimate *reranked* income shares. These are estimated by first ranking individuals into percentiles using ordinary factor income, and then calculating each group's share of Haig-Simons income. We do so because Haig-Simons income is volatile, and in years of large losses the bottom of the distribution will contain wealthy individuals with capital losses. Reranking by ordinary factor income in this case cuts down on dramatic reranking of individuals across years, and eases interpretation over time.

Our measure of wealth inequality is the top wealth share, and we likewise construct reranked wealth shares by first ranking individuals on factor income, then calculating the share of wealth held by that group.

We estimate confidence intervals for top income and wealth shares through a survey bootstrap procedure, which takes into account the sampling error of income ranks as well as the income shares of top quantiles.

2.2 Data

Our goal is to construct a dataset of individual level Haig-Simons income and wealth. The basic building blocks for this are the Distributional National Accounts of PSZ, which we replicate with internal tax records. The DINAs contain data on ordinary factor income at the individual level. We add to this our own estimates of wealth and individual level capital gains.

Our primary data source is internal individual and business tax records from 2002-2021, provided by the Internal Revenue Service through the Joint Statistical Research Program. We use a wide variety of forms and subforms in our analysis: the primary forms and line items used are summarized in figure 3. Table 1 presents summary statistics for the sample and key income variables.

We use **Form 1040**, the individual income tax return, to measure capital income that flows to individuals. We use a .2% (approximately 300,000 observations per year) weighted sample constructed by the IRS Statistics of Income for all inequality analysis. **Schedule A** of form 1040 lists the itemized deductions,

[16] Wealth portfolio components are described in section A.1.

which we use to estimate owner-occupied real estate wealth. We use **Schedule C** to estimate sole proprietorship wealth.

Table 1: Summary Statistics

	2002	2007	2012	2017	2021
Population and sample					
Tax Filer Sample	175,315	335,920	338,342	350,624	438,281
Filer Population (weighted)	151,024,628	160,706,016	172,157,842	182,560,333	191,450,996
Adults (weighted)	206,200,680	218,456,658	230,631,608	241,963,680	249,433,156
Income and wealth averages (current $)					
AGI	29,418	39,831	39,727	45,834	59,634
Ordinary factor income	44,025	54,638	57,980	66,701	75,235
Capital gains (5yr)	4,473	-7,044	13,229	11,310	24,437
Realized capital gains	1,146	4,175	2,660	3,584	8,448
Haig-Simons (5yr) income	48,498	47,593	71,208	78,010	99,672
Wealth	204,974	298,932	283,310	371,380	516,356
Tax averages (current $)					
Federal income tax	4,037	5,360	5,057	6,669	7,388
Federal capital gains tax	225	795	487	776	1,624

For tenant occupied (t.o.) real estate that is directly owned, we use **Schedule E**. For tenant occupied real estate indirectly owned through partnerships and S-corps, we use **Form 8825**. For estimating private business wealth, we use **Form 1120-S** for S-corps and **Form 1065** for partnerships. To identify who owns the businesses, we use **Schedule K-1** of **Forms 1120-S and 1065**. For the employment of firms, we use **Form 941** and **Form W2**. When analyzing aggregate t.o. and business wealth, we use 100% samples. For the inequality analysis, we use the .2% (matched) sample.

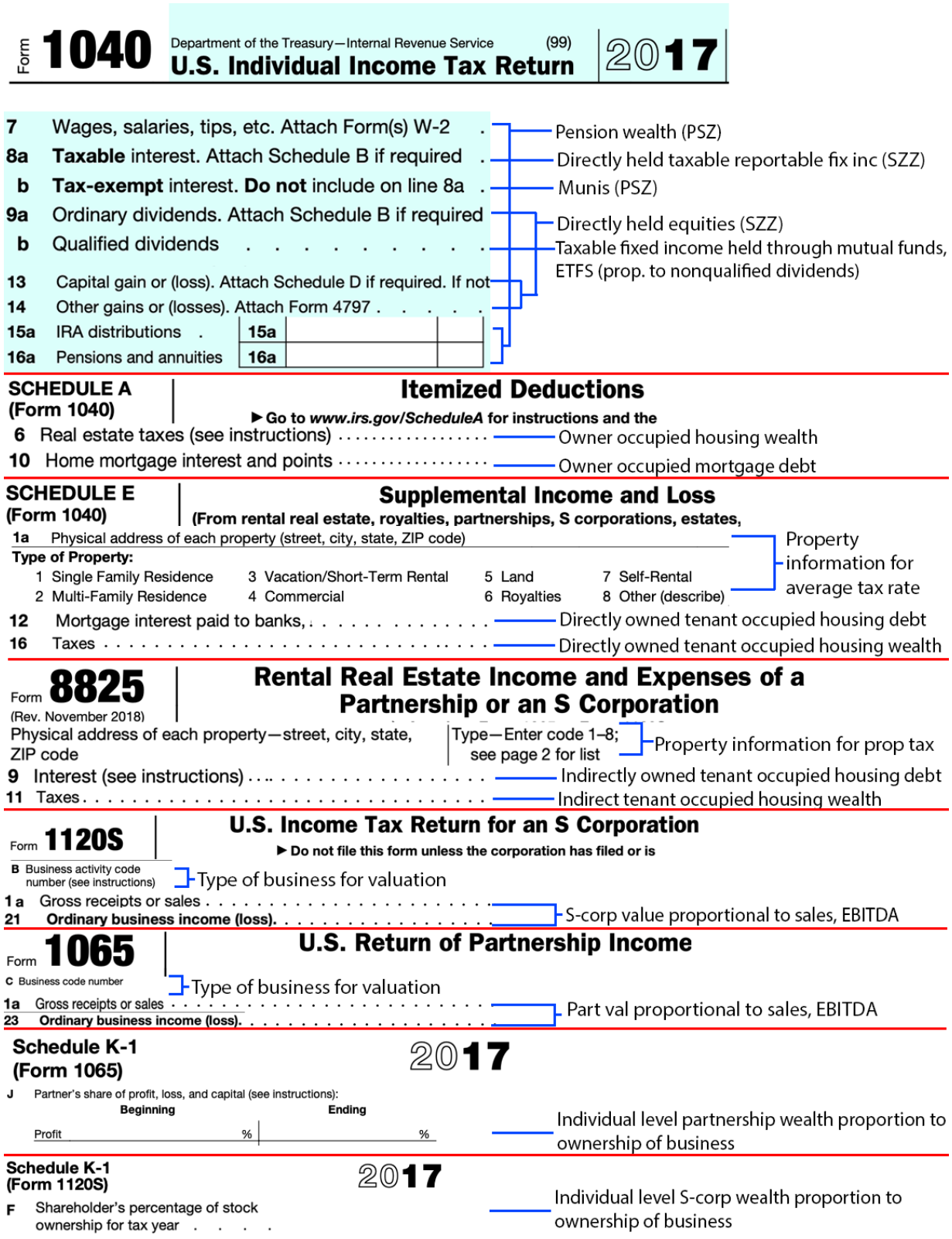


Figure 3: Primary tax forms used in estimating wealth and capital gains.

We combine the tax files with a variety of secondary data sources. Data on aggregate wealth and capital gains is from the **Financial Accounts** of the Federal Reserve. Data on national income components is from the **National Income and Product Accounts** (NIPAs) and **Fixed Asset** tables of the Burea of Economic Analysis (BEA). We impute a number of wealth variables using the **Survey of Consumer Finance** (SCF) of the Federal Reserve.

2.3 Estimating wealth

Our estimation of capital gains follows a three step procedure: (i) link individuals to their specific portfolio holdings (ii) estimate the market value of said portfolio through capitalization (iii) multiply wealth by price appreciation to derive capital gains.

Capitalization is the process wherein measured income flows from the asset are used to estimate the market value by multiplying the flow by a capitalization factor. For a general asset class j, individual i, and year t, the value of the asset is given by

$$\text{Value}_{it}^{j} = \text{Capital flow}_{it}^{j} \cdot \text{Cap factor}_{it}^{j}. \tag{1}$$

For example, we trace the ownership of a partnership business in the warehousing industry thorugh a holding company to its ultimate owner, then estimate the market value by multiplying its (flow) EBITDA by a cap factor of 8.5. In this case, the cap factor was estimated from a database of sales of partnership businesses in the same year that were in the same industry and a similar size.

The specific asset identification and capitalization method will differ depending on the asset class, which we now describe.

2.3.1 Owner-occupied housing

For tax units that are itemizers, we identify homeowners through property tax deductions listed on Schedule A, and the specific location of the home through the zip code address listed on the tax return. To estimate the value of the property, we capitalize an individual's property taxes, with a capitalization factor equal to the inverse average property tax rate for the county, estimated from the American Community Survey and Decennial Census for the year. For an individual i living in county c in year t, the value of their house is estimated as

$$\text{O.O. House Value}_{ict} = \frac{\text{Property tax payment}_{it}}{\overline{\text{Property tax rate}_{ct}}}. \tag{2}$$

Appendix figure A.1 shows that this procedure captures about 80% of the aggregate value of owner-occupied housing from the Financial Accounts. Following PSZ, we scale the value of itemizers to exactly equal 80% of FA values, and allocate the remaining 20% to nonitemizers and non-filers using averages from the SCF.

While our approach to the valuation of owner-occupied homes is sensitive to geographic variation in property tax rates, it does not account for within-jurisdiction variation in assessment ratios. To the extent that richer individuals face lower assessed value-to-market value ratios within taxing jurisidicitions, we will underestimate owner-occupied housing wealth, and therefore capital gains, inequality. Avenancio-León and Howard (2022) provide evidence that within-jurisdiction assessment gradients exist along racial lines such that minorities face systematically higher assessed value-to-market value ratios, although they do not explicitly investigate the assessment gradient according to income. Others, such as McMillen and Singh (2020), who observe market values and assessed values directly find that homes with higher market values face lower assessment ratios, with some evidence that the same regressivity exists when homeowners are ranked by income.

The Tax Cut and Jobs Act (TCJA) of 2018 increased the standard deduction from $6,500 to $12,500 for single filers (and likewise close to double for other filing statuses as well), which correspondingly reduced the percentage of itemized tax returns from 30% to 11%, hindering our ability to capture real estate wealth. In 2017, capitalized itemizers' property tax payments accounted for 77% of Financial Accounts housing wealth, dropping to 40% in 2018. To accurately estimate housing wealth from 2018 onwards for non-itemizers, we use the following procedure. First, we take the address of the tax filer post 2018, and see if that same address filed a tax return in 2017. If they did, and itemized a property tax deduction, we can estimate the 2017 value of the house, then update the value to the current year using the FHFA house price indices for the area. This procedure increases the percentage of Financial Accounts housing wealth accounted for to 75%. The residual wealth we impute using the same SCF methodology as above.

2.3.2 Tenant occupied housing

We identify the tenant occupied properties owned directly by individuals via information on Schedule E, and those owned indirectly through partnerships and S-corps from Form 8825. These data contain property level tax payments, the location of the real estate, and the type of property, which we separate into three broad categories: single family, multifamily, and commercial. We estimate property values using equation 2, where property tax rates are at the county-year-type level. Data on effective tax rates is taken from the Lincoln Institute of Land Policy and the Minnesota Center for Fiscal Excellence.[17]

Our procedure is able to capture the majority of aggregate tenant occupied real estate value, measured in either the Financial Accounts or SCF. Figure A.6 shows that in 2021, aggregate TO wealth is $16.3 T in the Financial Accounts, $14.8 T by our reckoning, and $12.7 T in the SCF.

Appendix figure A.5 provides details on the composition and ownership

[17]For small cities and rural areas the effective tax rate is estimated; see appendix A.8.1.

structure of rental housing. About half is owned through partnerships, slightly less than half owned directly, and the remainder through S-corps. Commercial real estate is the largest component, followed by multifamily, then single family.

2.3.3 Private business wealth

We estimate the value of private businesses by capitalizing EBITDA and sales from operating businesses, using a methodology developed in Campbell and Robbins (2023). The enterprise value (EV) for company j is given by mutliplying *j's* EBITDA by an EV to EBITDA multiple, $Mult_j$,

$$\text{EBITDA valuation}_{jt} = \text{EBITDA}_{jt} \cdot \text{Mult}_{jt}. \tag{3}$$

To estimate appropriate cap rates, we follow the methodology of business appraisers, who form valuations from a comparison to similar businesses that have previously sold.[18] We estimate multiples at finely grained levels: by legal form of organization, industry, size, and year cells. Data on private business sales is from two separate private transactions databases from Business Valuation Resources, which collects data on private business sales. Data on business level sales and EBITDA comes from tax returns: Form 1120-S for S-corps, 1065 for partnerships, Schedule C for sole proprietorships. We estimate a separate sales valuation analogous to equation 3 by multiplying sales by an EV to Sales multiple, then take an average of the EBITDA and sales valuations to form our final measure.

We estimate large totals for aggregate private business wealth (figure A.17 and table A.1), comensurate with their economic importance in terms of employment and sales. Aggregate value is \$17.4 T in 2017, much higher than the Financial Accounts value of \$8.6 T. The higher totals stems primarily from the fact the Financial Accounts uses *book* values of partnerships for their valuations, which are small in comparison to profits and sales. In 2017, for example, the FA estimated partnership values to be only \$2 T from book value, a year when partnership businesses made \$5.5 T in sales and \$810 B in net income.[19]

2.3.4 Other wealth elements

To estimate fixed income wealth, we capitalize interest flows from fixed income assets. The work of SZZ shows that wealthier individuals hold risky long duration assets such as corporate and government bonds, with high interest rates, compared to individuals lower in the distribution who hold shorter duration safe assets with low interest rates. To account for these heterogeneous returns, we

[18] See Pratt (2006), chapters 11 and 12, or Goedhart, Koller and Wessels (2015), chapter 16. The American Society of Appraisers Business Valuation Standards recognizes the "market approach" as one of the three pillars of business valuation. This is also recognized in the Institute of Business Appraisers 'Business Appraisal Standards'. For a recent paper using this approach, see Smith, Zidar and Zwick (2023).

[19] See section A.5.1 for a description of Financial Accounts business estimates.

use data from SZZ on the average fixed income yield by quantile in the wealth distribution (by year) to capitalize taxable interest flows: 0-99th percentile, 99th-99.9th, 99.9-99.99, and top .01%. Following SZZ and PSZ, we then gross up our aggregates to match Financial Accounts totals for directly held bonds.

For indirectly held bonds held through mutual funds, money-market funds, ETFs, and closed-end funds, we capitalize non-qualified dividends under an equal returns assumption using Financial Accounts totals. For munis, we capitalize tax-exempt interest. For currency, we follow PSZ and allocate Financial Account wealth by income rank using SCF data.

For public equities directly held and held through mutual funds and ETFs, we use the methodology of SZZ and capitalize a mixture of 90% qualified dividends, 10% realized capital gains.

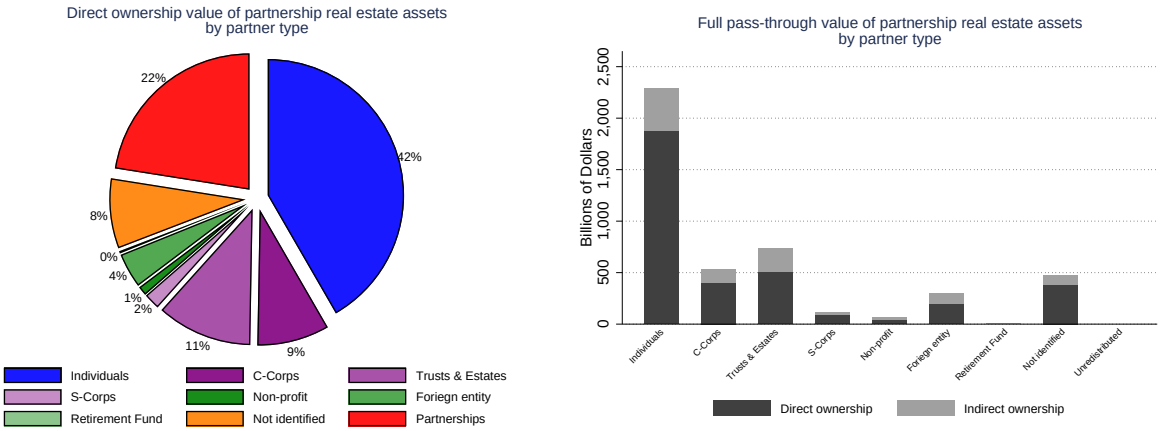
2.3.5 Allocating indirect business and real estate wealth

After estimating the value of private businesses and tenant occupied properties, we trace the wealth to its ultimate owners. Using Form 1120-S K1, we measure an individual's S-corp business and real estate wealth as the fraction of the business they own multiplied by the estimated business value. Figure A.23 shows the pass through of S-corp business values to their ultimate owners. In 2017, $7 T in S-corp business wealth is passed down to the K-1 level, where we capture $6 T in value. The loss of $1 T is due to (i) some companies not filing K1s (ii) insufficient data on business ownership on the K1s. A total of $5.5 T in value is accounted for at the individual level. This may be due to (i) some S-Corps being owned by nonprofits / estates / trusts (ii) foreign shareholders (iii) sampling error.

The process of tracing wealth through partnerships is more difficult due the presence of partnership networks: the fact that a partnership can be owned by another partnership. To cut through this chain of ownership, we use results from the network economics literature[20] to allocate value to its ultimate owner. The key to this allocation is capturing the information contained in the network of partnerships owning other partnerships.

A network of partnership ownership is denoted by matrix C, where C_{ij} is the fraction of partnership j that partnership i owns. The value of partnership i is the value of its fundamental assets, a_i, plus the value of the shares of other firms it owns: $V_i = a_i + \sum_{j \neq i} C_{ij} V_j$. The vector describing the market value of all partnerships is then given by $V = a + CV$. Solving for the total value of the firm, $V = (I - C)^{-1} a$. To estimate V for either businesses or real estate, we start with the estimate of the underlying assets a, then estimate the partnership ownership matrix C using Form 1065-K1.

[20] See, in particular, Elliott, Golub and Jackson (2014) and Galeotti and Ghiglino (2021).



(a) (b)

Figure 4: (a) Direct ownership of partnership real estate (b) Indirect ownership of partnership real estate

Figure 4 provides breakdown of partnership tenant occupied real estate ownership for the year 2017. A total of 42% of partnership t.o. wealth is owned directly by individuals, 22% are owned by other partnerships, and 34% are owned by other entities (C-corps, trusts, and unidentified entities being the largest shares). After inverting the partnership ownership matrix, we are able to pass through the full value of real estate to their ultimate owners. Figure 4 (b) shows that a full 51% of partnership real estate is ultimately held by individuals, 12% by C-corps, 16% by estates/trusts, and 21% by others. We allocate the 16% held by trusts to individuals in proportion to their estate and trust income. For those owned by C-corps, we do not attempt to allocate to individuals since this would be potentially double counting the value that is already allocated through public equity wealth, which includes REITs. For the final 23% we have little indication of ultimate ownership status, and we leave unallocated.[21]

For partnership operating businesses, the aggregate enterprise business value was \$7 T in 2017. Of this, \$6 T can be traced back to some K1 owner, of which ultimately \$2.7 T flows to individual ownership. Figure A.22 provides the full breakdown of partnership business ownership.

2.4 Capital gains

We estimate capital gains by multiplying wealth by price appreciation. For individual i holding asset class j in year t, the capital gain is the market value of the asset multiplied by the real price growth of the asset:

$$\text{KG}_t^j = \text{MV Asset}_{it}^j \cdot \%\text{ real price yield}_{it}^j. \tag{4}$$

[21] Recent work by Love (2021) suggests these are likely foreign owned entities.

We estimate capital gains for the following asset classes: public equities, private equities, owner-occupied housing, tenant occupied housing, and pension assets.[22] We exclude capital gains on fixed income and debt.[23]

For owner-occupied housing, real housing price data is from FHFA[24] price indices at the 5-digit zip code level based on the location of the taxpayer. For tenant occupied housing, price data on multifamily and commercial housing is from Freddie Mac and the CoStar Group, based on the location of the property.

For other asset classes, capital gains are estimated with a homogeneous returns assumption: that individuals across the income distribution have the same expected capital gain return. Real price yields are calculated at the macroeconomic level. For an asset class j, we compute yields by dividing the flow of aggregate gains during year t by the total value of the corresponding asset at the beginning of the year:

$$\text{Yield}_t^j = KG_t^j / W_t^j \tag{5}$$

Nominal yields are converted to real by adjusting for net national product inflation. Data on aggregate nominal capital gains on assets held by US nationals, by asset class, is taken from the Integrated Macroeconomic Accounts of the Financial Accounts.

The use of homogeneous returns is valid as long as individuals across the income distribution have the same expected return on assets. We must use this method because we lack data on heterogeneous returns. This is a serious limitation: for the asset classes we do have data for, we find strong evidence of heterogeneous returns and capitalization factors.[25] This is line with prior work such as SZZ who find heterogeneous returns on fixed income, and Fagereng et al. (2020) who likewise find evidence of persistent heterogeneity in returns. To the extent that the equal returns assumption is false, and richer individuals have higher returns, we will tend to understate the amount of capital gains inequality. To the extent that richer individuals have lower returns, we will tend to overstate the amount of capital gains inequality. Estimating heterogeneous returns on equity wealth is an important question for future research.

Capital gains are volatile, and embodiment of the stock and housing markets which drive them. This volatility poses a challenge for measuring and interpreting trends in Haig-Simons income inequality. In years when the stock and housing markets boom, top-income shares increase, as capital gains are very concentrated. In turn, during stock market crashes, top-income shares drop. For this reason, we will include smoothed measures of gains. Five year moving average capital gains are calculated using equation 4, with yields for year t taken as a five-year geometric average of returns centered at year t.

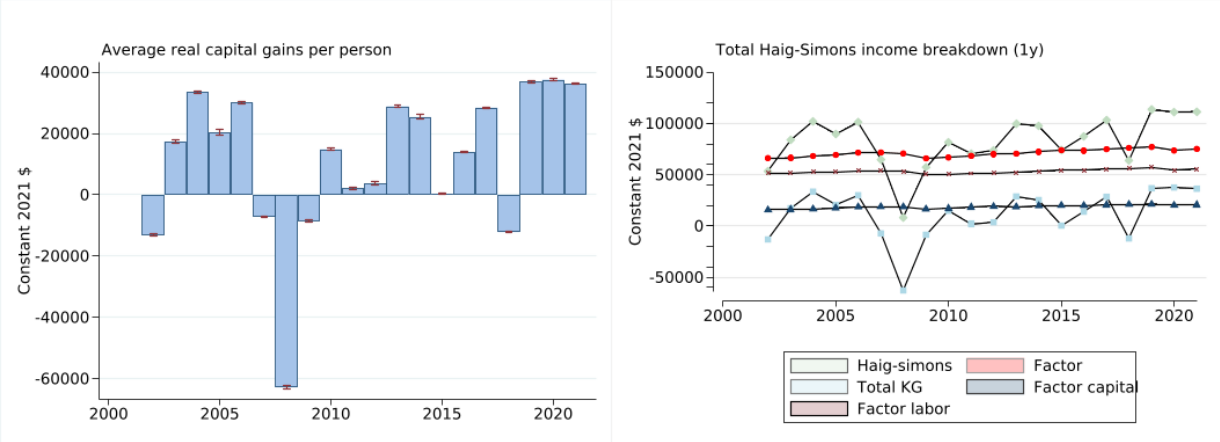
[22] For pension, we include only the capital gains that come from the equity component, and do not include fixed income capital gains or other components.

[23] We do so because they mainly consist of large yearly losses due to inflation.

[24] See section A.7.2 for details.

[25] See section 5 below.

3 The distribution of capital gains in the United States

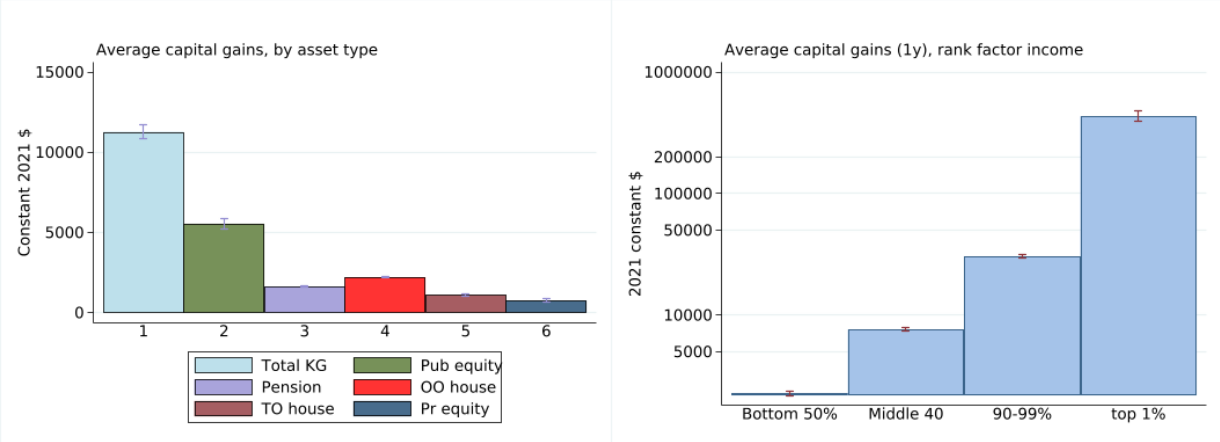


(a) (b)

Figure 5: (a) Average real capital gains per person, 2002-2021 (b) Average Haig-Simons income per person, by income group. Haig-Simons income equals factor labor plus (ordinary) factor capital plus capital gains. Capital gains totals are not smoothed.

Figure 5 (a) presents average per person capital gains. Capital gains were large, both in absolute terms and in comparison to other income sources. Across our time frame, the average gain was $11,275 per person per year, about two-thirds the magnitude of ordinary capital income ($18,719 per person), and about a fifth of the size of ordinary factor income ($71,101 per person). Figure 6 (a) displays capital gains by asset class. Although no one asset dominates, the largest component is public equities with an average of $5,548 per person, followed by owner-occupied housing ($2,219), pension ($1,633), tenant occupied housing ($1,113), and private business ($762).

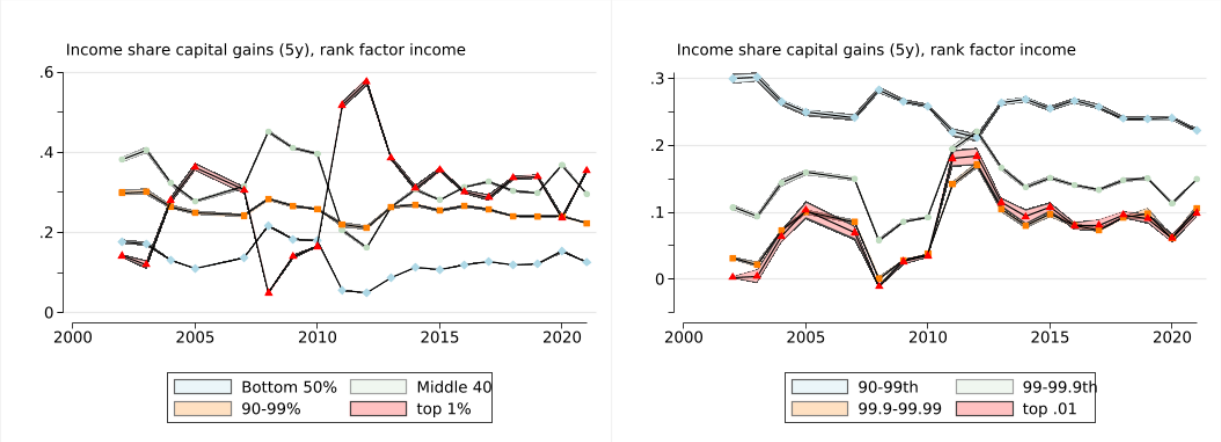
Figure 5 (a) shows the high degree of cyclicality of capital gains, with extreme lows in the Great Recession (a nadir of $-60,000 per person in 2008) and dot-com bust, and large gains during the long post-2010 expansion. As shown in Figure 5 (b), the cyclicality carries over into Haig-Simons income, which is negative in 2008. The volatility of capital gains and Haig-Simons income using 1-year returns, and the fact that it is negative in 2008, pose a challenge for measuring and interpreting trends in income shares. For this reason, we next focus on income series using 5-year moving average capital gain returns.



(a) (b)

Figure 6: (a) Average real yearly capital gain income per person by asset class. Every year the average capital gain per person is calculated, and bars display the average of these across all years of the sample. (b) Average real yearly capital gain income per person by factor income rank (log scale). Bars display averages across all years of sample.

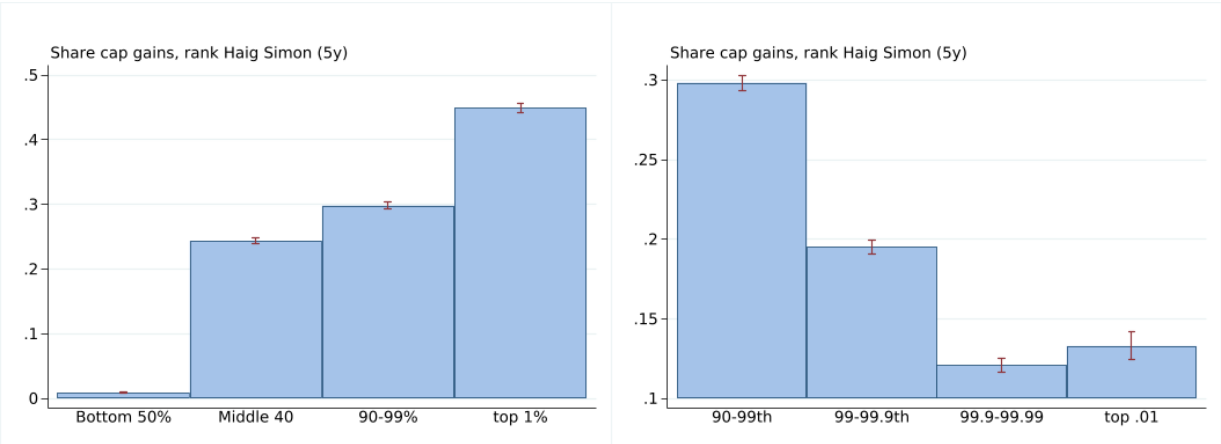
Figure 6 (b) shows that the upper parts of the distribution receive substantial flows of capital gain income. Ranking individuals by factor income (i.e. without capital gains), the average gain of the top 1% is $433,755 per person per year, about 40 times greater than the average, declining to $30,535 for the 90th-99th percentiles, $7,626 for the middle 40, and $2,278 for the bottom 50%. These flows lead in turn to high concentration of capital gain income. Figure 7 shows the share of overall capital gains for groups ranked by factor income. Over the full sample period the top 1% grossed 37.7% of aggregate capital gains. The share of gains by the top 1% is more than double their 18% share of ordinary factor income, and similar to their 38% share of ordinary capital income. Their share was the largest of any other income group; the next largest was the middle 40% (27.4%), 90-99th percent (24.7%), then bottom 50% (10.3%).



(a) (b)

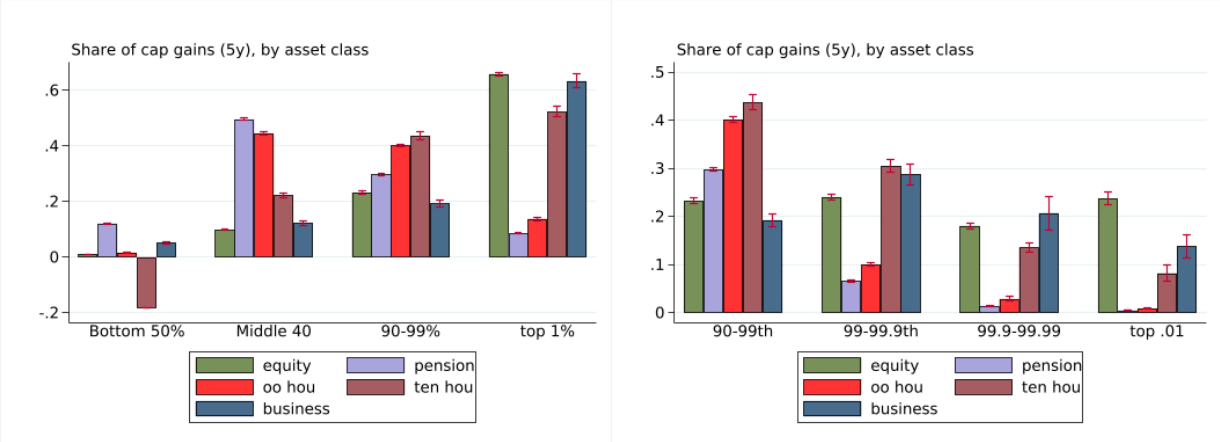
Figure 7: Share of capital gains by income group. Individuals are ranked by factor income, and the share of total capital gains for that group calculated. For graphing display purposes, extreme values above 150% have been trimmed.

The addition of capital gain income necessitates a reranking of individuals, which in turn leads to a higher concentration of capital gain income. Figure 8 shows the share of capital income from individuals ranked on Haig-Simons income. The top 1% received 45.3% of capital gains by this measure. As shown in figure 9, this high degree of concentration is driven by gains on public equity, private business, and tenant occupied housing assets.



(a) (b)

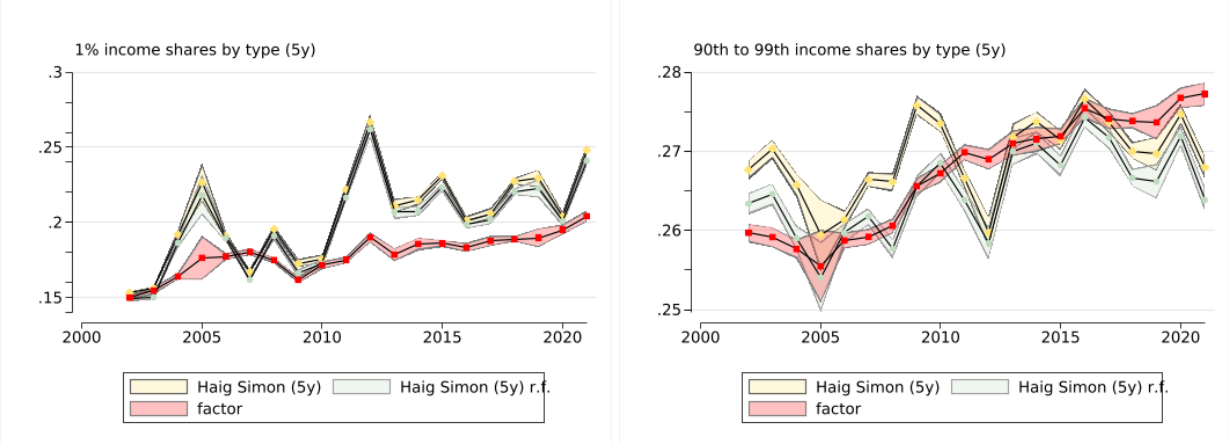
Figure 8: Share of real capital gains by income group. Individuals are ranked by Haig-Simons (5 yr) income, and the share of total capital gains for that group calculated. Bars display weighted averages across all years of sample, where weights are the level of capital gains in 2021 dollars.



(a) (b)

Figure 9: Share of real capital gain income by income group and asset class. Individuals are ranked by Haig-Simons (5 yr) income, and the share of capital gains for each asset class is calculated. Bars display weighted averages across all years of sample, where weights are the level of capital gains of the given asset class in 2021 dollars.

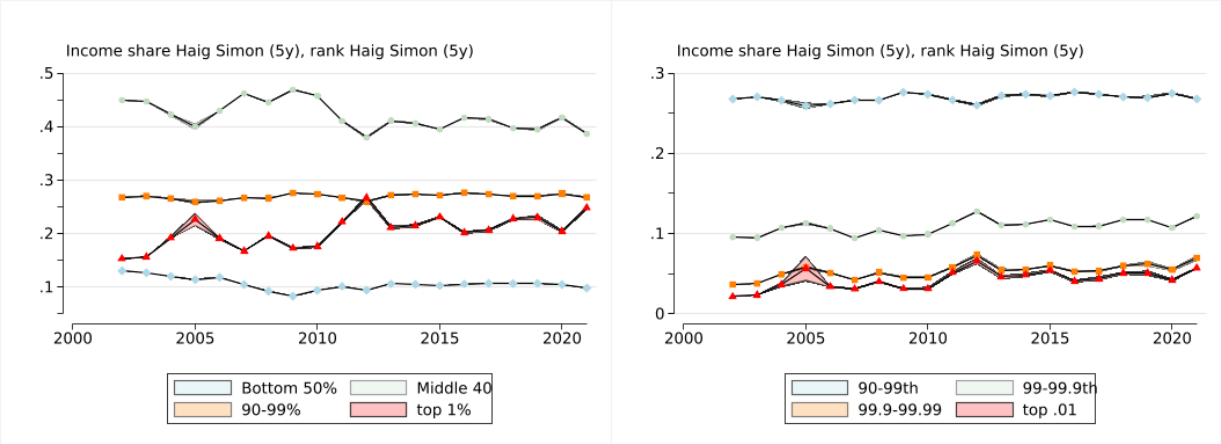
The large magnitude of capital gains combined with their concentration leads to high levels of Haig-Simons inequality. As a baseline, we first describe the distribution of ordinary factor income, shown in figure 10, red line. The top 1% received 15% of factor income in 2002, steadily growing over time to 20% by 2021. The increase is relatively smooth, and there is little cyclicality in income shares. The green series shows the distribution of Haig-Simons (5yr) income, ranked on factor income. This series, which adds capital gains to factor income (while preserving the ranking of individuals) increases the top 1% share to 20.5%, exceeding the factor income share of 18%. There is also more volatility and cyclicality, even in this smoothed capital gain series, with shares rising as high as 28%. Finally, the gold series shows the distribution of Haig-Simons (5yr) income, ranked on Haig-Simons income. The reranking has a moderate effect on income shares, increasing the top 1% share to 21.0%.



(a) (b)

Figure 10: Comparison of income shares: factor, Haig-Simons ranked on factor (r.f.), and Haig-Simons, ranked on Haig-Simons. Haig-Simons calculated using using 5 year average of capital gain returns.

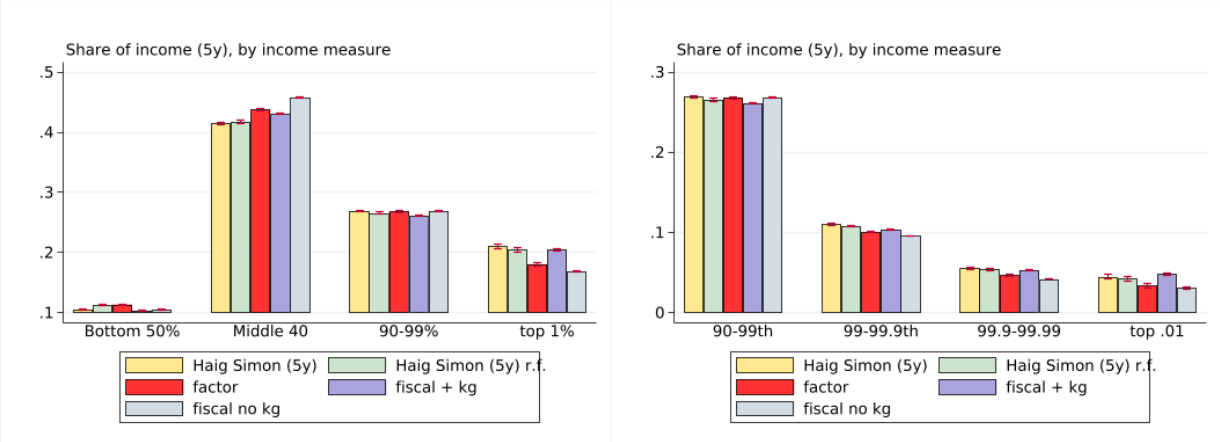
Figure 11 shows the Haig-Simons (5yr) shares for the rest of the distribution. The top 1% is the only group that shows an increase over the time period; this is made up by declines for the bottom 50% and middle 40%, while the 90th-99th is relatively flat. Even within the top 1%, it is the top part of this group, the 99.9-99.99 and top .01 group, that shows the largest gains.



(a) (b)

Figure 11: Average 5-year Haig-Simons income share by income group. Individuals are ranked on Haig-Simons (5 yr) income.

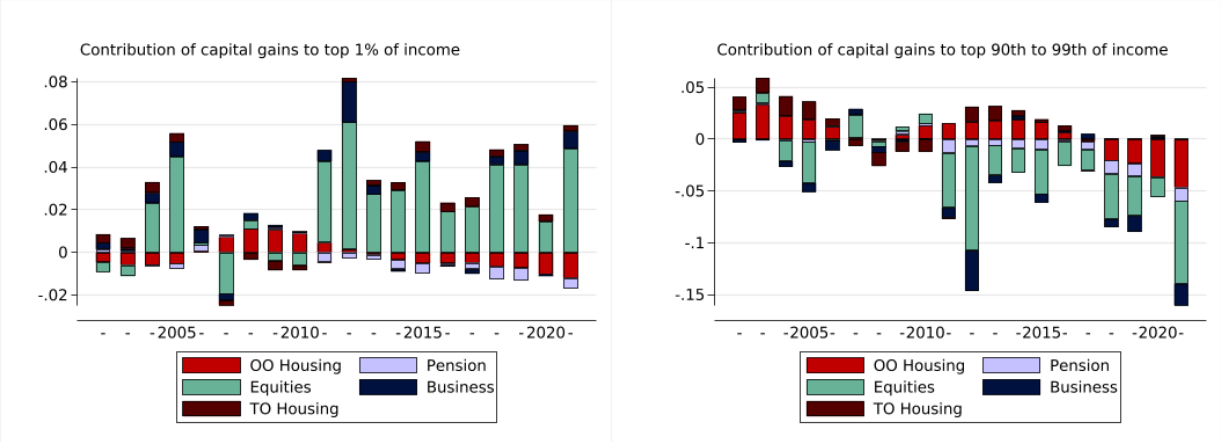
Figure 12 summarizes the changes in income share across the distribution by income measure. Income concentration increases moving from fiscal to factor income, factor to Haig-Simons (rank factor), and finally to Haig-Simons (rank Haig-Simons).



(a) (b)

Figure 12: Income share comparisons. 'Fiscal' income is income reported on tax returns. Haig-Simons income uses 5 year moving average for capital gain income.

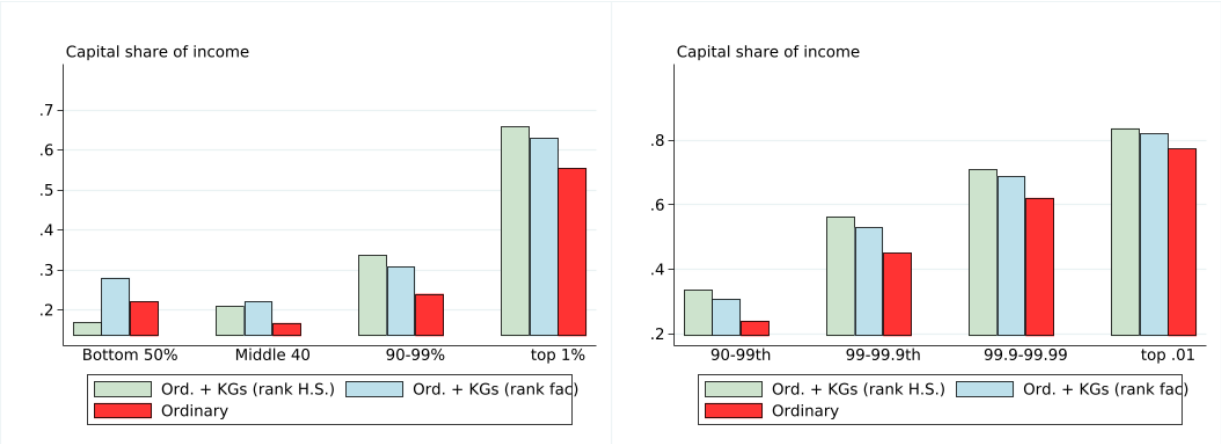
To better understand which specific capital gains increase inequality, figure 13 provides a decomposition. For each percentile ranking we start with their share of factor income, and then add asset-specific capital gains one at a time, calculating changes in income shares after adding in the gain. Since we do not rerank individuals, this process provides a lower bound on the concentration effects of capital gain income. The two largest drivers of increased income concentration are public and private equities; this is not surprising, given that these are the most concentrated forms of income. On the other hand, pension and owner-occupied housing gains tend to decrease concentration— this decrease comes about since the underlying assets are relatively evenly dispersed.



(a) (b)

Figure 13: Contribution of capital gains to changes in income share. Bars represent the marginal effect of capital gain income source on the share of income for the 1% (or top 10%) income group. Individuals ranked on factor income.

One additional implication of including capital gains as part of the income measure is that the capital share of income increases. Figure 14 shows that for the top 1%, the capital share increases from 55% without capital gains to almost 70% with capital gains. For the 90th-99th percentile, the capital share increases from 25% to 35%.

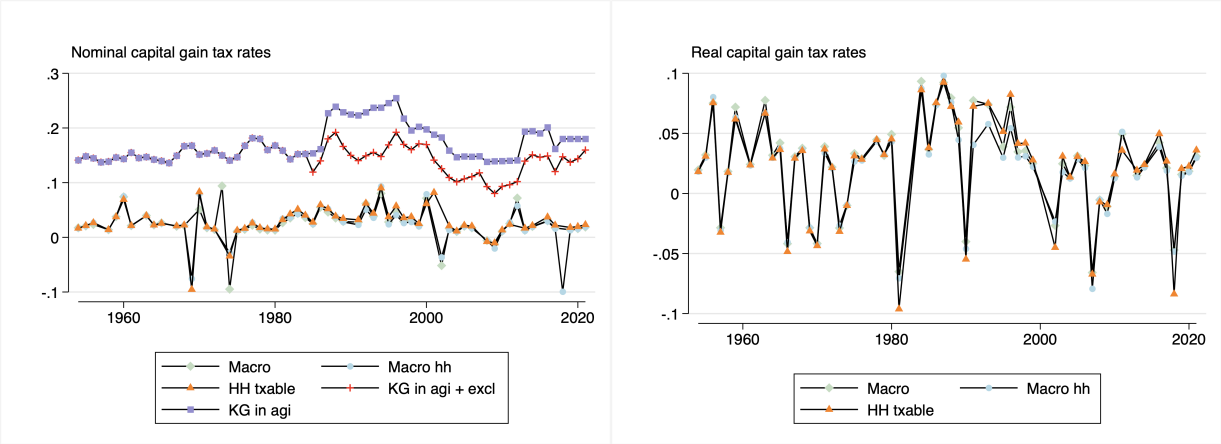


(a) (b)

Figure 14: Capital share of income, by measure. 'Ordinary' capital share equals ordinary capital income divided by factor income. 'Ord. + KGs' equals ordinary capital income plus capital gains, divided by Haig-Simons income.

4 Taxes and tax rates

4.1 Capital gain tax rates



(a) (b)

Figure 15: (a) Nominal capital gain tax rates (b) real capital gain tax rates. Tax rates calculated as total capital gains tax revenue, divided by alternate measures of aggregate capital gain income. 'Macro' capital gains are total realized and unrealized capital gains by households and nonprofits. 'Macro hh' are total realized and unrealized gains by households. 'HH txable' are total realized and unrealized gains by households in taxable categories, i.e. excluding pension and nonprofit. 'KG in agi + Excl' are capital gains reported on tax returns *plus* an estimate of capital gains on certain categories that are excluded by law (described in text). See section A.6.

The *macroeconomic tax rate* for capital gain income is defined as:

$$KGTR_t^{\text{Macro}} = \frac{\text{Aggregate household capital gain taxes paid}_t}{\text{Aggregate realized and unrealized gains households and nonprofits}_t} \tag{6}$$

Figure 15 shows that the macro tax rate for capital gains is quite low, averaging 3.0% for nominal gains and 5.2% for real. In 2021, total tax revenue from capital gain income was \$379 B, while aggregate nominal capital gains was \$20.5 T, for $KGTR_t^{\text{Macro}} = 1.8\%$. For real gains, the total macroeconomic rate was 3.2%.

The *realized tax rate* is the tax rate on gains realized and reported on tax returns:

$$KGTR_t^{\text{Realized}} = \frac{\text{Aggregate household capital gain taxes paid}_t}{\text{Total capital gains reported in AGI}_t}.$$

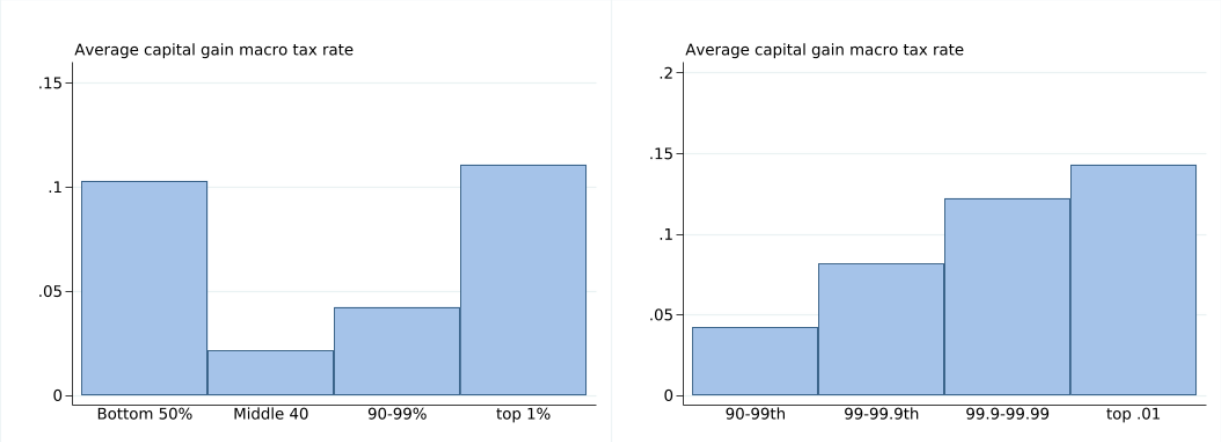
Figure 15 presents data on the realized rate, which greatly exceeds the macro rate— in 2021, it was 18%.

The macro tax rate is much lower than the statutory rate because only a fraction of macro capital gains are reported on tax returns— of the $20.5 T in 2021 macro gains, $2.1 T was reported. There are three reasons why aggregates dwarf tax-return gains: (i) a significant portion of capital gains are not taxable by law, including those in pension funds and held by nonprofits (ii) some part of gains are not subject to tax due to exclusions, such as those for selling a primary residence, 1031 exchanges when selling tenant occupied real estate, and small business sale exemptions[26] (iii) gains are only taxed when *realized*.

Figure 1 (b) provides a breakdown of the difference between aggregate and tax return capital gains in 2021. Of the $20.5 T in gains, $3.8 T are held in pensions or non-profits, and thus are nontaxable. $2.1 T were reported on tax returns as part of AGI, while $.3 T in gains were excluded from returns. The total that can be accounted for is thus $6.2 T, leaving $14.3 T which were *unrealized* (or unmeasured).[27] For the entire 1954-2021 period we have data on, there have been $116 T in gains: $18 T nontaxable, $20 T realized and reported on tax returns, $6 T excluded, and $72 T unrealized.

[26]We estimate the total amount of sales that are excluded from tax returns using the following method. First, the size of the 'tax expenditure' for each category (e.g., exemption for the sale of primary residences) of excluded gains is taken from the Joint Committee on Taxation's yearly estimate (see JCT (2008)). This yields the estimated tax revenue that capital gain category would have yielded in the absence of the exemption. We then use the average capital gain tax rate, in combination with the tax expenditure, to back out the size of the capital gains not reported on tax returns.

[27]Prior research consistently shows that capital gains reported on tax returns captures only a small fraction of total capital gains. Bourne et al. (2018) link federal estate tax returns from decedents in 2007 to panel data on income tax returns prior from 2002-2006. Although this was a period of very high returns in the stock and housing markets, the majority of wealthy individuals reported *nominal* returns on capital to the IRS of less than 2%. Steuerle (1985) and Steuerle (1982) also provide evidence that realized capital gains bear little relation to actual returns.



(a) (b)

Figure 16: Average macroeconomic capital gains tax rate, by income group. Calculated as in equation 6. Individuals ranked by Haig-Simons (5yr) income. Bars are weighted averages across years, with weights equal to the level of capital gains in 2021 dollars.

How does the $KGTR_t^{\text{Macro}}$ vary across the income distribution? Figure 16 shows that the top 1% macro tax rates exceed those of the lower percentiles. This is a function of (i) greater percentage of gains that taxable by law (figure A.26, i.e., non-pension and housing gains) (ii) steeper tax rates on realized gains due to being in a higher bracket (figure A.27) (iii) a higher percentage of gains that are realized (figure A.25).

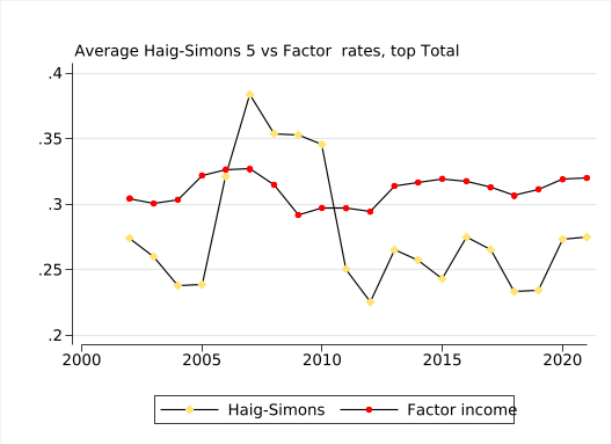
4.2 Haig-Simons tax rates

The Haig-Simons tax rate is defined as the total amount of direct and indirect taxes paid, divided by Haig-Simons income:

$$HSTR_t = \frac{\text{Total direct and indirect taxes}_t}{\text{Haig-Simons income}_t}. \tag{7}$$

For estimation of the taxes paid and their incidence, we follow PSZ's construction of tax variables and tax incidence assumptions. Taxes are comprehensive across individual, corporate, payroll, property, and sales. They include federal, state, and local taxation. As a comparison to our Haig-Simons series, we also estimate tax rates on ordinary factor income (i.e., excluding capital gains):

$$FATR_t = \frac{\text{Total direct and indirect taxes}_t}{\text{Ordinary factor income}_t}. \tag{8}$$



(a)

Figure 17: Average Haig-Simons (5yr) tax rate vs factor income tax rate. Haig-Simons tax rate defined in equation 7, factor income tax rate defined in equation 8.

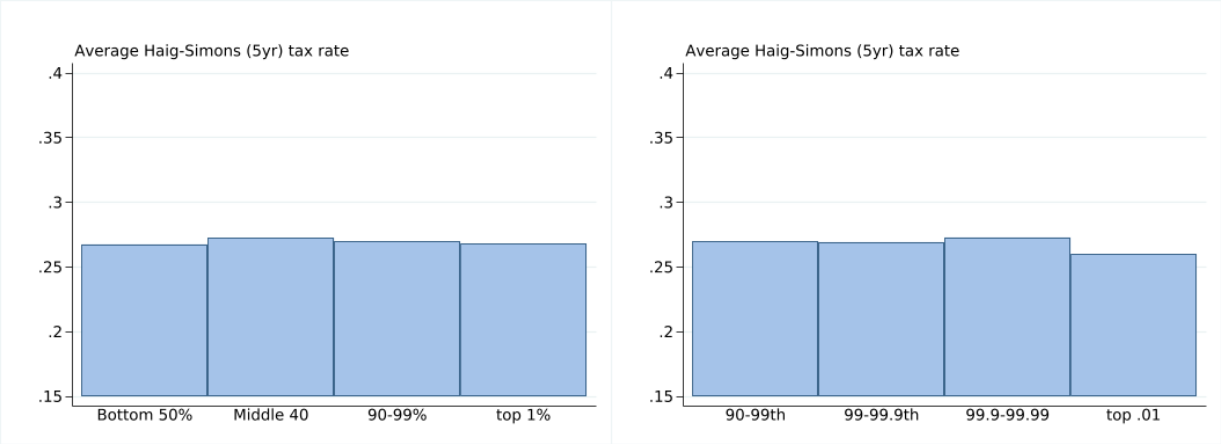
Figure 17 compares Haig-Simons and factor tax rates. The addition of capital gains to the income definition leads to a lower rate for Haig-Simons than factor income. The Haig-Simons tax rate averaged 25% over the sample period, compared to 30% for factor income.

Figures 18-19 compare Haig-Simons tax rates across the income distribution. Because the top 10% receive the bulk of capital gains, in periods of high returns tax rates drop, sometimes below the rates of the lower 90%. In the years of capital losses, such as the Great Recession, the pattern is reversed. Over our entire sample, however, the gains outpaced the losses, which means that top groups saw the largest decrease in rates.

Figure 19 shows that Haig-Simons tax rates change our understanding of tax progressivity: tax rates moderately *decline* across the income distribution. The middle 40% pays average rates of 27.3%, the 90th-99th 27.0%, and the top 1% 26.8%. The decline of the top 1% is driven by the top .01% of the distribution, which has the lowest tax rate of any group.

(a) (b)

Figure 18: Haig-Simons (5yr) tax rates, by income group. Haig-Simons tax rate defined in equation 7.



(a) (b)

Figure 19: Haig-Simons (5 yr) tax rates, by income group. Haig-Simons tax rate defined in equation 7. Bars are weighted averages across years, with weights equal to the level of Haig-Simons income in 2021 dollars.

Figure 20 compares the progressivity of the different tax rate measures. While factor income tax rates are progressive, with an increasing rate for higher percentiles, Haig-Simons tax rates are relatively flat, and decrease with higher levels of income.

(a) (b)

Figure 20: Comparison of tax rates. Haig-Simons tax rate defined in equation 7, factor income tax rate defined in equation 8. PSZ tax rates taken from Distributional National Accounts.

5 Differential cap rates and returns

We find evidence of substantial heterogeneity in returns across the income distribution. Two separate forms of differential returns influence our estimates: (i) differential cap rates that affect how income flows are capitalized into wealth (ii) differential returns on wealth that affect measured capital income. In addition, there is the interaction between the two, since higher measured wealth in turn can lead to higher measured income. The focus of our analysis will be documenting the differential returns, and studying how they affect our measures of income and wealth inequality.

Our analysis of heterogeneous returns has several limitations. First, the returns are not adjusted for risk, either in absolute terms or through a CAPM or other asset pricing model. Second, we have limited indications of the forces driving the return differences.[28] Finally, we cannot measure differential returns for public equities and pension wealth.

[28]Heterogeneity may be caused by higher skill or risk tolerance at all wealth levels, known as *type dependence*, or from *scale dependence*, which posits that access to higher wealth changes returns through differential information, opportunity, or decreasing relative risk aversion. See Bach, Calvet and Sodini (2020) and Fagereng et al. (2020).

5.1 Owner-occupied housing

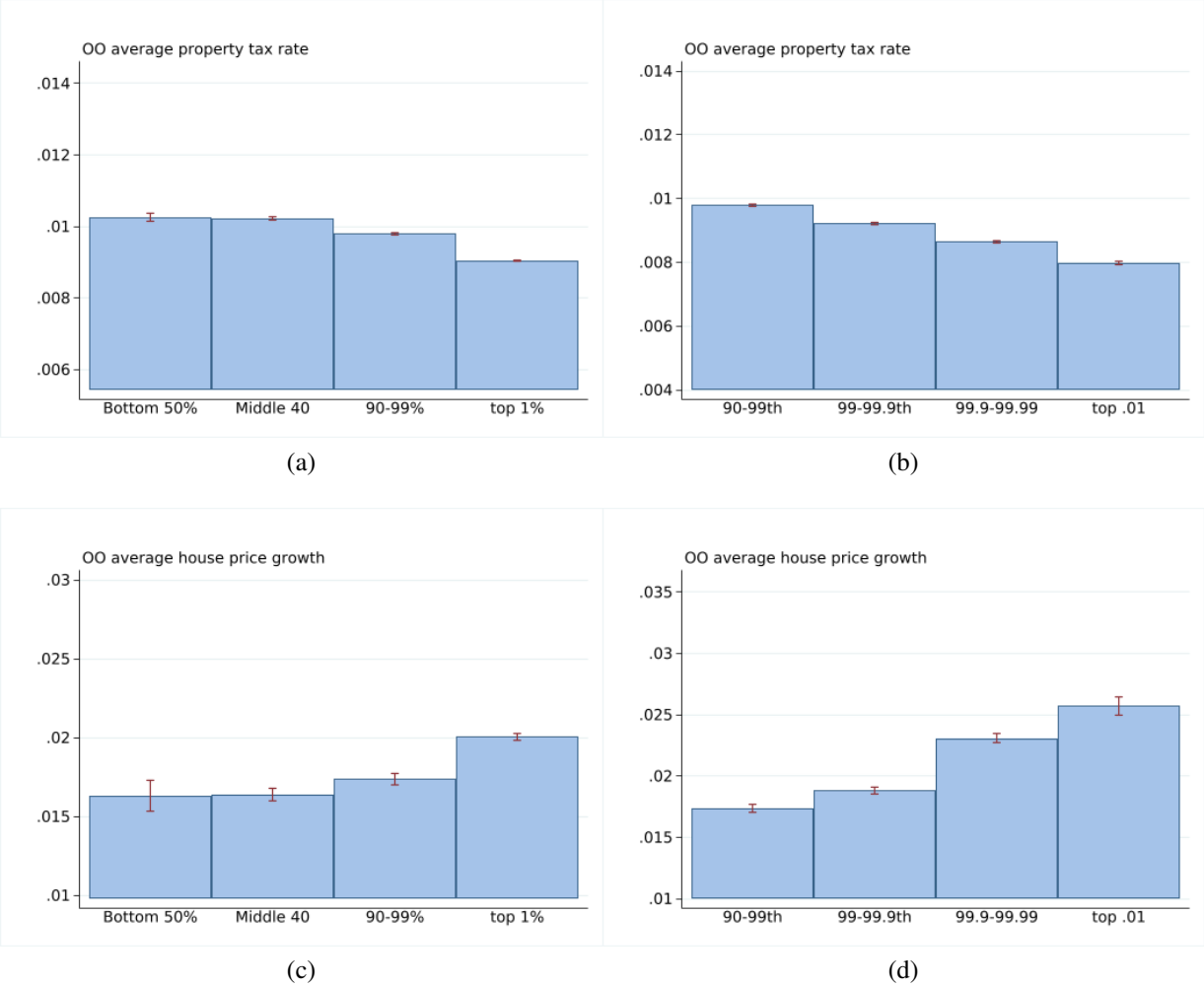


Figure 21: Owner-occupied housing.(a) - (b) Average property tax rates (c)-(d) Average capital gain returns. Individuals ranked by factor income.

For individuals that are homeowners, figure 21 presents average property tax rates by factor income rank, showing declining rates as income increases. The middle 40% pays average rates of 1.02%, declining across the distribution to 0.90% for the top 1%. Tax rates continue to decrease to the tails of the distribution, with the top .01% paying the lowest rates of all.

The source of our variation for figure 21 is purely geographic; richer individuals have lower tax rates because they live in counties with lower rates. Prior research suggests that the disparities would only increase if we took into acount within geographic variation. Avenancio-León and Howard (2022) finds that within neighborhoods, black and hispanic residents face 10-13% higher burdens, while McMillen and Singh (2020) also finds regressivity in tax rates across incomes.

Lower tax rates lead to higher estimated housing wealth and wealth concentration. Figure 22 (a) shows that the top 1%'s average housing wealth increases from $780,000 under equal rates to $810,000 under heterogeneous taxes. The share of housing wealth held by the top 1% increases from 8.30% to 8.93%.

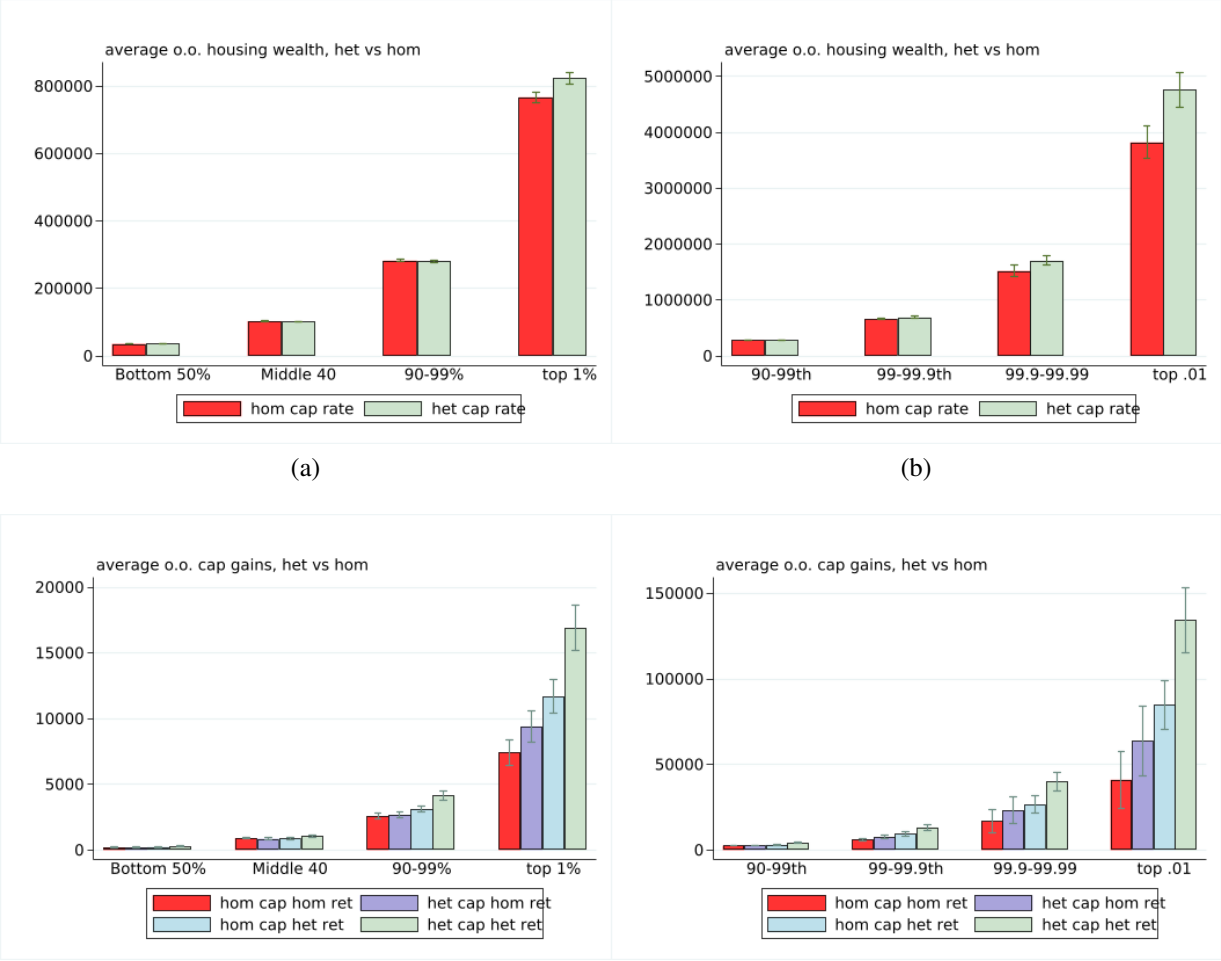


Figure 22: Owner-occupied housing wealth and capital gains, comparison of heterogeneous vs homogeneous returns. (a)-(b) Average owner-occupied housing wealth (c)-(d) Average housing capital gains. Individuals ranked by factor income.

Figure 21 (c) shows average real house price growth across the factor income distribution, displaying a strong relationship between income and returns. The top 1% has an average return on owner-occupied real estate of 2.00% compared with 1.64% for the middle 40.

Again, our source of variation is geographic, suggesting that higher income individuals reside in counties that have seen larger growth in real estate prices. This result is consistent with Demers and Eisfeldt (2022), who find that high price-tier cities accrue more capital gains.

Heterogeneous returns make a substantial difference for capital gain inequality. Average owner-occupied housing capital gains for the top 1% are $ 17,500 under heterogeneous returns, compared to $ 7,500 under homogeneous returns. Figures A.10 and 22 show that both heterogeneous cap rates and heterogeneous returns contribute to an increase in income inequality. Moving from homogeneous cap rates and returns to heterogeneous ones, the top 1% share of housing capital gains increases from 8.83% to 15.23%.

5.2 Directly owned tenant occupied housing

(a) All

(b) Homestead

(c) Multifamily

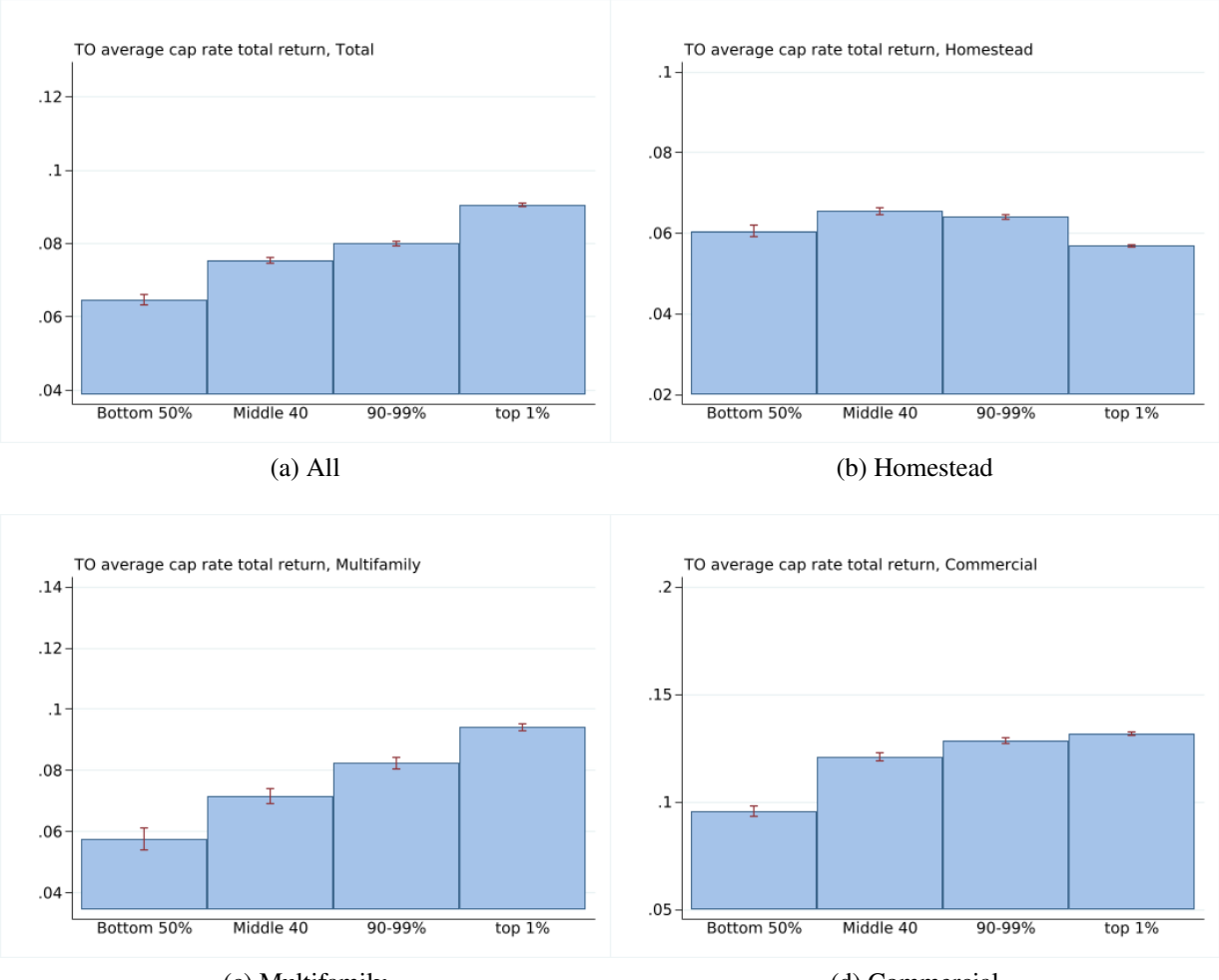
(d) Commercial

Figure 23: Average property tax rates, Schedule E real estate, by income group.

For individuals that directly own tenant occupied properties, figure 23 calculates average property tax rates by income group. Results are broken out by three primary property classes: homestead (single family and vacation homes), multi-family, and commercial (which includes land and other types of proper-

ties). Within property classes, we find similar results to owner-occupied housing: there is a negative relationship between factor income and property tax rates, suggesting that richer individuals invest in real estate located in areas with lower property tax rates.

Looking at tenant occupied housing as a whole, however, there is little variation in rates (panel a). This result is due to a composition effect: higher income individuals own more multifamily and commercial buildings, which have higher average tax rates, canceling out the within-property class effects. Heterogeneous property tax rates thus do not meaningfully change the concentration of property wealth (see figure A.13).



(a) All

(b) Homestead

(c) Multifamily

(d) Commercial

Figure 24: Average Schedule E real estate total return. Total return equals rental return plus real capital gain yield. Individuals ranked by factor income.

Total tenant occupied housing returns equals the income return plus the cap-

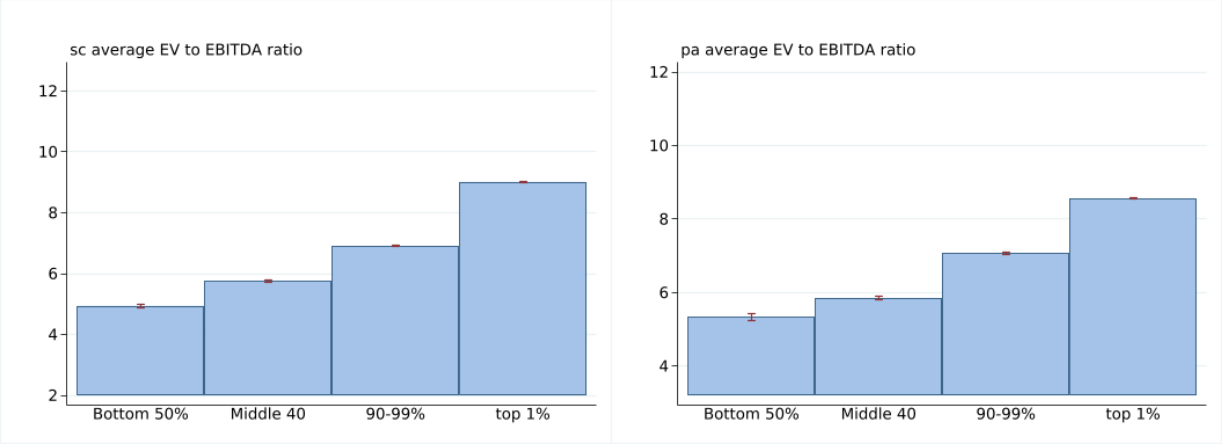
ital gain return,[29]

$$Ret_t^{tot} = \frac{\text{Net rental income}_t + \text{Capital gains}_t}{\text{Market value}_t}.$$

Figure 23 displays average total returns across the income distribution. There is a positive relationship between income and total returns, with richer individuals receiving higher average yields. As shown in appendix figures A.12 and A.11, this pattern is driven mainly by differences in the income return, with little variation in capital gain yields. Heterogeneity thus affects the overall concentration of Haig-Simons income, but not capital gain income.

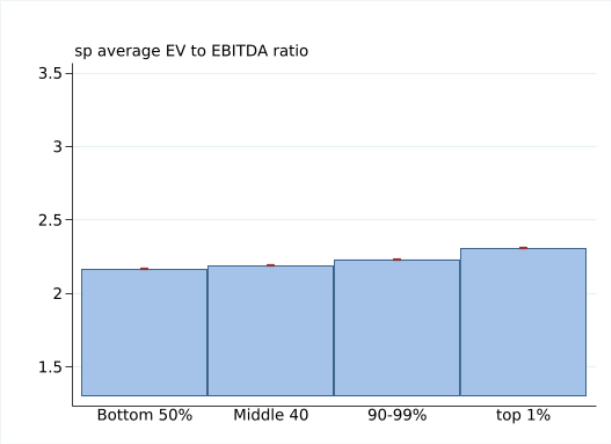
[29]Net rental income equals rent roll minus maitenance, management, utilities, and other expenses from Schedule E.

5.3 Private business wealth



(a) S-corp

(b) Partnership



(c) Sole proprietorship

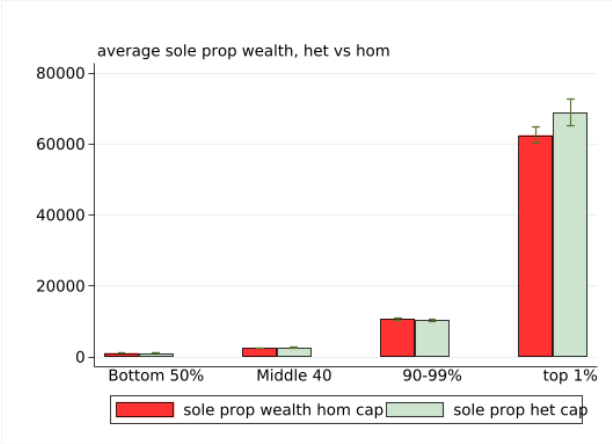
Figure 25: Private business, average EV/EBITDA valuation ratios, by income group. Individuals ranked by factor income.

For owners of private business, we combine together all ownerships stakes and calculate average statistics across investments. We then calculate average cap rate by income group. Figures 25 and A.18 show that richer individuals own private businesses that sell for higher multiples. The average S-corp EV/EBITDA ratio for the top 1% is 9.0, compared to 5.8 for the middle 40. The average partnership EV to EBITDA for the top 1% is 8.6 compared to 5.9 for the middle 40. There is less heterogeneity in sole proprietorship valuation to earnings ratios, ranging from 2.2 for middle 40 to 2.3 for the top 1%.

Richer owned businesses are worth more for two reasons: (i) the businesses are larger (ii) they are in industries that sell for a premium. Figure A.19 shows differences in business size across the distribution. Top 1% owned S-corps are worth about $4.5 million, compared with $500,000 for the 90th-99th percentile,

and $100,000 for the middle 40. Top 1% partnerships are worth $1,000,000 on average, compared with $50,000 for the middle 40. Figures A.20 and A.21 show the industry composition: rich owned S-corps have more manufacturing, retail, and wholesale than average, which tend to sell for higher multiples, and fewer professional businesses, which have lower mutliples.

(a) (b)



(c)

Figure 26: Average private business wealth, by measurement method. "FA" columns present homogeneous capitalization using Financial Accounts totals. "Hom cap" present totals assuming homogeneous capitalization rates across the income distribution. "Het cap" represent our baseline results, which use heterogeneous capitalization rates.

6 Conclusion

This paper develops new methods to study the distribution of capital gains, and finds that:

1. Capital gains are large and highly concentrated. They average about 20% of ordinary factor income, and are comparable in magnitude to ordinary capital income. Capital gains in public equities, private equities, and tenant occupied housing are particularly concentrated, with the top 1% receiving a majority of gains. Capital gains on housing and pension assets are more widely dispersed. Overall, the top 1% of the distribution receives 45.3% of capital gains.

2. Capital gains contribute substantially to income inequality. The top 1% share increases from 18% without capital gains to 21.0% with gains included.

3. The U.S. tax system is less progressive when capital gains are taken into account. Overall, only a small proportion of gains are taxed, leading to an overall macro tax rate on nominal gains of 3%, significantly below the statutory rate. Because gains are concentrated in the top 10%, the average tax rate on Haig-Simons income is lower for higher income groups, leading to a tax rate that is flat across the income distribution.

4. Cap rates and returns exhibit marked differences across income levels. Richer individuals have higher cap rates for real estate and private business wealth, and higher returns for owner and tenant occupied housing. The heterogeneity makes a material difference in measures of overall income and wealth inequality.

These empirical findings have direct relevance to capital gain tax policy. Capital gain tax reform is a perennial issue, with the standard debate weighing revenue against concerns over the effects on entrepreneurship as well as large estimated elasticities of tax responses.[30] While traditional scorekeepers such as the Joint Committee on Taxation use revenue elasticities as high as -.7,[31] recent findings suggest that -.3 to -.5 may be more reasonable for long-run responses.[32] Our findings suggest that wealthy taxpayers have historically been able to largely shield their capital gains from taxation. In order to raise substantial revenue from the tax it will be necessary to close one or more of the existing loopholes: the step-up basis at death, charitable giving of appreciated property, or taxation at realization.

There are several limitations of this study which we leave for future work. More analysis needs to be done to estimate heterogeneous cap rates and returns on public equities and pension wealth, which we could not do due to data limitations. In addition, it will be important to distinguish between capital gains that reflect pure changes in discount rates, which do not necessarily correspond to welfare changes. Finally, there is still a portion of indirectly held partnership and real estate wealth which cannot be traced back to individuals, which could also affect measured income and wealth equity.

[30] See Burman (2010) and Slemrod and Chen (2023).

[31] See JCT (1990), JCT (2021),Dowd, McClelland and Muthitacharoen (2015).

[32] Sarin et al. (2022) Agersnap and Zidar (2021).

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Online Appendix for
The Distribution of Capital Gains

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A Data construction

A.1 Final wealth categories

Total household net worth equals the sum of fixed income, public equities, private equities, pension, owner occupied housing, and tenant occupied housing, minus debt. Aggregate wealth for each category will equal Financial Accounts totals, with the exception of bespoke estimates for private business wealth and tenant occupied housing. For all Financial Accounts variables, we use the March 24 2024 data release. Wealth variables are mid-year totals. We estimate wealth at the individual level through a combination of our own methods and those of PSZ and SZZ. We use the latest PSZ (2020) updated methods, described here. SZZ methods are described in their online appendix.

1. **Fixed income**, 2021 total = \$20.77 T.
    - **Currency**, 2021 total = \$3.37 T. Follows PSZ methodology and imputes based on tabulations from the SCF.
    - **Bond mutual fund / ETF / closed end funds**, 2021 total = \$4.38 T. Estimated by capitalizing nonqualified dividends from 2003 onward, following SZZ. Prior to 2003, capitalized using dividends (following PSZ).
    - **Munis**, 2021 total = \$2.32 T. Follows PSZ and capitalizes tax exempt interest.
    - **Taxable fixed income wealth**, 2021 total = \$10.70 T. Capitalizes taxable interest, with heterogeneous cap rates following SZZ; see section A.4.
2. **Public corporate equities**, 2021 total = \$16.35 T. Uses SZZ methodology, capitalizing mix of 90% qualified dividends, 10% capital gains.
3. **Private business wealth**, 2021 total = \$25.78 T. Household total \$18.66 T. See section 2.3.3.
    - **S-corporation**, 2021 total = \$8.47 T. Household total \$6.70 T.
    - **Partnership**, 2021 total = \$11.62 T. Household total \$6.28 T.
    - **Private C**, 2021 total = \$4.53 T.

- **Sole proprietorship**, 2021 total = $1.16 T.

4. **Pension wealth**, 2021 total = $47.59 T. Following PSZ, capitalizes a mixture of 60% taxable pensions, 30% wages, and 10% tax-exempt pensions.
   - **IRA**, 2021 total = $13.56 T.
   - **Defined contribution**, 2021 total = $10.15 T.
   - **Defined benefit**, 2021 total = $16.57 T. Note that here we use the full value of DB pensions, and not only the funded portion, as in PSZ.
   - **Life insurance, annuity, other**, 2021 total = $7.31 T.
5. **Owner occupied housing**, 2021 total = $35.94 T. See description in section A.8.
6. **Tenant occupied housing**, 2021 total = $11.06 T. See description in section A.8.
7. **Household debt**, 2021 total = $-21.58 T.
   - **Owner occupied mortgages**, 2021 total = $-11.37 T. Allocated proportionally to o.o. housing wealth.
   - **Tenant occupied mortgages**, 2021 total = $-4.73 T. Allocated proportionally to t.o. wealth.
   - **Other debt**, 2021 total = $-5.47 T. Following PSZ, imputed using tabulations from SCF.

A.2 Capital gain variables

Capital gains estimated (i) using totals from the Financial Accounts, using a homogeneous return assumption (ii) for owner and tenant occupied housing, using real estate price indexes multiplied by the value of the real estate asset. We strip out all fixed income capital gains from the totals, and do not include capital gains or losses on debt. The breakdown by asset class is as follows:

1. **Fixed income**, capital gains not included.
2. **Public corporate equities**, 2021 total = $3,899 B. Totals from Financial Accounts. Estimated using equal returns.
3. **Private business wealth**, 2021 total = $1,753 B. Household total = $1,243 B. See description in text. Estimated using equal returns.
   - **S-corporation**, 2021 total = $437 B. Household total = $345 B.
   - **Partnership**, 2021 total = $741 B. Household total = $323 .
   - **Private C**, 2021 total = $352 B.

- **Sole proprietorship**, 2021 total = $223 B.

4. **Pension wealth**, 2021 total = $1,292 B. Only includes capital gains of corporate equities; fixed income capital gains are stripped from Financial Accounts totals. Totals from Financial Accounts, distributed using equal returns.
   - **IRA**, 2021 total = $772 B.
   - **Defined contribution**, 2021 total = $560 B.
   - **Defined benefit**, capital gains not included. Under our assumptions individuals do not receive DB kgs, only sponsors do.
   - **Life insurance, annuity, other**, capital gains not included.
5. **Owner occupied housing** 2021 total = $2,019 B. Totals estimated using FHFA price index multiplied by home values. See description in text and section A.8.
6. **Tenant occupied housing**, 2021 total = $589 B. Total estimated from property type specific price indexes by real estate values. See description in text and section A.8.
7. **Household debt**, capital gains not included.

Nominal capital gains for asset class j during year t are converted to real gains using the formula:

$$\text{Real gains}_t^j = MV_{t-1}^j \cdot (1 + \frac{\text{Nominal gains}_t^j}{MV_{t-1}^j}) \cdot \frac{1}{1+\pi_t} - MV_{t-1}^j, \qquad \text{(A.1)}$$

where MV_{t-1}^j is the market value of the asset at the end of year $t-1$, π_t is inflation for year t using the Net National Product price index (calculated by the percent change of the index from December $t-1$ to December t). The formula multiplies the market value (end of year $t-1$ prices) by the real price growth to yield real gains. Finally, to put gains in midyear t prices, we multiply the gains by NNP inflation during the first half of the year.

To form five year moving average for capital gains, for every year we calculate the real yield as $\frac{\text{Real gains}_t^j}{MV_{t-1}^j}$, where gains and wealth totals are in end of year $t-1$ prices. We then take a geometric average of the yield centered around year t, and mutliply the real yield by MV_{t-1}^j. To put gains in midyear t prices, we multiply the gains by NNP inflation during the first half of the year.

A.3 Ordinary factor income

We estimate ordinary factor income following the methodology of PSZ: national income components are apportioned to individuals in proportion to taxable income and estimated wealth categories. Some of our wealth categories are different than PSZ, which leads to differences in the income distribution methodology.

1. **Labor and labor component of mixed income**, 2021 total = $13,904 B. Apportioned as in PSZ.

2. **Corporate equity income directly held** (other than S-corp income), 2021 total = $947 B. Total corporate equity income distributed to three separate wealth variables using equal returns: public corporate equity directly held, public corporate equity held through pension funds, private C corps directly held. We compute the C corp yield as aggregate C income / aggregate C wealth, then multiply the yield by the three components. Note that because the retained earnings is contained in capital gains, we strip them out from the numerator here.

3. **Fixed income directly held**, 2021 total = $594 B. Total fixed income apportioned to directly held vs pension in proportion to asset totals.

4. **Pension**, 2021 total = $1,701 B. Pension component of fixed income and corporate income.

5. **Private business**, 2021 total = $1,676 B.

    - **S-corporation**, 2021 total = $940 B.
    - **Partnership**, 2021 total = $543 B. Partnership and soleprop distributed in proportion to asset values.
    - **Sole proprietorship**, 2021 total = $192 B.

6. **Owner occupied housing** 2021 total = $1,168 B. Apportioned proportional to owner occupied housing using net imputed rent. Rent is imputed for owner occupiers by multiplying housing wealth by area specific net rental rates.

7. **Tenant occupied housing**, 2021 total = $398 B. Apportioned proportional to tenant occupied net rental income.

8. **Debt payments**, 2021 total = $-735 B.

    - **Owner and tenant occupied mortgage interest**, 2021 total = $-422 B. Allocated in proportin to owner and tenant occupied mortgages.
    - **Other debt interest**, 2021 total = $-313 B. Allocated in proportion to non mortgage debt.

9. Nonprofit and government income, 2021 total = $-261 B. Apportioned as in PSZ.

A.4 Replication and use of Distributional National Accounts and Smith, Zidar, and Zwick variables

We replicate the DINAs of PSZ using the 2020 vintage of their files, using the Stata programs provided on https://gabriel-zucman.eu/usdina/ and directly from the authors. We extend analysis for several additional years, through 2021. This requires (i) using additional CPS data for the non filer sample, from NBER data (ii) using the 2019 and 2022 vintage of SCF files for use of constructing tabulations from Fed Reserve files. Our replication matches closely the key and income and wealth inequality series from the DINAs.

We use the DINAs through two channels.

1. To capitalize a number of our wealth variables, as described in section A.1. The wealth totals for these categories will be slightly different, however, as we use updated Financial Accounts data.

2. To distribute ordinary factor income for most income categories, with the exception of private business income, tenant occupied housing income, and owner occupied housing income. The totals will exactly equal the DINA total, as we derive the income totals from the parameters.xlsx file provided in the replication file.

We use the exact methodology of SZZ to estimate bond mutual fund wealth and taxable corporate equities. To estimate taxable fixed income wealth, we use capitalization rates provided by SZZ in their ExhibitData.zip, wealth_excel_exhibits.xlsx, DataFig3CD sheet, provided on Zidar's website. SZZ provide capitalization for four wealth groups: 0-99%, 99-99.9%, 99.9-99.99%, and top .01%. We rank individuals into quantiles based upon non-interest financial wealth, and capitalize taxable interest using the appropriate cap rate to the wealth group.

A.5 Analysis of Financial Accounts data

Financial accounts data is used for (i) wealth totals (ii) capital gains (iii) comparison with our bespoke estimates. Our use of this data is similar to PSZ and SZZ; we compare our variables below.

The FA contains estimates of wealth, flows, and capital gains by asset class for households, nonprofits, and all other sectors of the economy. We use data from the Z1 release, https://www.federalreserve.gov/releases/z1/. We use the following category of variables: (i) FL, LM: levels, used for wealth totals (ii) FR: revaluations, used for capital gains.

We manipulate FA data to form asset classes that correspond to income flows on tax returns. In addition, for pooled assets such as mutual funds, ETFs, and closed end funds, we separate out the equity from the fixed income. This is necessary because we do not include fixed income capital gains in our baseline estimates.

The primary tables we use are B.101 Balance Sheet of Households and Nonprofit Organizations, B.104 Balance Sheet of Nonfinancial Noncorporate Business, B.101.n Balance Sheet of Nonprofit Organizations, S.3.a Households and Nonprofit Institutions Serving Households.

We use additional Investment Company Institute (ICI) data on the composition of IRA mutual funds, as in PSZ and SZZ. This is necessary to fully strip out fixed income capital gains from IRA mutual funds.

We form seven mutually exclusive categories

1. Taxable dividend wealth: money market non-munis, directly held stocks, ETFs, mutual funds. We separate this category into two groups: assets that pay qualified dividends (money market funds, bond mutual funds, bond ETFs), and those that pay non-qualified dividends (stocks and equity funds). This is in line with SZZ, but differs from PSZ who do not include indirectly held bonds in this category.

2. Currency: follows PSZ and SZZ.

3. Taxable fixed income: deposits, bonds directly held, loans. Does not include bonds held through mutual funds / ETFs. Follows SZZ, but not PSZ who includes these indirectly held fixed income assets.

4. Munis: through money market, mutual funds, ETFs. Follows PSZ and SZZ.

5. Real estate: includes owner occupied as well as tenant occupied. Differs slightly from PSZ and SZZ in that we include nonresidential (LM115035035) as well as residential in this category. PSZ and SZZ include nonresidential in noncorporate business.

6. Pension: includes defined benefit, defined contribution, life insurance, IRA. Our construction follows the FA, which is somewhat different than PSZ, who do not include unfunded defined benefit pension plans. SZZ likewise do not include unfunded DB, but use estimates from Sabelhaus and Volz (2019) to estimate this component.

7. Private business wealth: non corporate business wealth (excluding tenant occupied real estate), plus private S corp and private C corp wealth. Follows PSZ with the exception of the exclusion of commercial real estate.

The household balance sheets do not breakdown the holdings of household mutual funds and ETFs between fixed income and equity assets. In addition, they do not separately break out IRAs from other assets. To estimate these breakdowns, we utilize the following detail tables.

1. L.117 Private and Public Pension Funds

2. L.123 Closed-End Funds

3. L.124 Exchange-Traded Funds
4. L.224 Corporate Equities
5. L.122 Mutual Funds
6. L.229 Pension Entitlements
7. L.118.b Private Pension Funds: Defined Benefit Plans
8. L.118.c Private Pension Funds: Defined Contribution Plans
9. L.119 Federal Government Employee Retirement Funds
10. L.119.b Federal Government Employee Retirement Funds: Defined Benefit Plans
11. F L.119.c Federal Government Employee Retirement Funds: Defined Contribution Plans
12. F L.120 State and Local Government Employee Retirement Funds
13. F L.120.b State and Local Government Employee Retirement Funds: Defined Benefit Plans
14. L.120.c State and Local Government Employee Retirement Funds: Defined Contribution Plans

The total for our seven categories equals the total from Table B.101, FL152000005, and total liabilities likewise equal B.101 liabilities FL152090005A.

To separate household and nonprofit assets, we subtract totals from the nonprofit balance sheets on Table B.101n. This differs from PSZ, who have alternative methods of estimating nonprofit wealth.

Total Financial Accounts capital gains are calculated using the revaluation variables FR for the above assets classes.

The totals for our wealth variables (described in section A.1) will generally match FA totals, with the exception of private business wealth and tenant occupied housing, which we estimate separately. To equal FA wealth, take our starting estimates, subtract private C-corp, S-corp, partnership, sole proprietorship, tenant occupied real estate, and add in FA private C and S corp wealth, partnership and sole proprietorship wealth, and tenant occupied real estate.

A.5.1 Private business wealth in the Financial Accounts

Nonfinancial noncorporate business wealth is measured in table B.104. Table B.104 combines together many disparate asset types: partnership and sole proprietorship business assets, tenant occupied real estate, and financial assets held on balance sheets. The elements are as follows:

1. Residential real estate (LM115035023). This is estimated by a perpetual inventory type method, where flows of BEA residential investment are combined with a capital gains price index.

2. Nonresidential real estate (LM115035035), again measured using perpetual inventory type method from BEA nonresidential investment.

3. Mortgages (FL113165005)

4. Fixed assets of businesses (LM115015205 + LM115013765 + LM115020005). Measured using BEA fixed assets. I break out partnership from sole proprietorship assets using the underlying BEA data. Total partnership assets equal partnership fixed assets of equipment, IPP, and inventories (k1ntot17eq00 + k1ntotl7ip00 + estimated partnership share of LM115020005).

5. Net non-mortgage financial assets (FL114090005 - (FL114190005-FL113165005)).

Our EV/EBITDA and EV/SA estimates of private noncorporate business values are estimated on transaction data that do not include financial or real estate assets. The best apples to apples comparison is thus a comparison to the Financial Accounts fixed assets of businesses. To yield the total market value of private noncorporate business, we add to our capitalized estimates the net non-mortgage financial assets from Table B.104.

Financial accounts private corporate wealth equals S-corp (LM883164133) + private C-corp (LM883164135) market values, which are directly comparable to our estimates on an apples to apples basis. The total comparison between our estimates and Financial Accounts private business wealth is shown in figure A.17.

One additional difference of our analysis is that the FA implicitly assumes all noncorporate businesses (and tenant occupied real estate) are owned by U.S. residents. As seen in figure 4, this is not the case, and our inequality estimates reflect lower wealth totals than the aggregate.

We compare our tenant occupied housing values to those on Table B.104: our residential estimates are directly comparable to LM115035023, and our commercial to LM115035035. This comparison is shown in figure A.6.

We estimate the value of commercial/industrial real estate by capitalizing property taxes from rental properties. This is potentially missing industrial or commercial properties that are used for own-use by businesses (for example, a restaurant that owns its premises through the same llc). This is a current drawback of our method, however our aggregates in figure A.6 are still in line with the FA and SCF.

Table A.1: Private business wealth

	2002	2007	2012	2017	2021
Estimated Values (trillions of $)					
Enterprise Value Total	6.25	11.97	11.97	15.85	23.63
Market Value Total	6.10	12.39	12.56	17.37	25.78
Partnership Total	2.54	5.54	5.83	8.48	11.62
S-corp total	2.54	4.11	4.16	6.00	8.47
Market Value Individuals	4.32	8.95	8.91	12.63	18.66
Partnership Individuals	0.91	2.45	2.62	4.46	6.28
S-corp individuals	2.39	3.76	3.72	5.29	6.70
Private C-corp individuals	0.84	1.91	1.78	1.91	4.53
Sole prop individuals	0.19	0.83	0.78	0.96	1.16
Financial Accounts Private Business (trillions of $)					
Total Market Value	2.02	4.45	4.75	8.61	12.45
Partnership	0.34	1.14	1.45	2.50	3.32
S-corps	1.06	1.88	1.99	4.04	6.42
Private C	0.36	1.14	1.02	1.75	2.32
Sole prop	0.26	0.29	0.29	0.32	0.38

A.6 Estimation of capital gain and Haig-Simons tax rates

To compute capital gain tax rates, we use the following data series:

- S1, Macro taxes paid on capital gains: aggregate data from U.S. Treasury and Tax Foundation historical series. Directly comparable to our micro estimates below.
- S2, Macro capital gain realizations: same sources as S1.
- S3, Micro taxes paid on capital gains: data at the tax return level estimated using Taxsim for short and long term capital gains.
- S4, Micro capital gain realizations: 1040 Line 6, total capital gains from Schedule D. Includes capital gain distributions and supplements.
- S5, Macro capital gains: Aggregate Financial Accounts household + nonprofit revaluations, plus adjustments for our custom private business, tenant occupied housing, and owner occupied housing.
- S6, Macro household capital gains: Macro capital gains minus nonprofit capital gains.
- S7, Household taxable gains: these include gains that are taxable in principle: household owned share wealth (stocks, mutual funds, ETFs), private businesses, owner occupied real estate, tenant occupied real estate. Does not include nonprofit capital gains or pension/IRA gains. Note that owner occupied capital gains are included even though in practice they are untaxed due to large exclusions.

- S8, Capital gain exclusions: estimates of total capital gains that are not subject to tax due to exclusions, such as those for selling a primary residence, 1031 exchanges when selling tenant occupied real estate, and small business sale exemptions. Described in section 4.

We then compute the following tax rates: (i) Macro $= \frac{S1}{S5}$, Macro hh $= \frac{S1}{S6}$, HH txable $= \frac{S1}{S7}$, KG in agi + excl $= \frac{S1}{S2+S8}$, KG in agi $= \frac{S1}{S2}$.

To compute Haig-Simons tax rates, we follow PSZ (2021)'s construction of tax variables and tax incidence assumptions. In particular,

- Payroll taxes: paid by labor.
- Individual income taxes: paid by individual taxpayers.
- Corporate income tax: falls on all capital except housing.
- Property taxes: business property taxes borne by all capital excluding housing, residential property tax are borne by the owners of housing assets.
- Sales and excise taxes: proportional to disposable income less savings.

For comparison with PSZ tax rates, we make additional modifications to income to match what PSZ refers to as "pre-tax" income. In particular, we add in Social Security, unemployment benefits, and private pension benefits, and exclude the contributions to Social Security, private pensions, and unemployment insurance.

A.7 Estimation of owner occupied housing

A.7.1 Housing valuation

For households that are itemizers, we estimate home values by scaling up property tax payments listed on deductions. We assume that the tax unit that lists the property tax on their return is the homeowner, and allocate the entire value of the home to the tax unit.

In order to go from property tax payments to home values, we use the zip code address listed on the tax form to match the individual to their county of residence, using a zip-county crosswalk from the Department of Housing and Urban Development (see here).

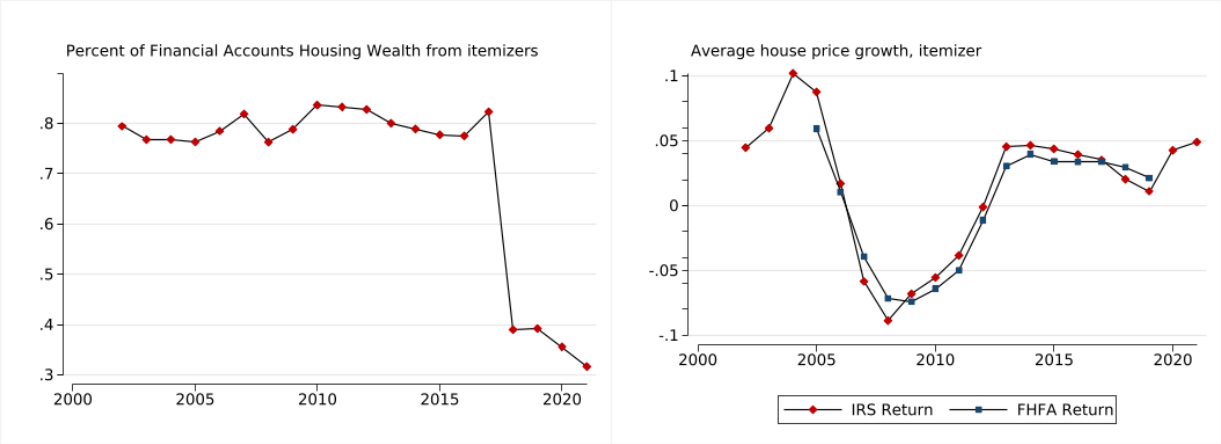
We estimate average tax rates using data from the American Community Survey and Decennial Census. The ultimate analysis relies on a complicated combination of datasets, necessary due to the fact that there is incomplete coverage of counties in any one data set.

The primary source of property tax rates come from county-level aggregates of the ACS, accessed through the Census API. To account for as many counties as possible, the 5-year files are used. The second source of property tax rates

come from county-level aggregates of the 1990 and 2000 census, again accessed through the census API.

The third source of property tax payments come from micro-data from the ACS and 1990 and 2000 decennial censuses, as well as the 2001-2018 ACS micro data. We restrict the files to homeowners, and estimate property tax payments using the midpoints from the categorical variables, with top-coded households imputed at 1.5 times the threshold. Similarly for housing values, we assume top-coded housesholds have housing value 1.5 times the threshold. We collapse the data to the PUMA level, and link PUMAs to counties using the crosswalk from the Missouri Census Data Center.

County of residence for itemizers are available for 99.9% of all tax returns. Scaling up property tax payments to housing value, we are able to account for a substantial percentage of total housing wealth, as measured in the Financial Accounts. Figure A.1 (a) shows around 80% of housing wealth is accounted for by capitalizing property tax payments.



(a) (b)

Figure A.1: (a) Comparison of capitalized itemizer owner-occupied housing wealth with Financial Accounts totals (b) Comparison of average tax payer house price growth with FHFA national index.

Following PSZ, we scale the value of itemizers' housing wealth to equal 80% of Financial Accounts owner-occupied housing wealth, and allocate the rest to nonitemizers/nonfilers using averages from the SCF.

A.7.2 Computation of capital gains

We estimate capital gains using housing price appreciation data from the FHFA. The FHFA has estimates of house appreciation at the 5-digit zip code, county, 3-digit zip code, and state level. These are annual price indexes, which in practice capture price appreciation in year t for both year t and t-1. To better capture an

annual index change during the course of year t, we estimate price growth in year t through an average of (index t/index t-1) and (index t+1/index t).

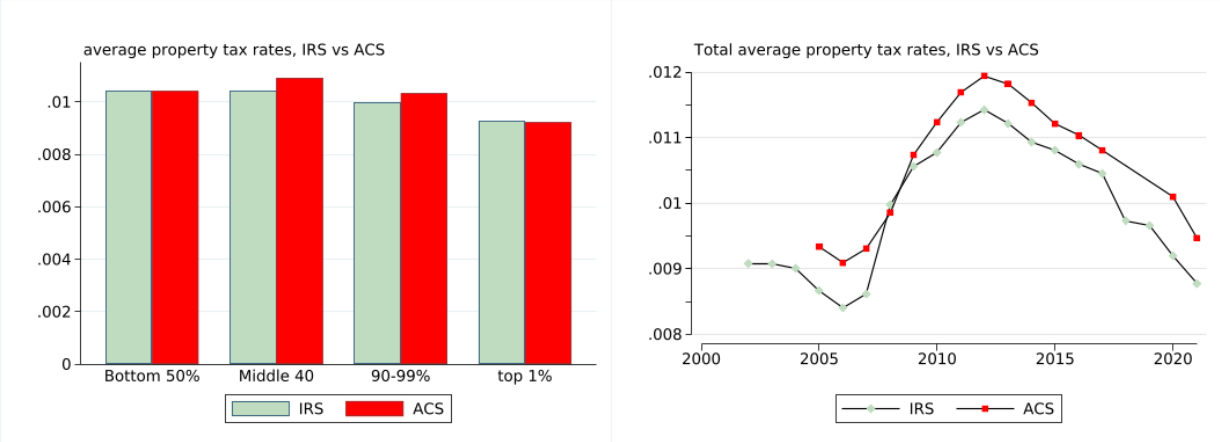
Due to limited data on home sales, the FHFA does not have price data for all zip codes. For each tax unit, we try to estimate house price using the finest geography available first. If this is missing, we then proceed to use larger geographies, proceeding from 5 digit zip codes to counties, 3-digit zip codes, and states. For itemizers, 80% of tax-units have 5 digit zip code house price data, 15% have county-level price data, while the rest have state data.

Figure A.1 (b) gives the weighted average real housing return for itemizers, and compares it to the FHFA annual house price growth index. In general the two align fairly closely, although they should not be expected to exactly match, given our average is for itemizers only and have a more detailed geographical breakdown than the FHFA index, which is a combination of state-level price indexes.

A.7.3 Analysis of property tax rates using the ACS/Census

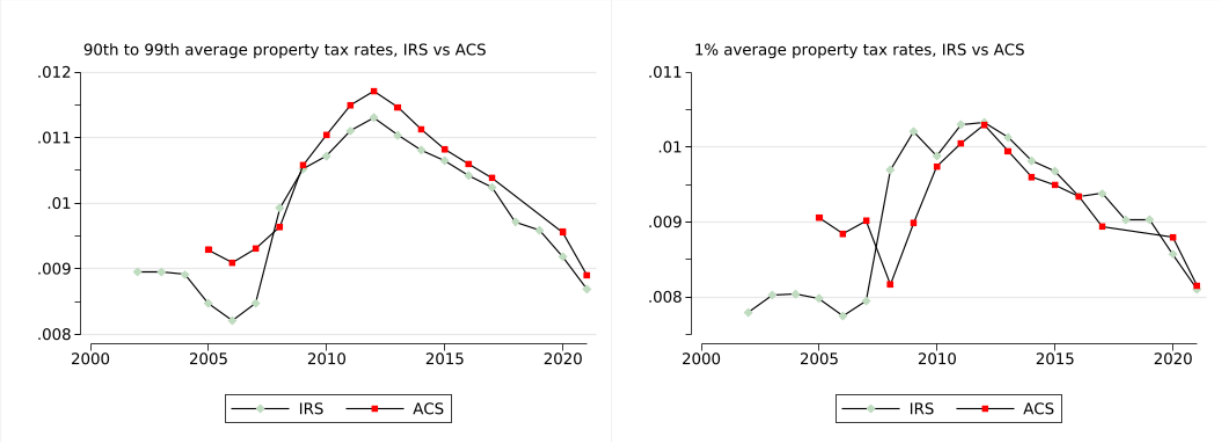
We complement our analysis of differential property tax rates through a comparison of our results to those from a different data set: the ACS/Decennial census microdata. Every year we rank individuals into percentiles by household income, and calculate weighted average property tax rates by percentile, with weights corresponding to the value of individuals' houses. An advantage of ACS data is the microdata on both (self-reported) property tax payments and housing value. A disadvantage is that housing values and incomes are top-coded, potentially biasing our estimates for the top of the distribution. This is particularly problematic given our finding of substantial tax rate variation at the very top of the distribution. For our analysis of ACS data, we exclude households that have top-coded housing values.

Figure A.3 (a) plots average property tax rates by income percentile for our two sources: both show that top percentiles have lower property taxes than those lower in the distribution. Figure A.3 shows the time series. Overall, the patterns for the top 10% and top 1% match very closely between the two data series, again showing substantially lower property tax rates for the upper parts of the distribution.



(a) (b)

Figure A.2: Average property taxes, comparison ACS vs IRS data.



(a) (b)

Figure A.3: Average property taxes, ACS vs IRS data comparison (a) 90-99th percentile (b) top 1%

A.8 Tenant occupied housing

Tenant occupied real estate wealth is estimated by capitalizing property tax payments. For properties that are directly owned, this is present on Schedule E, line 16. For properties indirectly owned through partnerships and S-corps, this is on form 8825 line 11. Each individual property is valued using a county-year-type cell specific property tax rate. Properties are sorted into three general classes: homestead (single family), multifamily, and commercial.

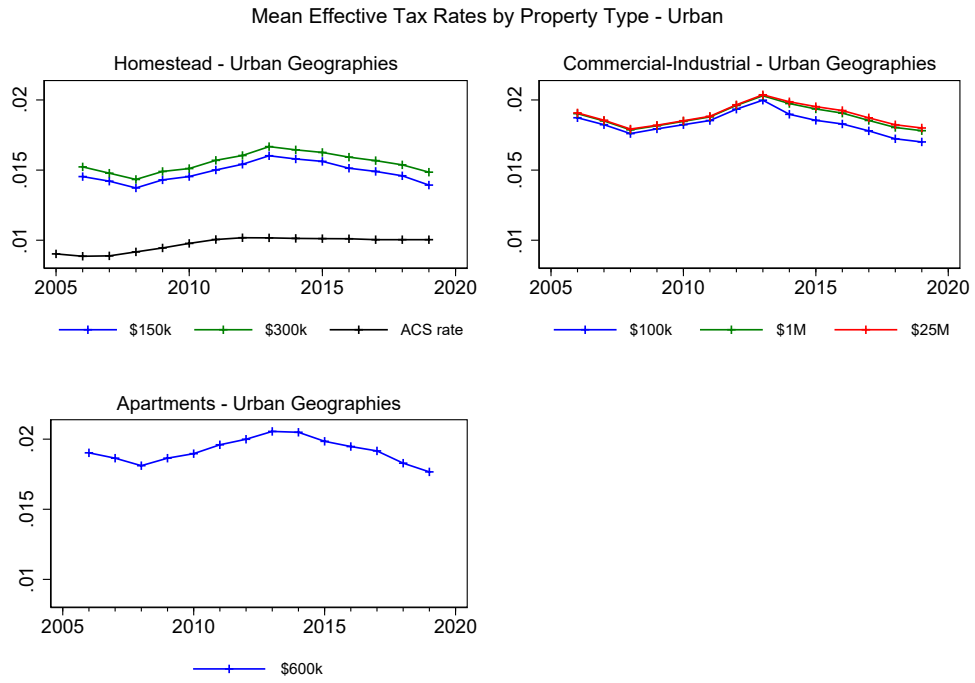
A.8.1 Estimating property tax rates

We obtain data on effective property tax rates (ETRs) from annual reports published jointly by the Lincoln Institute of Land Policy and the Minnesota Center for Fiscal Excellence.

The reports estimate ETRs for each property type for three sets of geographies: 1) the largest city in each state 2) the largest 50 cities in the country regardless of state, and 3) one rural jurisdiction in each state, defined as county seats in non-metropolitan counties with population sizes between 2,500 and 10,000.

We assign these ETR averages to county data in two stages. First, using Census Bureau data on county-place (incorporated places and Census Designated Places) geographic equivalencies, we directly assign ETRs in the Lincoln Institute/Minnesota Center data to county equivalents in our county-level data.

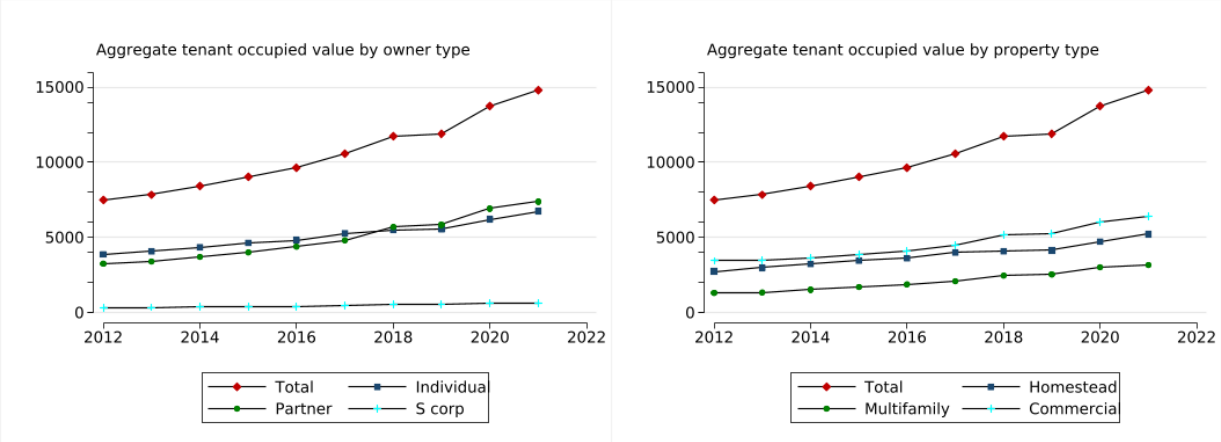
For those counties not directly represented by a place (city or rural jurisdiction), we assign as ETRs simple averages of ETRs within state-geography-year cells, where the geography is urban (from the largest cities in each state or the 50 largest cities in the U.S.) or rural (from the rural jurisdictions in each state). Figure A.4 gives mean effective tax rates by property type for urban counties.



(a)

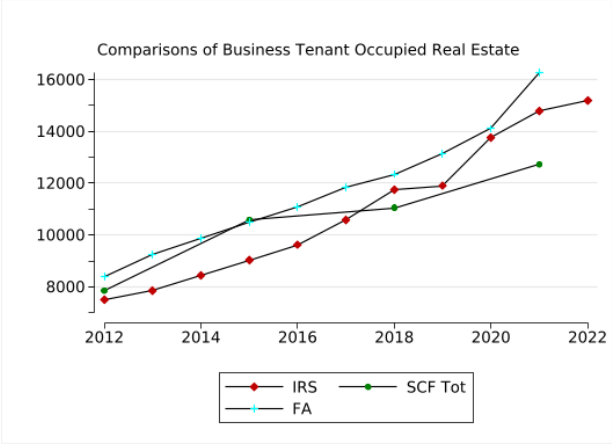
Figure A.4: Mean effective tax rates, tenant occupied real estate, urban counties.

Figure A.5 shows estimated aggregate tenant occupied housing wealth by owner and property type.



(a) (b)

Figure A.5: Tenant occupied housing wealth (a) by owner type (b) by property type



(a)

Figure A.6: Comparison of aggregate tenant occupied real estate: Survey of Consumer Finances, Financial Accounts, our estimates.

A.8.2 Capital gain yields

Data on commercial and multifamily property price growth comes from two principal sources. From the Federal Home Loan Mortgage Corporation (Freddie Mac), we obtain a quarterly price index for multifamily rental properties for 25 metropolitan areas across the U.S., a component of their Apartment Investment Market Index.

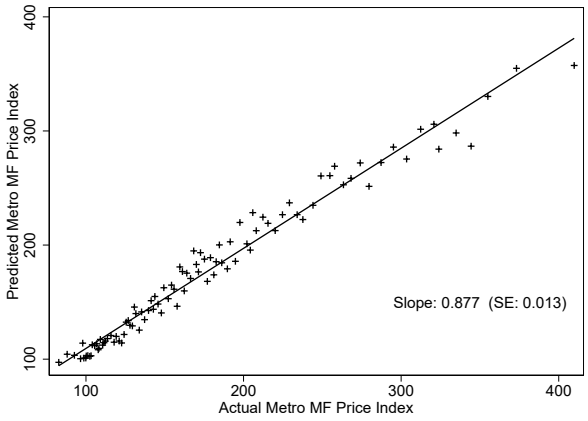
From the CoStar Group, Inc., we obtain their CoStar Commercial Repeat-Sales Indices (CCRSI), a set of quarterly price indices that include separate indices for office, industrial, retail, and multifamily properties at the Census region level (Northeast, South, Midwest, and West).

We estimate county level multifamily price growth in two stages. For the counties that comprise the 25 metropolitan areas available in the Freddie Mac data, we assign these directly. For other counties, we use data at the metropolitan area level available in the Freddie Mac data to estimate multifamily price levels as a function of owner-occupied, single-family home price levels, and then project that relationship onto our remaining county-level data.

To do so, we combine the Freddie Mac metropolitan area quarterly MFPI with the Federal Housing Finance Agency's (FHFA) quarterly House Price Index for All Transaction (HPI) at the same geographic level and regress the MFPI level in metropolitan area m in year t on HPI in the same area and year with year-dummy indicator variables as described in Equation A.8.2.

$$\text{MFPI}_{mt} = \alpha + \beta \text{HPI}_{mt} + \delta_t + \epsilon \tag{A.2}$$

We form predictions of MFPI ($\widehat{\text{MFPI}}_{ct}$) in our county-level data for those counties without an exact match to the metropolitan areas in the Freddie Mac MFPI using the coefficients recovered from Equation A.8.2. Finally, we take annual growth rates of $\widehat{\text{MFPI}}_{ct}$ to obtain estimates of county-level multifamily property price growth. Figure A.7 compares the predicted house price to the actual for the counties we have available and shows a close correspondence.



(a)

Figure A.7: Multifamily house price vs predicted for exact county matches

To obtain county-level price growth rates for the commercial property classes in the CCRSI, we perform a similar procedure to the one employed for the Freddie Mac MFPI, modified to account for the fact that the CCRSI are available at a much higher geographic level than the Freddie Mac MFPI. Like the MFPI procedure, we combine the CCRSI with the FHFA HPI, this time the quarterly HPI for All Transactions for Census Divisions. As for multifamily properties, we obtain county-level estimates of commercial property price levels by regressing

the commercial price index (CMPI) in the CCRSI on regional HPI and year-dummy indicator variables and using the recovered coefficients to predict CMPI ($\widehat{\text{CMPI}}_{ct}$) from county-level HPI.

A.8.3 Returns

We estimate returns at the property level, using line items from Schedule E and Schedule 8825. The total returns on tenant housing is the sum of rental returns and capital gain yields. For property p, the rental return is equal to the gross rental yield, $\text{GRY}_{pt} = \frac{\text{Rent}_{pt}}{MV_{pt}}$, minus the cost yield, $\text{CY}_{pt} = \frac{\text{Cost}_{pt}}{MV_{pt}}$. Costs consist of maintenance, management, utilities, and other expenses. The capital gain yield is the real increase in housing price at the county-year-type cell, as described above.

B Additional figures

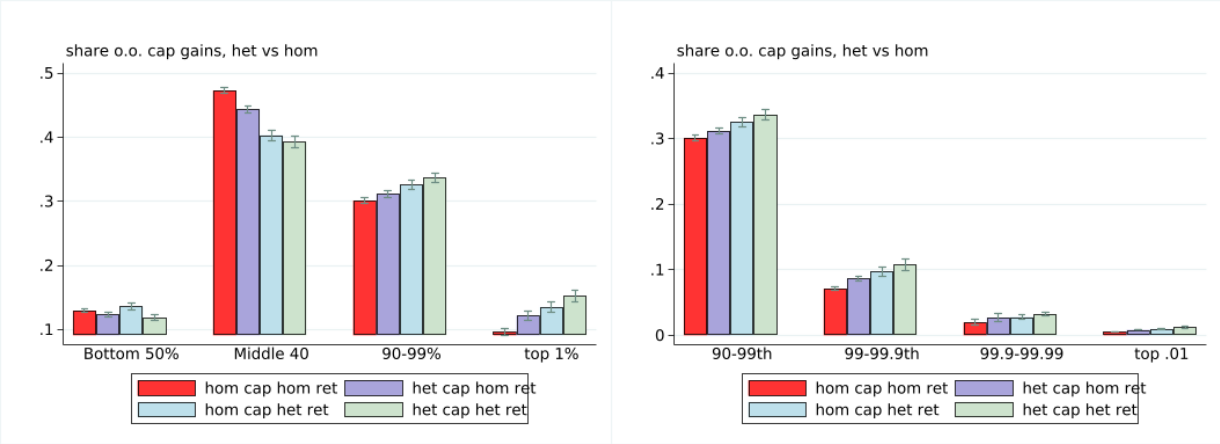
B.1 Owner occupied housing

(a) (b)

Figure A.8: Share of owner-occupied housing wealth, by capitalization type

(a) (b)

Figure A.9: Average real house price growth by income group, rank factor income.



(a) (b)

Figure A.10: Share of capital gains, by capitalization type, by factor income rank.

B.2 Tenant occupied housing

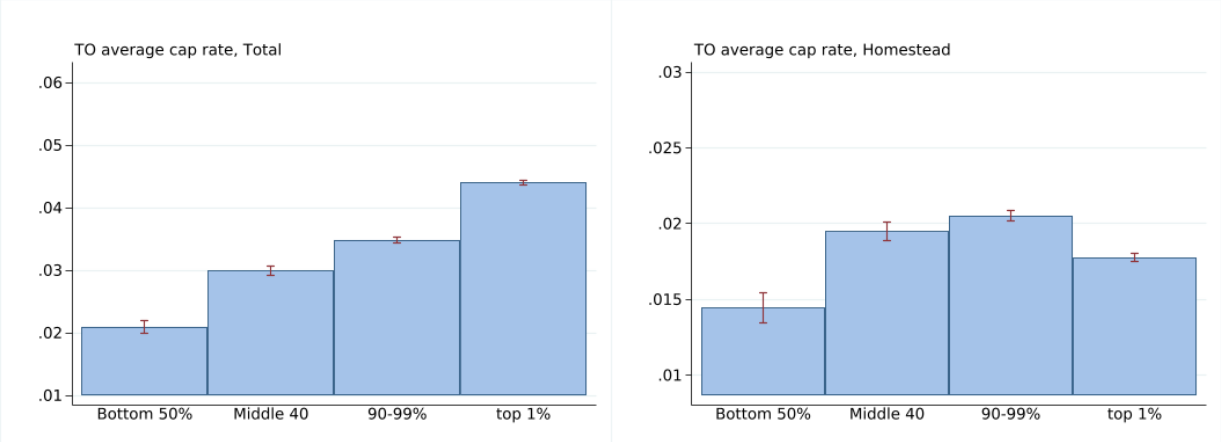
(a) Total

(b) Homestead

(c) Multifamily

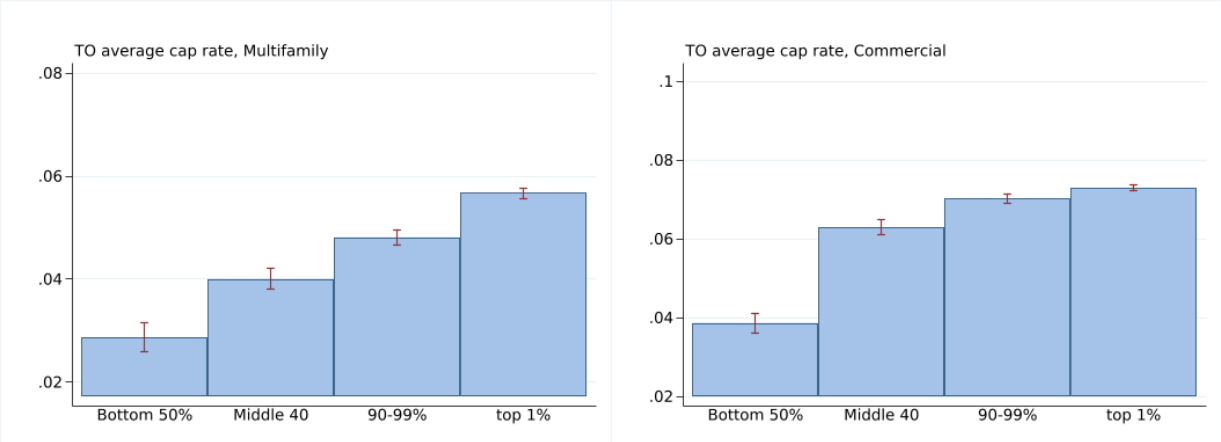
(d) Commercial

Figure A.11: Average schedule E real estate capital gain returns, by income group.



(a) Total

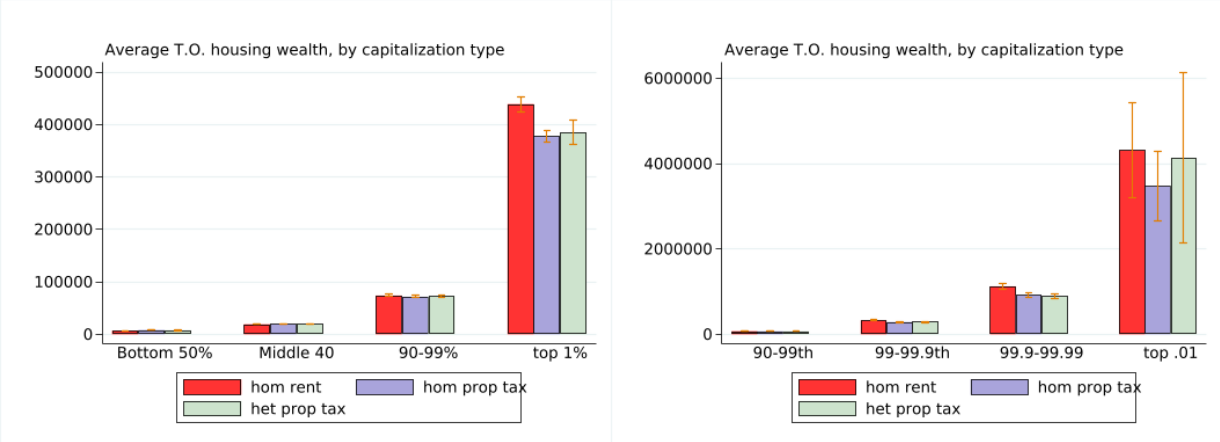
(b) Homestead



(c) Multifamily

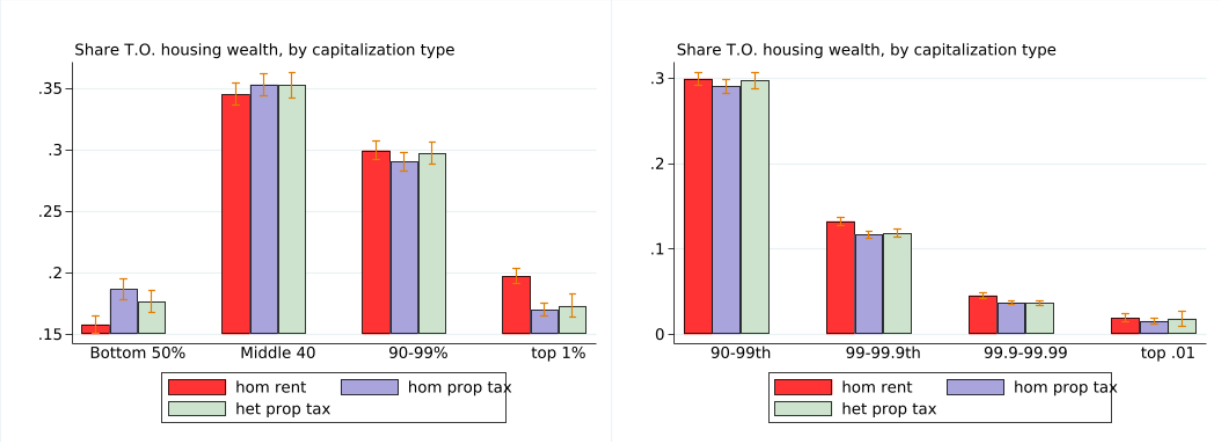
(d) Commercial

Figure A.12: Average Schedule E real estate rental return, by income group.



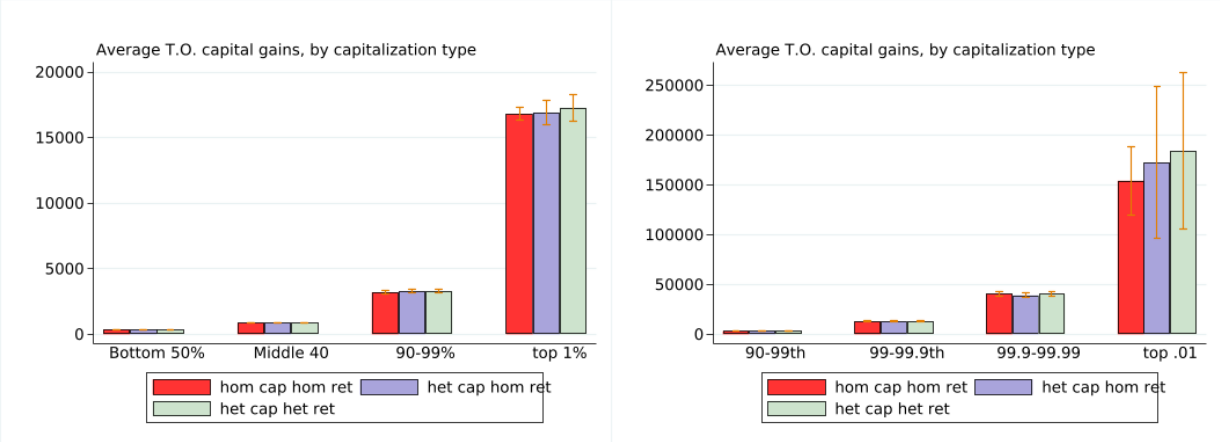
(a) (b)

Figure A.13: Average Schedule E t.o. property wealth, by capitalization type. 'hom rent' capitalizes rental income using homogeneous returns. 'hom proptax' capitalizes property taxes with homogeneous rates. 'het prop tax' represents our baseline series.



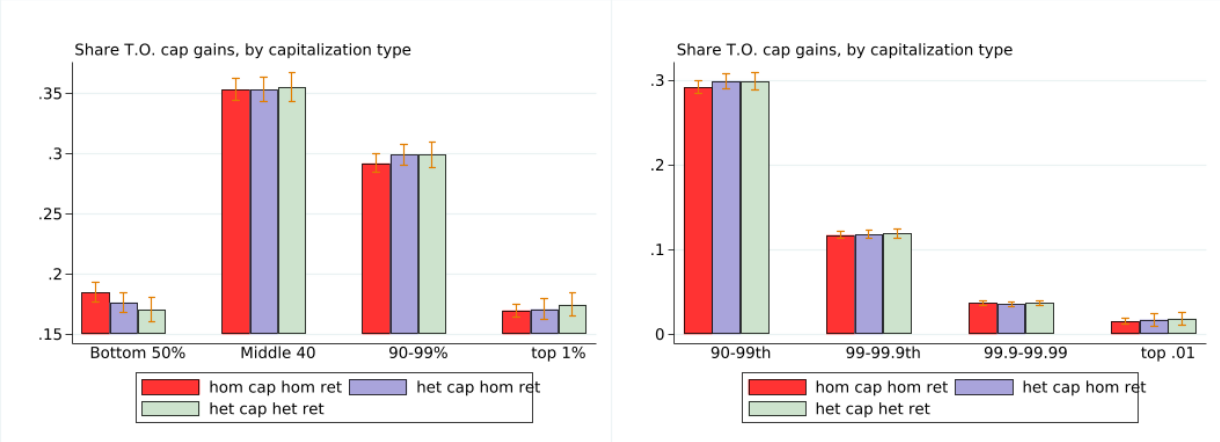
(a) (b)

Figure A.14: Share Schedule E t.o. property wealth, by capitalization type. 'hom rent' capitalizes rental income using homogeneous returns. 'hom proptax' capitalizes property taxes with homogeneous rates. 'het prop tax' represents our baseline series.



(a) (b)

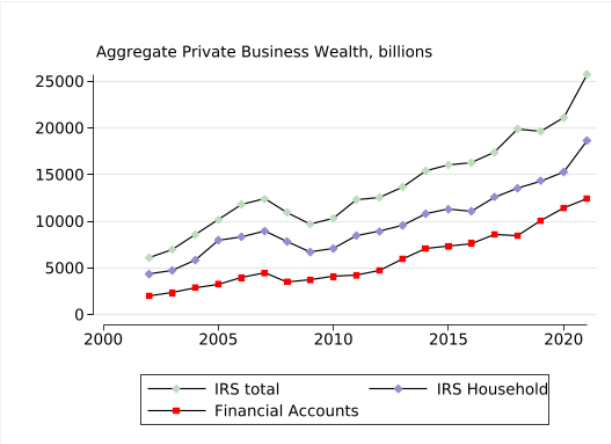
Figure A.15: Average Schedule E t.o. capital gains, by capitalization type. 'hom cap hom ret' capitalizes wealth using homogeneous property taxes, and estimates capital gains with homogeneous returns. 'het cap hom ret' capitalizes property taxes with heterogeneous returns and estimates capital gains with homogeneous returns. 'het cap het ret' is our baseline series.



(a) (b)

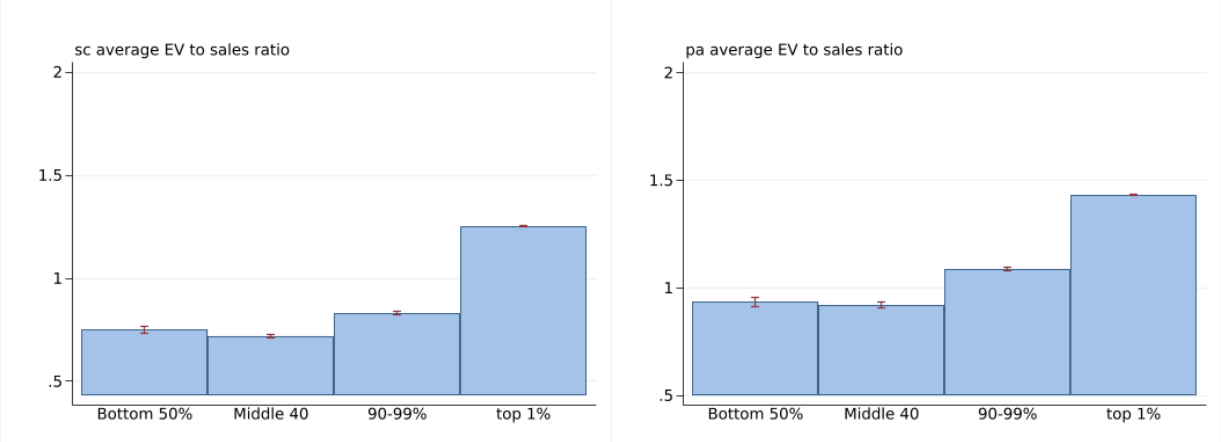
Figure A.16: Share Schedule E t.o. capital gains, by capitalization type. 'hom cap hom ret' capitalizes wealth using homogeneous property taxes, and estimates capital gains with homogeneous returns. 'het cap hom ret' capitalizes property taxes with heterogeneous returns and estimates capital gains with homogeneous returns. 'het cap het ret' is our baseline series.

B.3 Private business wealth



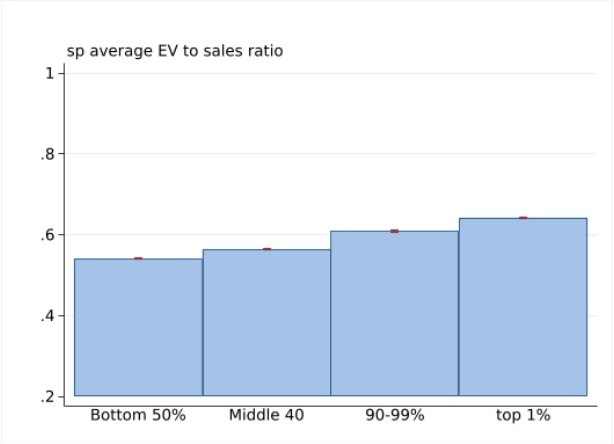
(a)

Figure A.17: Private business wealth estimates vs Financial Accounts totals. Total private business market value equals S-corp + partnership + private C-corp + sole proprietorship. Financial Accounts equal market value of C-corp + market value S-corp + fixed asset values of partnership + sole proprietorships + net non-mortgage financial assets of noncorporate businesses. See section A.5.1 for details.



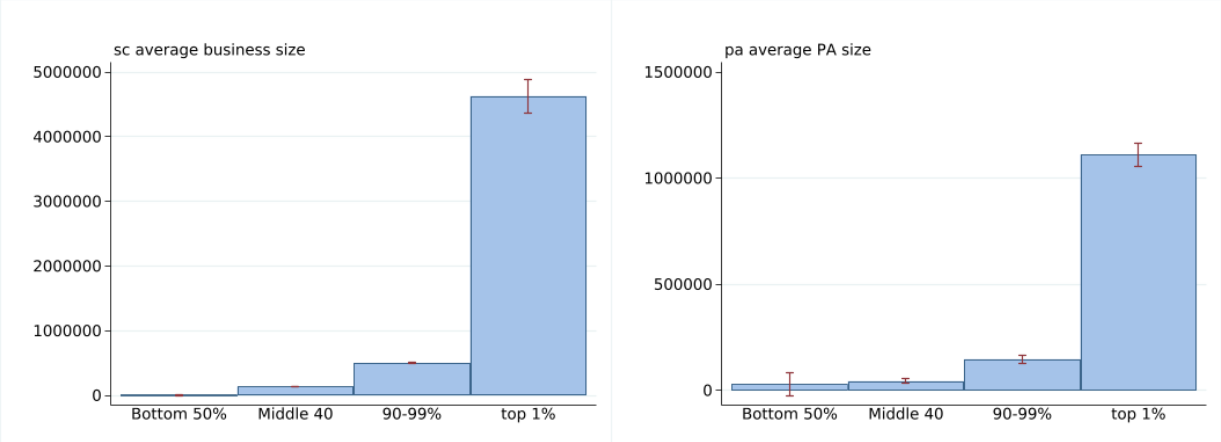
(a) S-corp

(b) Partnership



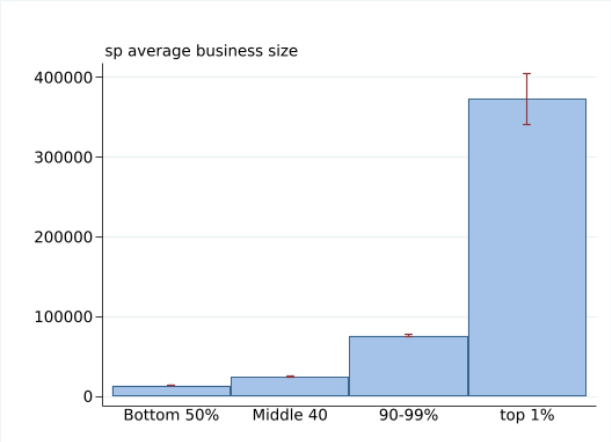
(c) Sole prop

Figure A.18: Private business, average Enterprise Value to Sales ratio.



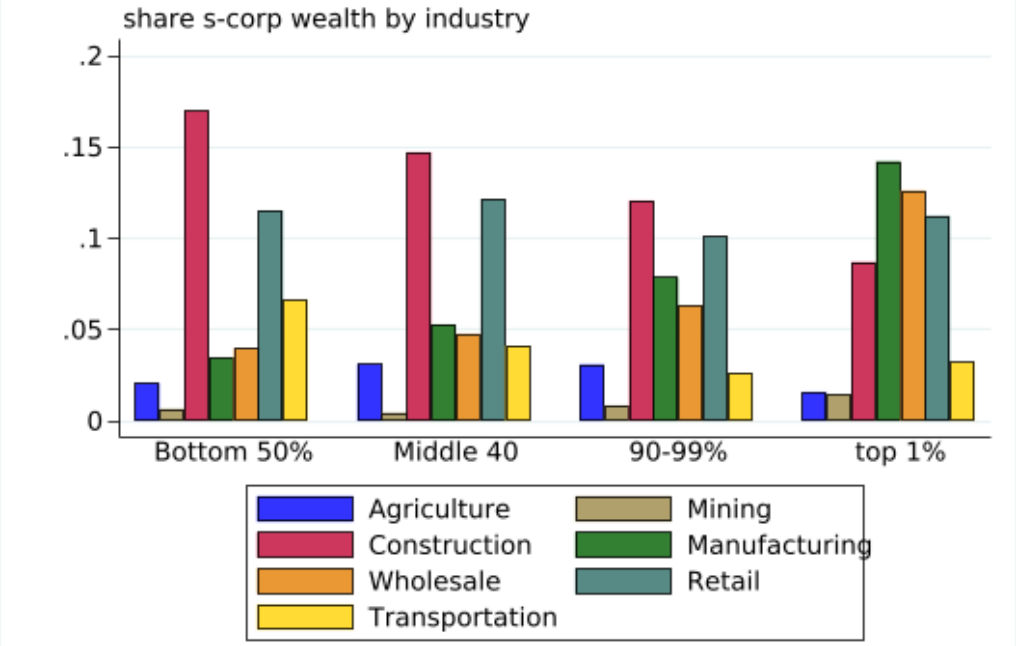
(a) S-corps

(b) Partnerships

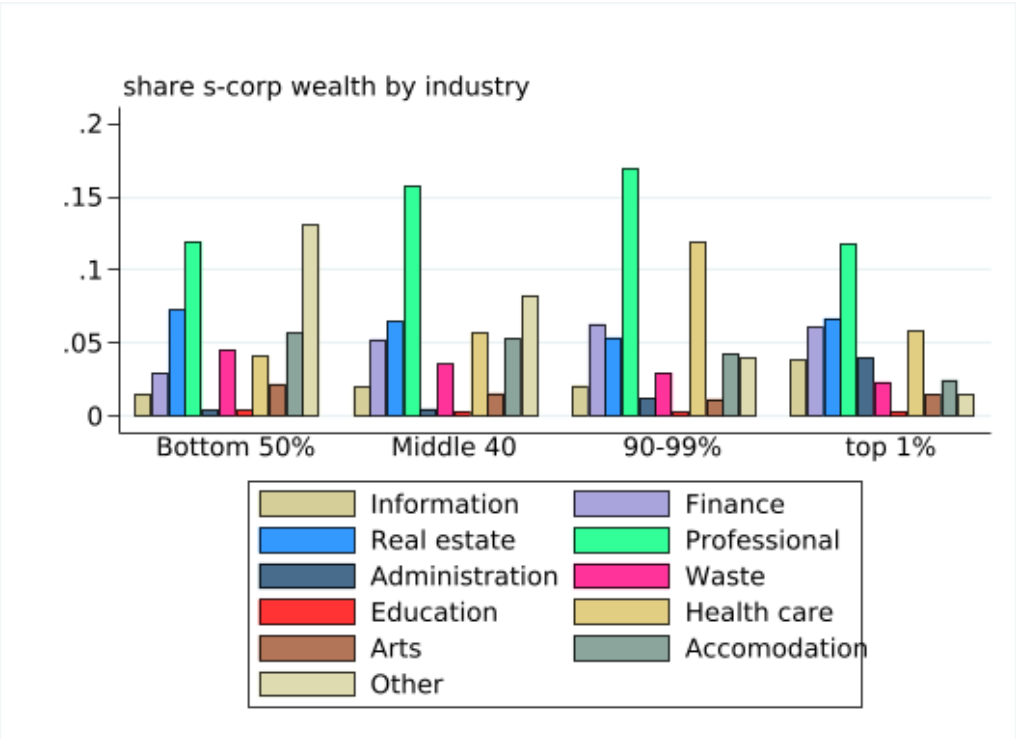


(c) Sole prop

Figure A.19: Private business wealth, average business size.



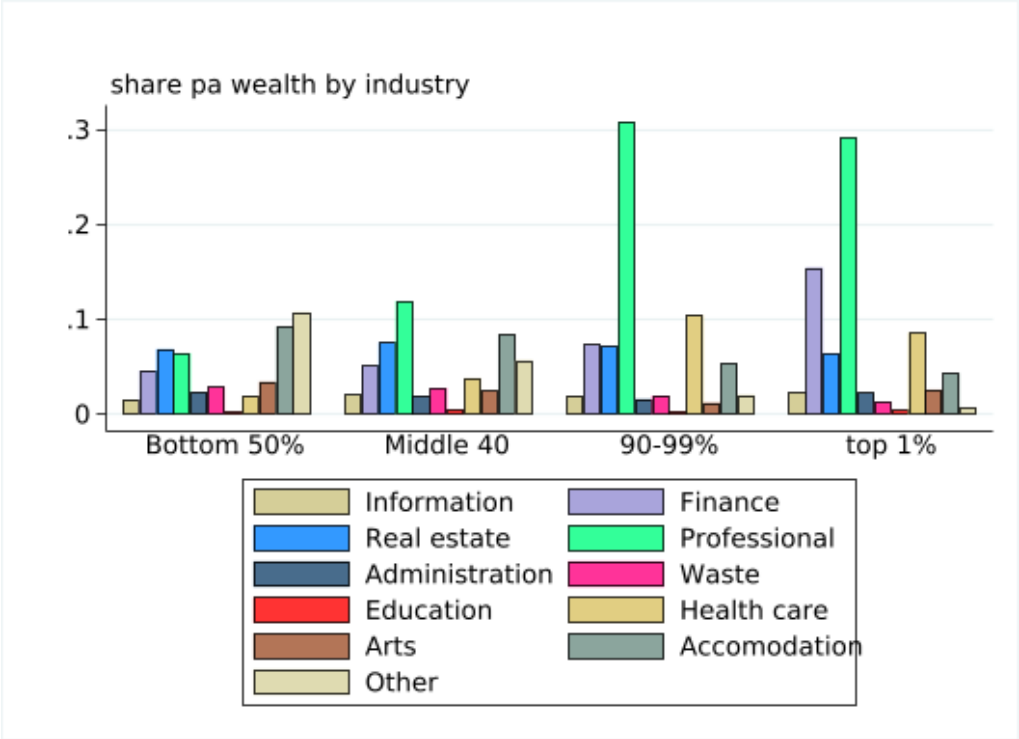
(a)



(b)

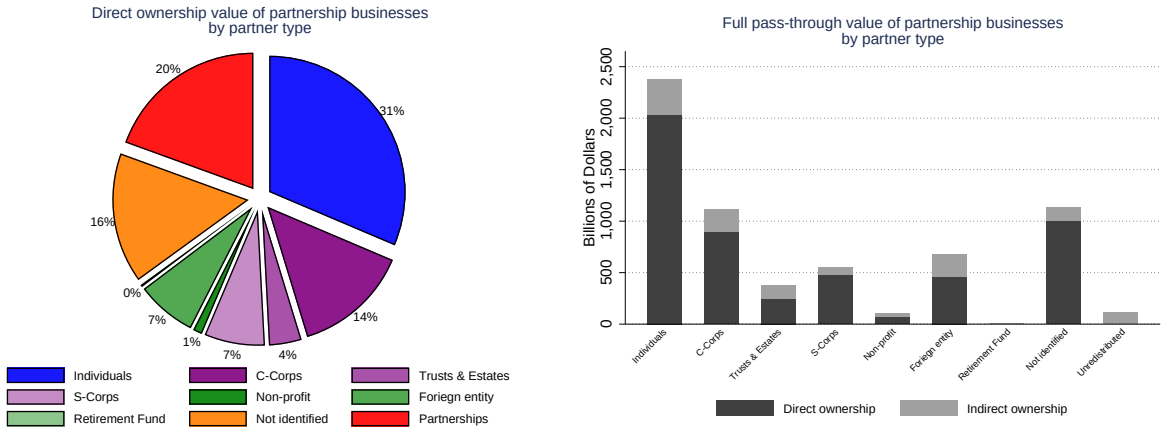
Figure A.20: S-corp business industry composition

(a)



(b)

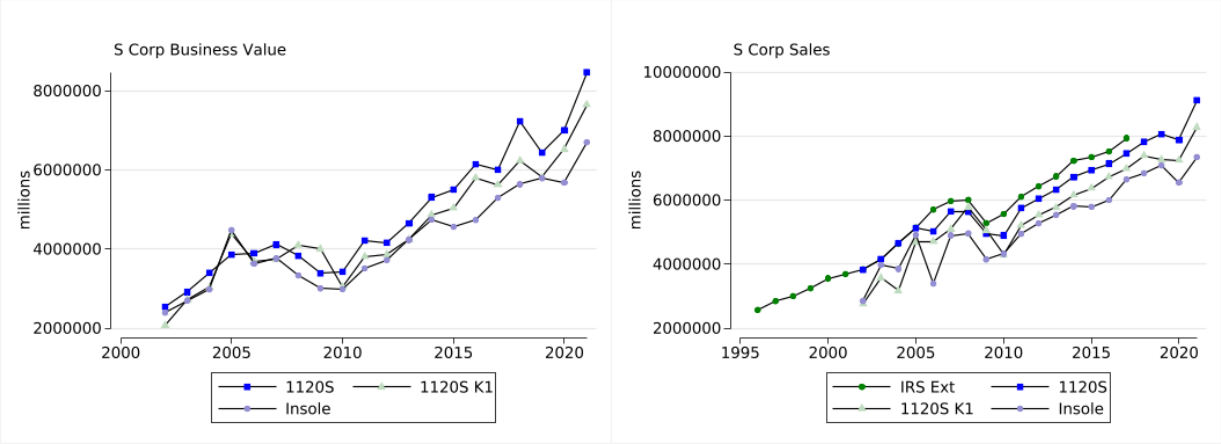
Figure A.21: Partnership industry composition.



(a) (b)

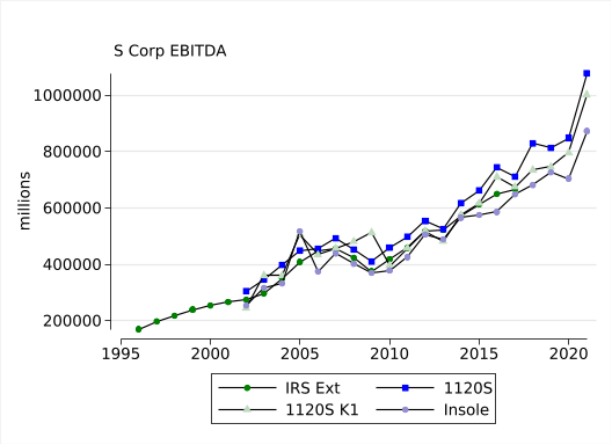
Figure A.22: (a) Direct ownership of partnership business (b) Indirect ownership of partnership business

B.4 S-corp comparisons



(a) Value

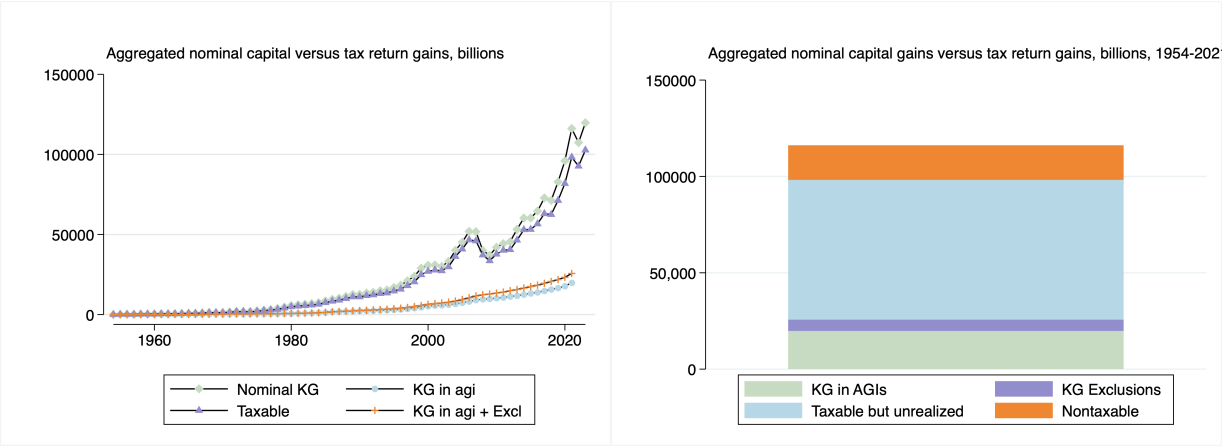
(b) Sales



(c) EBITDA

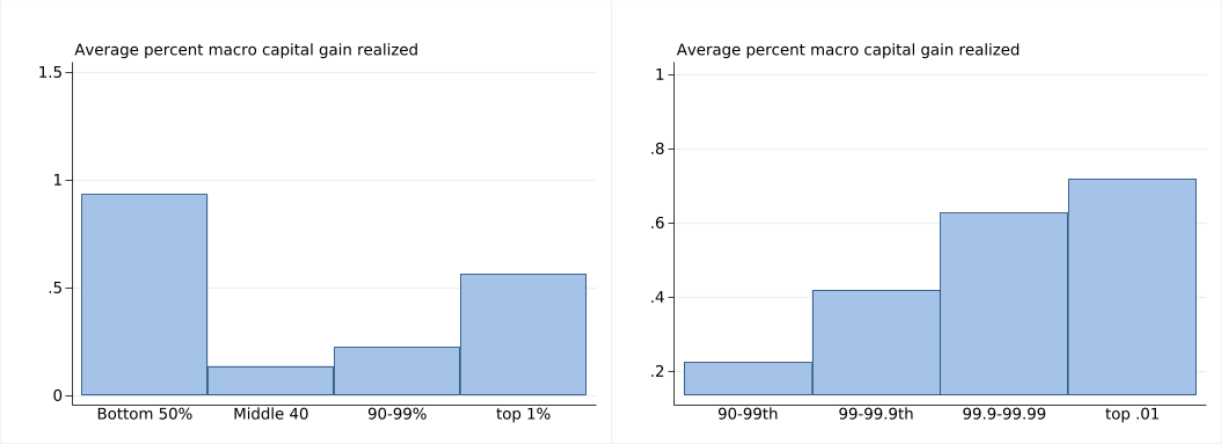
Figure A.23: S-corp pass through totals.

B.5 Capital gains tax rates



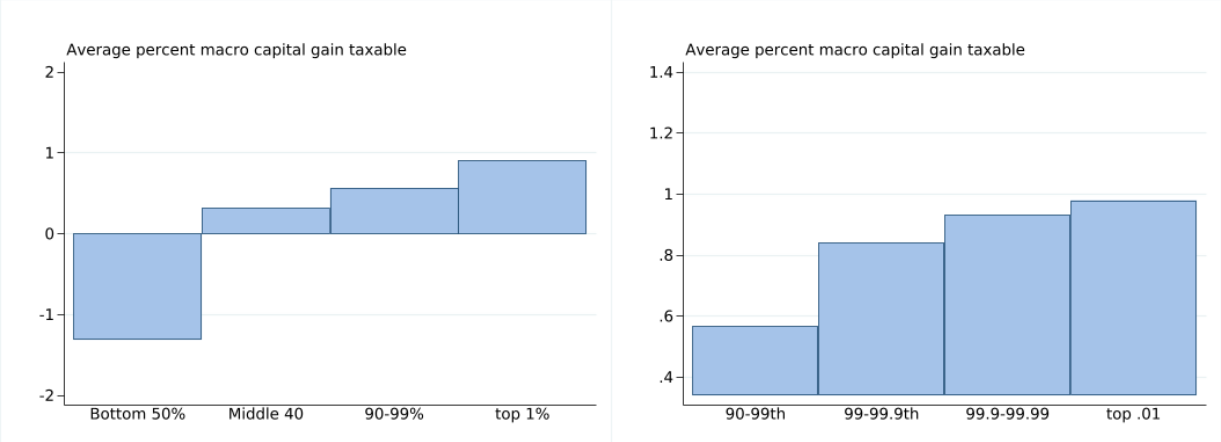
(a) (b)

Figure A.24: (a) Comparison of aggregated capital gains, 1954-2021 (b) Measures of capital gains, 1954-2021. 'Nominal KGs' are total realized and unrealized macro capital gains. 'Taxable' gains exclude pension and nonprofit gains. 'KG in agi + Excl' are capital gains reported on tax returns *plus* an estimate of capital gains on certain categories that are excluded by law (described in section 4). 'Nominal KGs' estimated from Financial Accounts data. 'KG in AGI' estimated from individual tax files.



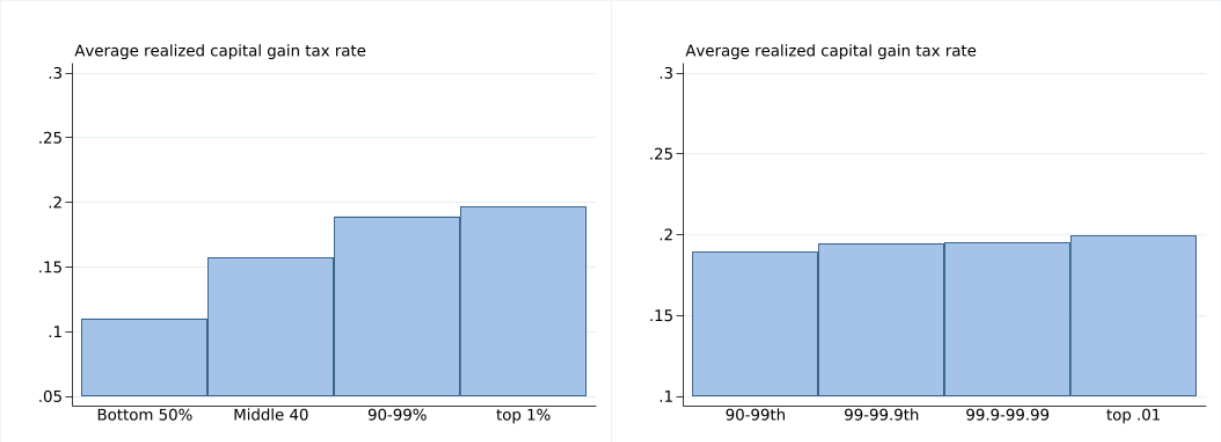
(a) (b)

Figure A.25: Average percent of macro capital gains realized, by income group. Calculated as total realizations divided by macro household capital gains. Bars display averages across years.



(a) (b)

Figure A.26: Average percent macro capital gains that are taxable, by income group. Calculated as total taxable capital gains divided by macro household capital gains. Bars display averages across years.



(a) (b)

Figure A.27: Average tax rate on realized capital gain income in AGI, by income group. Calculated as total taxes paid on capital gains divided by realized capital gains. Bars display averages across years.