Finance and Economics Discussion Series

Federal Reserve Board, Washington, D.C.
ISSN 1936-2854 (Print)
ISSN 2767-3898 (Online)

Rates of return on private and public businesses

Jesse Bricker, Kevin B. Moore, Alice H. Volz

2025-107

Please cite this paper as:
Bricker, Jesse, Kevin B. Moore, and Alice H. Volz (2025). "Rates of return on private and public businesses," Finance and Economics Discussion Series 2025-107. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2025.107.

Rates of return on private and public businesses*

Jesse Bricker†, Kevin Moore‡, Alice Volz§

November 25, 2025

Abstract

Privately owned business assets are an important source of wealth for families across the world, but measurement issues are believed to hamper our understanding of these firms. We use income and valuations of private firms in the Survey of Consumer Finances (SCF), first validating the data against external aggregates and then using these data to find rates of return for private firms. With the exception of the years leading up to the Global Financial Crisis, overall rates of return on public firms have generally outpaced rates of return on private firms during the past 30 years.

*We thank Dalton Ruh and Maya Satchell for excellent research assistance, our Federal Reserve Board colleagues for feedback, and helpful comments and suggestions from Olympia Bover, Arthur Kennickell, John Sabelhaus, Matt Smith, Annette Vissing-Jorgensen, Daniel Waldenström, Eric Zwick, Gabriel Zucman, and conference participants at the Household Finance and Consumption Network meeting at the Bank of Greece, the Society for the Study of Economic Inequality, the National Tax Association, and the NBER Summer Institute (CRIW). The views expressed herein are those of the authors and do not necessarily reflect the views of the Federal Reserve Board of Governors.

†Federal Reserve Board, jesse.bricker@frb.gov

‡Federal Reserve Board, kevin.b.moore@frb.gov

§Federal Reserve Board, alice.h.volz@frb.gov

1 Introduction

Privately owned business assets are among the largest assets for wealthy families in the United States (Smith et al. (2023); Bricker et al. (2021)) and across the world (Fagereng et al. (2020); Bach et al. (2020b)). In the United States, the economic size of these private nontraded firms is about equal to the economic size of publicly traded corporate firms (see Moskowitz and Vissing-Jørgensen (2002) for valuations, or Campbell and Robbins (2025) for aggregate sales). Private firms should carry a rate of return premium because of their relative illiquidity, their lack of diversification within the household portfolio, and the required skill and attention to operate. Early work, though, showed a puzzle: rather than carrying a premium, the rate of return on private firms lagged those of public firms (Moskowitz and Vissing-Jørgensen (2002)). More recent evidence on this subject is mixed (Kartashova (2014) and Bhandari et al. (2020b)). That said, a lack of agreed-upon data has hampered our understanding of private firms in the US (Bhandari et al. (2020b)).

In this paper, we return to owner-reported values of income and wealth from privately held businesses in the Survey of Consumer Finances (SCF) to re-estimate and update rates of return for private firms, as in Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014). The SCF data have clear benefits: business income and wealth are measured independently in the SCF for the same firms, in contrast to efforts that use income tax data to infer business wealth. Importantly, the SCF oversamples wealthy families by using tax data, which ensures that coverage of the top of the wealth distribution—where private business wealth is concentrated—is comparable to the income tax data (Bricker et al. (2019)).

Due to inherent difficulty in measurement, the starting point for many researchers is to be skeptical of private business wealth and income data reported in survey data. Given this uncertainty, we begin with basic checks of the data quality: comparing aggregate net income and sales from private firms in the SCF to private firm aggregates derived from IRS business returns data. We show that the SCF and IRS aggregates are not statistically

different from each other, even at granular levels of business organization (figures 1 and 2). Further, recent work has shown that SCF valuations are similar to those of transacted businesses—again, even by business organization level Campbell and Robbins (2025)—and we show here that the self-reported valuations of SCF respondents are well-anchored to business fundamentals (figure 3a).

Next, using SCF income and valuation data, we update and extend the work of Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) using a rate of return estimation strategy proposed in Bhandari et al. (2020b). Rates of return under this new method largely confirm the previous results in Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014): returns to public firms outpaced returns to private firms in the 1990s and reversed in the lead up to the Global Financial Crisis.

We then extend the analysis to include the years since the Financial Crisis. In triennial estimates in the 2010-2022 period, returns to private firms lag returns to public firms (figure 5), providing support for the original "private equity puzzle". Over the full time period of the SCF (1989-2022), then, the 2000-2010 period may be the outlier due to lower-than-usual returns on public firms (figure 4b and appendix figure A.1).

Reliable data on private firms has typically been difficult to find. While regular income declarations from public firms help facilitate public stock exchanges, private firms do not need to file regular public disclosures and rarely transact. Reporting incentives and lack of third-party verification appears to lead private firms to underreport income to the US tax authority (Guyton et al. (2021); GAO (2015); Johns and Slemrod (2010)); as a result, NIPA assumes business income reported to the IRS is 18-50% underreported (depending on the type of business income—NIPA (2024)). Thin markets make valuations hard to determine, and intangible asset valuation and depreciation rules can distort already fraught models that relate book value, assets, and income to market value (as in Saez and Zucman (2020), Board of Governors of the Federal Reserve System (2020), Smith et al. (2023), and Campbell and Robbins (2025)). The most reliable, comprehensive data on private firms

has often been found in the SCF survey data (Moskowitz and Vissing-Jørgensen (2002), Kartashova (2014), Cagetti and De Nardi (2006)).

Recently, Bhandari et al. (2020b) leveraged data on transacted private firms from Pratt's Stats—now DealStats—and the IRS Integrated Business Database (IBD) to argue that SCF business income is overstated and that valuations are too low. As a consequence, central questions in public finance may need to be revisited—including rates of return (Moskowitz and Vissing-Jørgensen (2002)) and reasons for being an entrepreneur (Cagetti and De Nardi (2006)—in favor of a theory of "sweat equity" advanced in Bhandari and McGrattan (2021).

While acknowledging the inherent uncertainty around data on private firms—many of which are private precisely to shield their owners and maintain opacity—we argue here that SCF data on private firms align with external data. One uncertainty to confront is what income concept to use to evaluate data quality and measure business returns.[1] The SCF questionnaire asks respondents to report the "net income" of their business. In the IBD, there are two possible net incomes—one that excludes all net income except profits (or "ordinary business income"), and another that includes profits plus other sources of capital income by which a business pays out its owners: dividends, interest, capital gains, and rent. Comparing the SCF income to a more restricted version of business income from the IRS—as in Bhandari et al. (2020b)—leads to the conclusion that the SCF overstates private business income. However, SCF business income lines up well with the broader net income measure in the IBD (figure 2a). Sales and receipts are a less-debated concept, so it is also re-assuring that the gross receipts reported by owners of private firms in the SCF align to the receipts reported to the IRS (figure 1).

Without a market for trading shares, private businesses valuations are inherently uncertain. Updated data from DealStats, though, on transacted private business used by Campbell and Robbins (2025)—the same data used in Bhandari et al. (2020b)—provide support

[1] As in the case of households, there are a variety of business income measures—EBIT, EBITDA, profits, net income, among others. See Clarke and Kopczuk (2025) for more on household income concepts.

for SCF self-reported valuations. The transactions data from DealStats (or Pratt's Stats) are not representative of the universe of private businesses in the IRS business tax filings data. After constructing weights to make the data representative, the DealStats valuations are similar to the SCF valuations (figure 5 of Campbell and Robbins (2025)). Furthermore, self-reported business values in the SCF align to values that are estimated from valuation multiples—a common valuation methodology (Lui et al. (2002))—based on SCF sales and income, with valuation multiples generated by business organization (figure 3a and 3b from Campbell and Robbins (2025)), and by industry (figure A.6, from Compustat data).

This paper proceeds as follows. Section 2 describes the SCF data on private firms and data on private firms from income tax data; a comparison of the two is found in section 2.3. Section 3 validates self-reported business valuations using basic valuation models. Section 4 presents our estimates of public and private rates of return, and Section 5 concludes.

2 Data: the SCF, CRSP/Compustat, and income tax data

2.1 The SCF

The SCF is a cross-section survey, conducted every three years by NORC on behalf of the Federal Reserve Board (FRB) and with the cooperation of the Department of Treasury.[2] The survey combines a wealthy oversample with a nationally representative set of families, and collects a comprehensive snapshot of the assets, liabilities, income, and demographic characteristics of these families.

Private businesses are an increasingly important source of wealth, and the sampling techniques in the SCF ensures the representation of wealthy families. The SCF identifies wealthy households to sample by predicting wealth based on administrative records derived from income tax returns, and verifies that wealthy families participate by grouping sampled families into narrow classes of increasing wealth, and targeting completion rates in each wealth group (Kennickell (1999)). The set of wealthy families that respond to the

[2] See Aladangady et al. (2023) for results from the most recent triennial SCF.

SCF mirrors that of wealthy nonrespondents (Bricker et al. (2021)).[3]

2.1.1 Private business income, business assets, and business traits in the SCF

The SCF questionnaire is designed to elicit information about family ownership of all types of privately-held businesses through a business module.[4] The questionnaire distinguishes between businesses with an active management role and those with a passive role. For actively-managed businesses, respondents are asked questions about the family's ownership share of the firm, that share's value, total income and sales of the firm, industry, number of employees, and legal business organization, along with a battery of questions about the business's finances. Summary questions on income and net worth are asked about any additional actively managed businesses beyond the first two. For passively-managed businesses, the questionnaire collects information about income, net worth, cost basis, and the legal business organization, with all firms grouped by type of business organization.

Business receipts are collected via the question "What were the gross sales of the business as a whole in [the year prior]?" It is asked only for actively-managed businesses and can be used to generate aggregate receipts when used along with the family's ownership share and the SCF weights. For actively-managed businesses, income is collected via the question: "What was the business's total pre-tax net income in [the year prior]?" and for passively-managed businesses through the question: "What was the total net income you (and your family living here) received from this business." This is the entirety of the question text and it does not refer to "special lines of IRS tax forms" that specify the ordinary

[3]The SCF cannot sample families in the Forbes 400 but the very wealthiest SCF families have wealth comparable to the lower end of the Forbes 400 (Vermeulen (2018), Kennickell (1999)). Though we have developed ways of incorporating the Forbes wealth in general (Bricker et al. (2019)), we do not have detailed enough balance sheets to include them in this analysis.

[4]A separate set of questions are asked about publicly traded stock and holdings of mutual funds and ETFs later in the survey, and the lead-in to the private business module notes "Do not include corporations with publicly-traded stock".

business income concept (contrary to Bhandari et al. (2020b)).[5]

Nearly all private businesses are so-called "pass through" businesses, whereby income from the business gets "passed through" to distinct lines on the owner's individual tax return. Private firms pay out their owners in many ways: the profits (ordinary business income) of the firm, and also through dividends, capital gains, rent, interest, and other income. Private S Corporations, for example, may pay dividends to their owners (like public or private C Corporations). The sale of owned assets may generate a capital gain. An owner may receive interest payments from loans they have made to their private firms.[6] The SCF is agnostic about whether a business owner would consider these income flows from their business as part of the net income that they receive from that business. We will later show that (a) the SCF aggregates here line up with business income tax aggregates that include such flows, and that (b) pass-though business owners receive a large share of aggregate capital income that appears on a personal income tax form.

Income from businesses is generally reported twice in the SCF: first, in the set of questions about privately-held businesses (the "net income" of the business, as described above) and, second, later in the survey in the income module. In this later set of questions, respondents are guided to separately report each of the components of their personal income as on a personal tax form, including wages, business profits, dividends, interest,

[5]However, this appears to be a simple mis-interpretation of the SCF codebook; namely, whether any text after the words "READ ONLY IF NECESSARY" is part of the question text for variable X3132. We note here that text is not part of the question; rather, it is part of a screen instruction—the last layer of a multi-layered strategy to aid the field interviewer. Screen instructions in the SCF are only visible to the interviewer, and are only read aloud when the SCF respondent is confused about the intent of a question and when the first two layers of interventions have been exhausted. In this case, the screen instruction refers to lines on a tax form, though only read aloud to close off discussion. An informal poll of SCF field interviewers show no instances of it being necessary to refer to this screen instruction. Accordingly, almost no respondent will ever be asked to refer to tax forms at this point in the interview. Screen instructions are found throughout the questionnaire and have been used since 1995.

[6]We note that the question flow allows for net income to be larger than gross receipts, which could be possible if income other than ordinary business income is included. The interviewer is prompted to comment if this unusual situation occurs, but the "edit check" that is noted in Bhandari et al. (2022) does not force gross receipts to be larger than net income. One design philosophy of the SCF has been to allow for a variety of unusual possibilities, rather than constraining the respondents (Kennickell (1999)).

capital gains, and rent. For example, dividend income—whether from a directly-held public equity or a payout from a private business—would be reported on line 3 of the personal Form 1040 and at variable X5710 in the SCF, while business profits would appear on line 8 of the 1040 and at variable X5714 in the SCF. This makes it challenging to look at an individual tax return and separately identify anything but profits that flows from a business. But business income from Schedule C and E in this income section of the SCF align well with records from personal income filings, as does financial income (appendix figure A.4).[7] The SCF data also show a strong overlap between ownership of private firms and financial assets: about 40%-50% of recent capital gains flows, for example, are reported by owners of partnerships (appendix figure A.5).

Due to this difficulty in studying business profits with individual income tax records, Bhandari et al. (2020b) appeal to the set of business tax records maintained at the IRS—the Integrated Business Database, described in the next sub-section—and we will begin our comparison of the SCF by following this approach.

2.2 Income tax data

The Integrated Business Dataset (IBD) are a set of publicly-available business income statistics based on samples of tax filings from S corporations (Form 1120S), C Corporations (Form 1120C), partnerships (Form 1065), and sole proprietorships (Schedule C), and are produced by the Statistics of Income (SOI) at the Internal Revenue Service (IRS). We use publicly available tables from the IBD that summarize gross receipts and income from these businesses. Net income in the IBD data are typically reported twice: the first just includes ordinary business income and, the second includes all of ordinary business income, dividends, interest, capital gains, and other forms of capital income that these private firms

[7] Further, the income section refers to all income from the prior year and the business section refers to current businesses (but income from the prior year); in the case where a business started or folded in the current year, there may be a mismatch between income in the business section and the income section due to the differences in timing.

pay out to the owners.[8]

The amount of business income that is reported to the IRS is known to be underreported in IRS audit studies (GAO (1995), Moskowitz and Vissing-Jørgensen (2002), GAO (2015), Guyton et al. (2021), Bhandari et al. (2020b)). To be as comparable to the past literature as possible, we adjust the tax data aggregates to reflect this underreporting.

Aside from known underreporting, a further wrinkle in analyzing the IBD is that the amount of partnership profits that flows to individuals and households—the main variable of interest in Bhandari et al. (2020b)—is unknown. Partnerships are sometimes set up in deliberately opaque ways to shield ownership and make tracing income back to an individual impossible; the best estimates find that about one quarter of partnership income filed in Form 1065 cannot be traced back to an individual (Cooper et al. (2016)). To get around this issue, Bhandari et al. (2020b) assume that 32% of the total ordinary business income (profits) in the IRS partnership returns data flows to individuals, an estimate derived from Cooper et al. (2016).[9] The Individual and Sole Proprietor (INSOLE) dataset produced by SOI, though, contains business profits that flow to individuals, and we will use these data in our preferred estimates.

Acknowledging this uncertainty in the IBD data—but wanting to stay as close to Bhandari et al. (2020b) as possible for comparison purposes—we produce three estimates of aggregate privately-held "pass-through" business income from the IBD data. Each estimate adjusts for underreporting, with variation in the assumptions made to address the unknowns about how much partnership income flows to individuals.

The first estimate uses the IBD net income data for S Corporations and sole propri-

[8]For partnerships, we use data from Table 1 and Table 5 of https://www.irs.gov/statistics/soi-tax-stats-partnership-statistics-by-sector-or-industry. For S Corps, Table 2.4 of https://www.irs.gov/statistics/soi-tax-stats-s-corporation-statistics. For sole-proprietorships, Table 1 of https://www.irs.gov/statistics/soi-tax-stats-nonfarm-sole-proprietorship-statistics.

[9]Cooper et al. (2016) show that the share of all partnership income—which represents income paid out to corporate, partnership, nonprofit, nominee, and individuals owners of partnerships—that flows to individuals is about 32 percent but is silent on the share of ordinary business income that flows to individuals. In an update of that paper, Love (2021) reports that about 40 percent (not 32 percent) of this total flows to individuals.

etorships, and for partnerships uses the share of the aggregate IBD partnership net income that flows to individuals—taken from Table 5 of the partnership returns data. We also faithfully replicate the underreporting adjustment factors in the Bhandari et al. (2020b) methodology. As in the NIPA tables (NIPA (2024)), Bhandari et al. (2020b) adjust all noncorporate business profits by an assumed 50 percent underreporting rate (meaning that profits for noncorporate business are doubled) and adjust corporate profits by an assumed 18 percent underreporting rate (as in Johns and Slemrod (2010), Guyton et al. (2021), IRS (2016), GAO (2015)). However, since much of the IBD partnership income is not business profits, we estimate partnership income in two steps. First, we isolate the partnership profits—assumed to be 32 percent of the IBD Table 1 aggregate, as in Bhandari et al. (2020b)—and use the same noncorporate adjustment as that paper. The financial income that partnerships pay out to individuals are adjusted this by the corporate adjustment.

Our second adjustment is based on estimates of underreported business income and other capital income from Guyton et al. (2021). Here, we adjust both partnership and S Corporation profits by 18 percent underreporting assumption, and adjust other capital income from businesses by a 9 percent underreporting rate. We also include a portion of nominee partnership income, assuming that about half of income that flows to estates and trusts ends up with families.

In our third estimate, we again separate partnership profits from partnership financial income—as in the first estimate—and adjust each for underreporting. Instead of the indirect profit measure of the first estimate, the third estimate contains a direct measure: the amount of ordinary business income from partnerships reported on individual Schedule E returns (INSOLE). This amount is about two times as large in recent years as the Bhandari et al. (2020b) estimate of partnership business income that flows to households. As in option 2, we also include half of nominee flows.

2.3 Comparison: SCF and IBD sales and income

Both the SCF and the IBD collect data on sales and income of private businesses, and the following figures compare these data for all "pass-through" businesses: sole proprietorships, S Corporations, LLCs, and partnerships. The SCF data collects the legal organization type, which is identical to the tax filing status found in the IBD data except for the case of LLCs. LLCs with one owner typically file as sole proprietors and LLCs with multiple owners typically file as partnerships (Internal Revenue Service (2025)), and we group LLCs in their expected tax filing status in figures 1 and 2. While there are a host of income concepts that could possibly be reported, business receipts are a more straightforward concept, so we begin there.

Sales at pass-through businesses reported to the SCF are remarkably consistent with sales at pass-though businesses reported to the IRS. Figure 1a plots aggregate business receipts for pass-though businesses in the IBD and in the SCF (along with the SCF 95% confidence band), showing that aggregate pass-though receipts in both data sets are comparable in levels and trends, and the aggregate captured in the IBD data is always in the 95% confidence band that surrounds the SCF estimate (figure 1a).[10]

Receipts for each type of pass-through business are shown in figures 1b-1d. The aggregates plotted for all pass-throughs in figure 1a are the most forgiving, as they do not rely on SCF respondents to accurately report the business organization (sole proprietorships in figure 1b, S Corps in figure 1c, or partnerships in figure 1d). Many private businesses are set up under complex business tax structures—with nested ownerships, with partnerships owning corporations, and so forth—and the SCF is not necessarily designed to capture

[10] In the SCF, gross receipts are only collected for businesses in which the family has an active management role, and not for those businesses in which the family has a passive role. Income, though, is collected for both active and passively-managed businesses, and in figures 1a-1d we scale up receipts in the actively-managed businesses according to the ratio of $\frac{\text{income}_{active}+\text{income}_{passive}}{\text{income}_{active}}$ for each business organizational type.

all of these complexities.[11] That said, the SCF aggregates are generally consistent with receipts reported to the IRS by pass-through businesses. Small samples in the SCF mean there is volatility in the estimates, especially when disaggregated (panels 1b, 1c, and 1d).

The panels of figure 2 demonstrate that aggregate business net income collected in the SCF aligns with the broader net income aggregate from the IBD. Figure 2a plots net income for all pass-through businesses by tax filing status—sole proprietorships, S Corporations, and partnerships—in the SCF and the IBD.[12] The IBD data are adjusted for underreporting as in Bhandari et al. (2020b)—as described in the previous section—and include both profits and other capital income that flow from private firms to their owners.

The SCF aggregates move remarkably well with the IBD aggregate across time in figure 2a: steadily increasing through the early 2000s, spiking prior to the Financial Crisis, falling during the Crisis, steadily rising in the aftermath (with a plateau in the years prior to the Covid era), and the spiking again while exiting the Covid era. These adjusted IBD aggregates typically fall in the 95% confidence interval surrounding the SCF estimates (the shaded region).

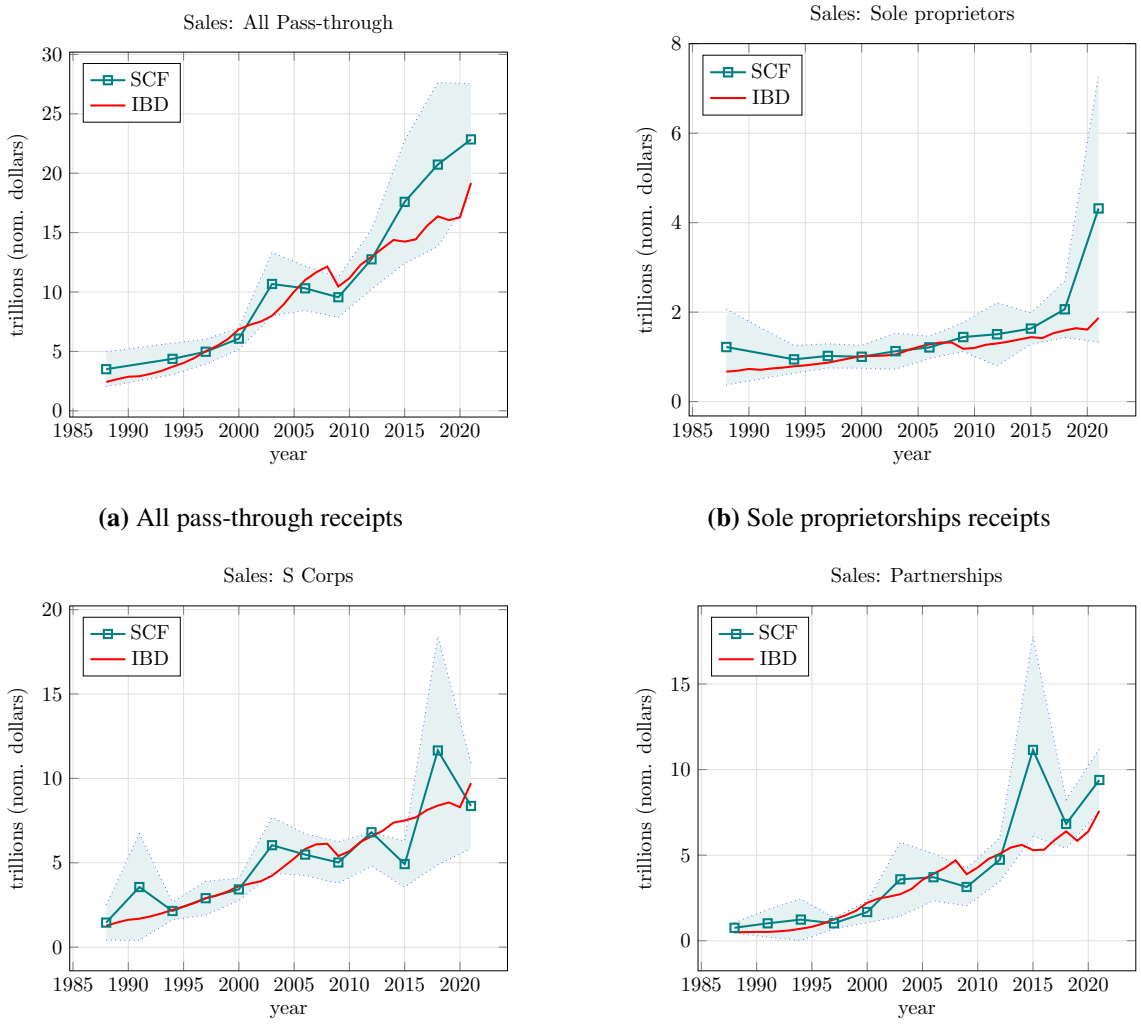
Again, aggregates plotted in figures 2b, 2c, and 2d rely on SCF respondents to accurately report the business organization, figure 2a is the most forgiving. That said, the SCF pass-through aggregates align with those in the IBD even by business organization.[13] Both the level and trend in sole proprietorship net income in the SCF has tracked that in the IBD (figure 2b). The IBD tax data includes all Schedule C income, including self-employment income from those who may not consider themselves business owners (such as freelancers, side-gigs, those who receive a 1099-MISC). While the business module collects Schedule

[11] The SCF is a household survey that is designed to capture important household assets—including private businesses. Bhandari et al. (2020b) note that the number of tax filings is lower in the SCF than in the IBD, but that is to be expected: the SCF is not a business survey, nor does it require respondents to enumerate a list of nested business structures, as a survey of small businesses may do.

[12] Solo-owned LLCs typically file as sole proprietors and LLCs with multiple owners typically file as partnerships (Internal Revenue Service (2025)). Accordingly, solo-owned LLCs are grouped with sole proprietors and multiple owner LLCs with partnerships in figures 1 and 2 be comparable to tax filing data.

[13] We focus only on pass-through businesses in this section, omitting a treatment of private C Corporations captured in the SCF. Private C Corps are included in our analysis of the returns to private businesses.

Figure 1: Aggregate sales by business organization: SCF and IBD



(a) All pass-through receipts

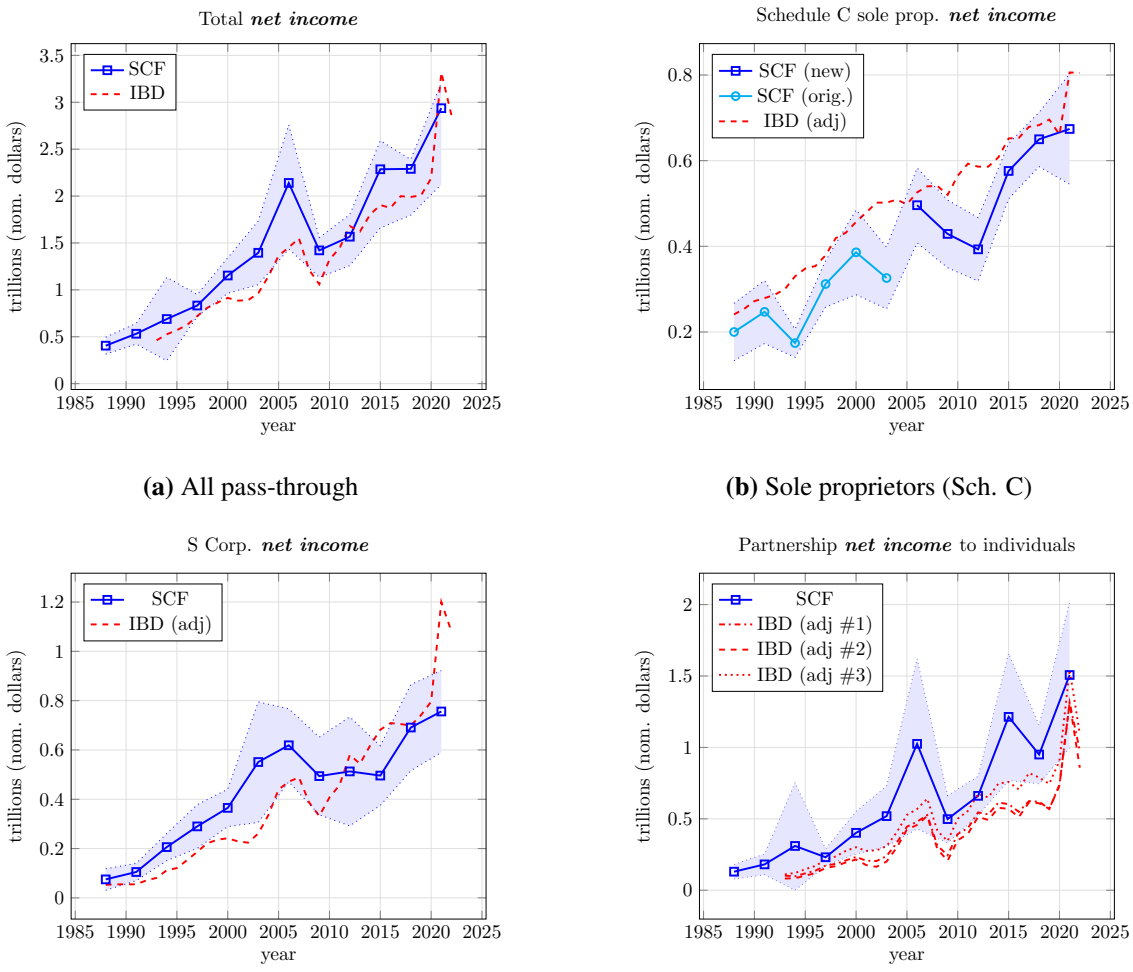
(b) Sole proprietorships receipts

(c) S Corp receipts

(d) Partnership receipts

Note: The figure shows the aggregate sales in the SCF and receipts in the IBD. The SCF collects receipts data on the year prior to the survey wave. In panel 1b, SCF sole proprietors include sole-owned LLCs ("single member LLCs"), as these businesses are generally taxed as a sole proprietor (Internal Revenue Service (2025)). LLCs with multiple owners typically file as partnerships, and LLCs in the SCF with multiple owners are classified as such in panel 1d. Receipts are only collected for actively-managed businesses in the SCF, while income is collected for both active and passive businesses. The green lines in these figures, then, are scaled by the ratio of $\frac{\text{income}_{active}+\text{income}_{passive}}{\text{income}_{active}}$. Authors' calculations using Board of Governors of the Federal Reserve System, Survey of Consumer Finances (SCF) and Statistics of Income, Internal Revenue Service, Integrated Business Database (IBD).

Figure 2: Aggregate net income in SCF and IBD



(a) All pass-through

(b) Sole proprietors (Sch. C)

(c) S Corporations

(d) Partnerships

Note: author's calculations from Board of Governors of the Federal Reserve System, Survey of Consumer Finances (SCF) and Statistics of Income, Internal Revenue Service, Integrated Business Database (IBD) and Individual file (INSOLE). Blue lines plot aggregate net income from SCF business section. Red dashed lines are tax return aggregates after adjustments for underreporting (adjustments as in Bhandari et al. (2020b)). In panel (d), adjustment #1 re-creates the Bhandari et al. (2020b) but adds other sources of business income that flows to households, in line with a "net income" concept. Adjustment #2 augments underreporting as in Guyton et al. (2021) and adds half of flows to estates and trusts. Adjustment #3 uses partnership profits reported in the INSOLE data from individual tax returns (adjusted as in Bhandari et al. (2020b)) adds other sources of business income that flows to households, and retains half of flows to estates and trusts as in version 2. The dashed red line in panel (a) is the sum of the dashed red lines in panels (a), (b), and (c).

C income just for those who consider themselves business owners, the SCF income module has collected Schedule C income since 2007, and we plot that amount beginning in 2007 in figure 2b to be most comparable to the IBD data. Prior to 2007, the plot shows just the subset who consider themselves as owning a business. The IBD data are adjusted for underreporting, as in Bhandari et al. (2020b) and NIPA (2024).[14]

Aggregate business income from S Corporations owned by SCF families is shown in 2c, and it is plotted with aggregate income of S Corporations from all sources in the IRS S Corporation returns data. S Corporations mainly produce ordinary business income, and the SCF aggregate values are generally comparable in magnitude and in time trend. Aggregate profits to S Corporations surged in 2021, as in Palazzo (2023).

Figure 2d plots aggregate SCF business income from partnerships and in the income tax return data (red dashed lines). As described earlier, net income from partnerships to individuals cannot be exactly determined in the IBD (Bhandari et al. (2020b)), so we plot the three estimates—described in the previous section—in figure 2d. While these estimates are generally smaller than the comparable SCF net income estimates, they are typically close to the lower bound of the 95 percent confidence interval surrounding the SCF estimate. In Bhandari et al. (2020b), income from partnerships drives the gaps in SCF and IBD income; appendix A.3 offers a replication of these estimates and describes in more detail why Bhandari et al. (2020b) may undercount partnership income to households.

3 Valuations

In the SCF data, private business wealth is the most important component of the wealthy asset portfolio (Bricker et al. (2016)), as is the case in Sweden (Bach et al. (2020a)), Norway (Fagereng et al. (2020)), Germany (Bach et al. (2020b)) and others. In theory,

[14]The exact underreporting correction varies by year, but BEA has generally assumed that about 50 percent of Schedule C income is reported to the tax authority, meaning that the underreporting correction will approximately double the aggregate amount of sole proprietor income. We use the underreporting adjustments found in Bhandari et al. (2020b) for these corrections. Appendix figure A.3 plots the unadjusted IBD data.

private business values in the SCF may be too low due to undervaluing of intangibles (Bhandari et al. (2020b)) or too high due to overly optimistic owners (Smith et al. (2023)). Gauging the accuracy of the self-reported values is challenging because there are few sources to use as a comparison.[15]

Data on private business transactions offer a comparison, and these data (DealStats and BizComps) are used in Bhandari et al. (2020b) and Campbell and Robbins (2025).[16] Data from transactions are often not representative of their target population (Gallin et al. (2021)), but these data may be used without any corrections (as in Bhandari et al. (2020b) or after aligning them to known totals (Campbell and Robbins (2025)). In particular, Campbell and Robbins (2025) show that the aggregates and distributions of income and sales in the transactions data do not align to those in the IRS-IBD and propose a weighting correction to align the transactions data and the IBD. After doing so, the self-reported valuations in the SCF are comparable to those in the transactions data (see figure 5 of Campbell and Robbins (2025))

To verify whether self-reported valuations in the SCF are grounded in business fundamentals, we use value-to-sales and value-to-income multiples by business organization from Campbell and Robbins (2025) and predict business valuations for each SCF firm using SCF business income and sales data.[17] Such predicted business valuations are common in the finance and accounting literature (Lui et al. (2002), Smith et al. (2023)). Our base

[15]The B.101.h table in the Financial Accounts of the U.S. (Z.1) offers a natural comparison for total noncorporate, nonfinancial business valuations held by the household sector, but differences in measurement hamper direct comparisons (Batty et al. (2019)). Smith et al. (2023) and Campbell and Robbins (2025) both offer adjustments to the B.101.h aggregate, which is smaller than the SCF aggregates, but are (a) a mixture of book and market values, (b) modeled partially from tax data, and (c) do not include financial firms, the largest industry among partnerships. Trends in the SCF and B.101.h aggregates are comparable over time, though (Batty et al. (2019)).

[16]Bhandari et al. (2020b) use DealStats and Campbell and Robbins (2025) use BizComps—an updated and re-branded version of DealStats.

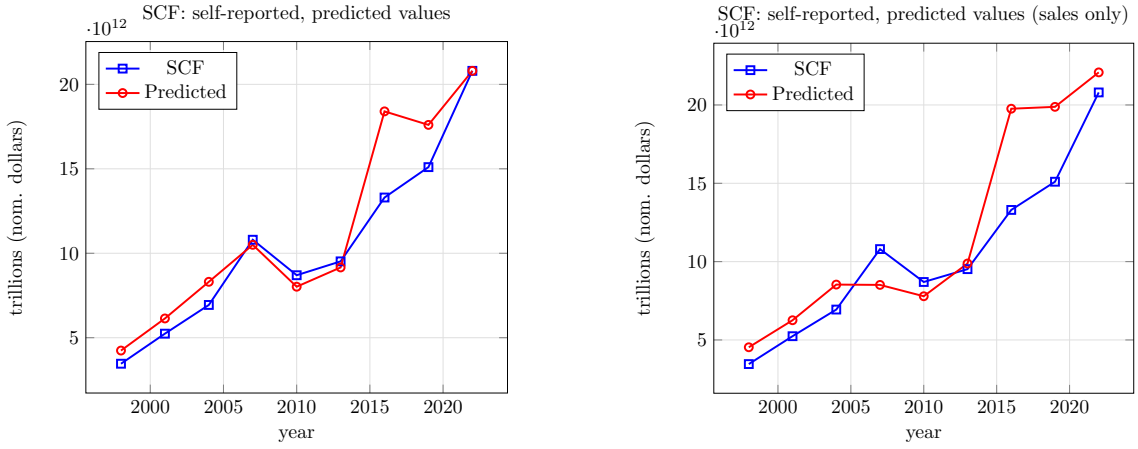
[17]As an alternate, in the appendix, we use data on public firms from CRSP/Compustat and calculate both value-to-sales and value-to-income multiples in each year and for eight broad industry classes, apply them to the SCF business income and sales for each firm, and calculate a predicted valuation. These predicted valuations are in line with the self-reported SCF valuations (figure A.6).

predicted valuations model is a weighted average of income and sales multiples:

$$\hat{bus}^{SCF} = \sum_{\forall k} \frac{1}{2} \cdot \left[sales_i^{scf} \cdot \left(\frac{\overline{value}}{\overline{sales}} \right)_k \right] + \frac{1}{2} \cdot \left[inc_i^{scf} \cdot \left(\frac{\overline{value}}{\overline{income}} \right)_k \right] \tag{1}$$

where $(\frac{\overline{value}}{\overline{sales}})_k$ and $(\frac{\overline{value}}{\overline{income}})_k$ are taken from Campbell and Robbins (2025) for each k type of tax filing business ($k \in \{$sole prop, S Corp, partnership$\}$) in each SCF year.

Figure 3: Predicted aggregate valuations



(a) Predicted aggregate valuations

(b) Predicted aggregate valuations—sales only

Note: author's calculations from Survey of Consumer Finances and data from Campbell and Robbins (2025). Solid blue line is SCF aggregate valuation of all pass-through actively-managed private businesses (organization types: sole proprietorship, partnership, S Corporation, or LLC, where solo-owned LLCs are mapped to sole prop tax filing status and multiple-owner LLCs are mapped to partnership filing status). Solid red line is the predicted value for these businesses, using equation 1 and multiples of value-to-sales and value-to-income—which vary by business tax filing status—from figure 3 of Campbell and Robbins (2025). The time series is shorter than the full SCF time series due to the availability of the multiples from Campbell and Robbins (2025). Panel (b) is predicted using only value-to-sales multiples.

The blue line in figure 3a plots the aggregate of all actively-managed pass-though businesses in the SCF. We restrict to actively-managed because the prediction model depends on sales, income, and business organization type, and the SCF does not contain information on all three inputs for nonactively managed businesses. The predicted SCF private aggregate business wealth—as in equation 1—of the actively-managed firms included in

the blue series is shown in the red line. The self-reported aggregates and those modelled from the self-reported sales and income are typically close.

Using SCF business income in equation 1 may be problematic if it includes capital gains and other financial income. Re-running the model in equation 1 using only sales and the sales multiples, the SCF self-reported valuations are still in line with transaction-based business fundamentals (figure 3b).

4 Rates of return

After establishing that SCF income aligns to available external data and that SCF private business values are governed by fundamentals, we compare the aggregate rate of return for private and public firms (figure 5). We use the SCF for private firm valuations and the CRSP/Compustat data for public firm valuations.

The rate of return comparison used here is a method suggested in Bhandari et al. (2020b): calculating aggregate returns separately for income yields and capital gains and sum these two pieces together.[18] A full replication and extension of the original Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) method, though, can be found in appendix A.2.[19] We construct both the income yield and capital gains yield in the SCF and in the Compustat data, constructing geometric averages of three-year capital gains in both SCF and Compustat, as in Bhandari et al. (2020b). The aggregate income yield (income divided by market value) and aggregate capital gains (change in market value between SCF years) are described by the following equations:

$$R_t^{inc} = \sum_i \left(\frac{income_{i,t}}{value_{i,t}} \right) \tag{2}$$

[18] Bhandari et al. (2020b) note that the returns used in Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) may conflate two things—an annual income yield and an annualized three-year capital gains return—that are not quite comparable to the annualized Compustat value-weighted return.

[19] See appendix section A.2 for more details on the differences in rate of return computations between Bhandari et al. (2020b)—used here—and Moskowitz and Vissing-Jørgensen (2002).

$$\tilde{R}^{kg}_{t+3} = \left(\frac{\sum_i value_{i,t+3}}{\sum_i value_{i,t}} \right)^{\frac{1}{3}} - 1 \tag{3}$$

Net income from private firms is a mix of the owners' labor income and capital income, while net income from publicly-traded corporations excludes the owners' labor income. In constructing R^{inc}_t, then, we use off-the-shelf estimates of the labor share of owners' income from private firms to remove labor income and retain the capital income that flows to these owners. Two recent estimates come from Smith et al. (2019), who estimate that only 25 percent of pass-through business income is capital income, and from Saez and Zucman (2020) who argue that the Smith et al. (2019) estimate is correct for small firms, while for large firms about 75 percent of pass-through business income is capital income.[20]

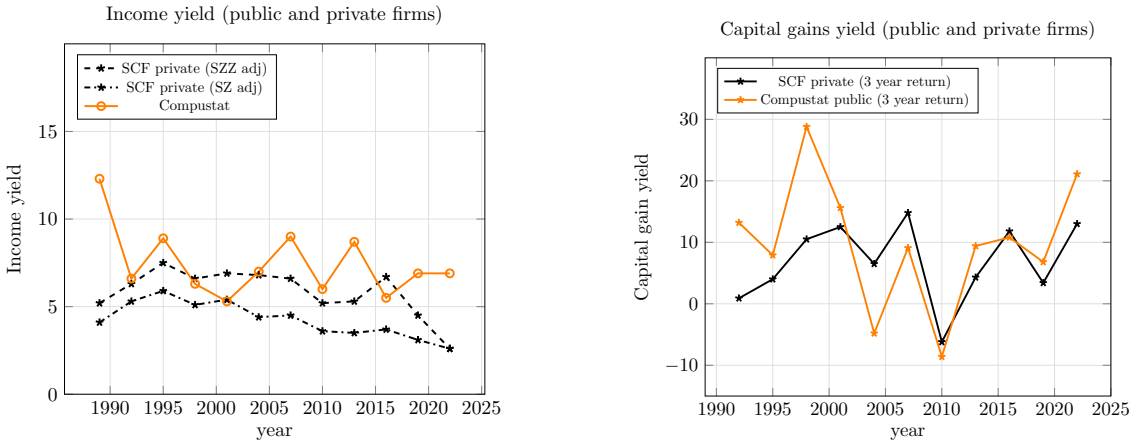
The income yields from private businesses in the SCF and public firms in Compustat (R^{inc}_t, based on equation 2) are plotted in figure 4a. Income yields of private firms in the SCF are shown after labor adjustments from Saez and Zucman (2020) and Smith et al. (2019). The differences between the public and private—especially the Saez and Zucman (2020)-adjusted yield—are generally small, though in most years the Compustat public-firm income yields are larger than the SCF private-firm yields.[21]

Capital gains yields are more volatile and generally larger than the the income yields. While the income yields in figure 4a are always positive and generally between 5 and 9 percent, the capital gains yields ($\tilde{R}^{kg}_{t+3}$, based on equation 3) are sometimes negative but also typically larger than the income yields when they are positive (in figure 4b). The capital gains yields for public firms are largest during the stock boom period in late 90s and the recovery period since the Financial Crisis (figure 4b). The capital gains yields for

[20] Overall, the Saez and Zucman (2020)-based method classifies about 50 percent of business income as labor income, similar to Bhandari and McGrattan (2021). An alternate approach removes predicted wage income from the business income of all SCF business owners who do not report wages and removes actual wages for those who report one (Moskowitz and Vissing-Jørgensen (2002)) and is produced in the Moskowitz and Vissing-Jørgensen (2002) replication in appendix A.2.

[21] Appendix table 1 shows the full set of income yields, including un-adjusted SCF private firm income yields and adjustments as in Moskowitz and Vissing-Jørgensen (2002).

Figure 4: Yields, by type



(a) Income yields

(b) Capital gains yields

Note: author's calculations from SCF and CRSP/Compustat data. These figures plot income yields (R_t^{inc}, in panel 4a) based on equation 2, and capital gains yields ($\tilde{R}_{t+3}^{kg}$, in panel 4b) based on equation 3. R_t^{inc} are also found in appendix table 1 columns 3, 4, and 5, and $\tilde{R}_{t+3}^{kg}$ are also found in appendix table 1 columns 6 and 7. In panel (b), there is no 1989 return that can be calculated, as it is the first year in the time series. Returns calculated between 1989 and 1992, for example, are plotted as 1992 on the x-axis.

public firms generally outpace those of private firms except during the mid-to-late 2000s.

Figure 5 displays the total return for public and private firms in SCF years recommended by Bhandari et al. (2020a) and Bhandari et al. (2020b): $R_t^{inc} + \tilde{R}_{t+3}^{kg}$. The rate of return on public firms (orange line) has outpaced the return on private firms (black lines) in most of the survey years, as in the original "private equity puzzle" Moskowitz and Vissing-Jørgensen (2002).

Notably, the pattern and level of the overall rate of returns in figure 5 can be inferred purely from the capital gains yields in figure 4b, ignoring the income yields. Income data tend to be fraught with measurement choices, both for families (Clarke and Kopczuk (2025)) and for businesses shown here. Income also interacts with the tax system in ways that tend to impart downward bias (Guyton et al. (2021)), and for business owners, the tax system also leads to a co-mingling of labor and capital income in the business profits.[22] The cleanest comparison between public and private firms, then, may focus only on valuations, as in figure 4b.

4.1 Comparison with past papers

Figures 4b and 5 use the rate of return advised in Bhandari et al. (2020b). But despite using a different method of constructing aggregate returns, the qualitative patterns of Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) remain: prior to 2001, the total return on public firms exceeded that of private firms, and in the 2001-2010 period, private returns exceed public returns.

Our results also provide an update of Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) for the years since the Financial Crisis (2013-2022). Overall returns on public firms have tended to outpace the returns to private firms in this period (figure 5). This is the case for both the income yield (figure 4a) and the capital gains yield (figure

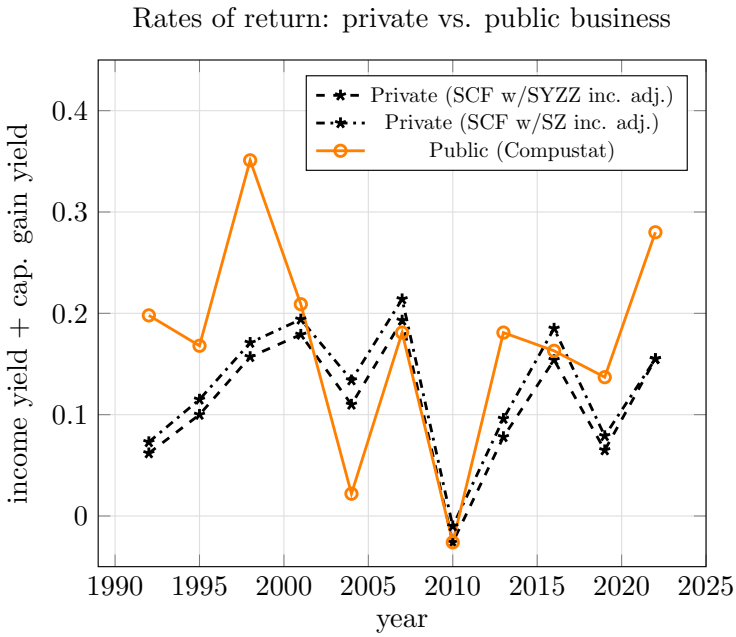
[22] Owners of partnerships and S Corps, for example, have incentive to pay out in profits over wages to avoid SECA taxes, and to pay out in capital gains over profits for even lower tax rates (Krupkin and Looney (2017)).

4b). That said, the public and private returns are very similar in this period, and may not be different from each other in the usual statistical sense (as noted in Bhandari et al. (2022)). Further, a replication that uses the original Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) rate of return calculation shows an alternating pattern in the post-Crisis era, where public returns outpaced private returns in the 2013 and 2019 waves, and private returns outpaced public returns in the 2016 and 2022 waves (appendix figure A.2a).

We note here that the description above is a different interpretation than conveyed in Bhandari et al. (2020b), who use income from private firms without adjusting for labor and, accordingly, find larger income yields (R_t^{inc}) throughout the time series and larger returns for private firms in general. Though there are a range of estimates in the ongoing debate over the correct capital-labor income shares for owners of private firms, labor makes up a notable share of owners' income in each (Smith et al. (2019), Saez and Zucman (2020), Moskowitz and Vissing-Jørgensen (2002), Bhandari and McGrattan (2021)). Estimates of private firm rates of return that include all labor income could be considered an upper bound, then. That said, if income from private businesses is too tangled to use, a rate of return comparison that ignores income and uses only capital gains, as in figure 4b, paints a similar picture.

Kartashova (2014) showed that private returns from the SCF exceed public returns from Compustat in 2001-2010 period and left off with the idea that the 1992-1998 period used in Moskowitz and Vissing-Jørgensen (2002) may have seen unusually high returns for public firms due to the "dot-com" boom. Over the full 1989-2022 SCF time period, though, it is the 2001-2010 period that stands out for unusually low returns to public firms (figure 4b). Using just S&P 500 firms, these low returns in the 2001-2010 period may be due to two years with exceptionally low public returns (appendix figure A.1). That said, the low interest rate environment post-Financial Crisis may be unusual itself and contribute to higher-than-expected returns on public firms (Lian et al. (2019)).

Figure 5: Aggregate overall business return: SCF private, Compustat public business



Note: author's calculations from SCF and CRSP/Compustat data. Figure plots overall rates of return for SCF private business and Compustat using equations 2 and 3, as advocated in Bhandari et al. (2020b). Orange line is the sum of Compustat income yield and annualized 3-year capital gains (appendix table 1, columns 5 and 8, respectively). Black lines add labor-adjusted SCF business income yields to SCF annualized capital gains (appendix table 1 columns 2, 3, or 4, and column 6).

5 Conclusion

Measuring the value and income of private businesses is challenging due to the private nature of these firms. In this paper, we evaluate owner-reported values and income of privately held businesses from the Survey of Consumer Finances (SCF) and provide estimates of rates of return on private business equity. Self-reported values are often met with skepticism, but the business sales and income in the SCF align closely to external aggregates, even when dis-aggregated into types of business organizations. In addition, self-reported business valuations are in line with what basic valuation models would predict.

We then compare aggregate returns of private and public firms, updating and extend-

ing the work of Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014) using a method proposed in Bhandari et al. (2020b). In the years since the Financial Crisis, the returns on public firms have tended to be larger than the returns on private firms—providing support for the "private equity puzzle" identified in Moskowitz and Vissing-Jørgensen (2002). That said, a replication of the original Moskowitz and Vissing-Jørgensen (2002) method paints a more nuanced picture, where private returns have exceeded public returns as often as public has exceeded private in these post-Crisis years. But over the past 30 years, with the exception of the years leading up to the Global Financial Crisis, overall rates of return on public firms have generally outpaced rates of return on private firms.

References

Aladangady, A., Bricker, J., and Chang, A. C. (2023). Changes in U.S. family finances from 2019 to 2022: Evidence from the Survey of Consumer Finances. Technical report, Board of Governors of the Federal Reserve System (U.S.).

Bach, L., Calvet, L. E., and Sodini, P. (2020a). Rich pickings? risk, return, and skill in household wealth. *American Economic Review*, 110(9):2703–2747.

Bach, S., Bartels, C., and Neef, T. (2020b). Distributional national accounts: A macro-micro approach to inequality in Germany. In *Measuring and Understanding the Distribution and Intra/Inter-Generational Mobility of Income and Wealth*. University of Chicago Press.

Batty, M., Bricker, J., Briggs, J., Holmquist, E., McIntosh, S., Moore, K., Nielsen, E., Reber, S., Shatto, M., Sommer, K., Sweeney, T., and Volz, A. (2019). Introducing the distributional financial accounts of the united states. Technical Report FEDS Paper No. 2019-017, Federal Reserve Board.

Bhandari, A., Birinci, S., McGrattan, E. R., and See, K. (2020a). Data appendix: What do survey data tell us about U.S. businesses? (Staff Report 578).

Bhandari, A., Birinci, S., McGrattan, E. R., and See, K. (2020b). What do survey data tell us about U.S. businesses? *American Economic Review: Insights*, 2(4):443–458.

Bhandari, A., Birinci, S., McGrattan, E. R., and See, K. (2022). Response to: Private business wealth and rates of return in the United States by Bricker, Moore, and Volz.

Bhandari, A. and McGrattan, E. R. (2021). Sweat equity in U.S. private business. *Quarterly Journal of Economics*, 136(2):727–781.

Board of Governors of the Federal Reserve System (2020). Statistical Release Z.1, Financial Accounts of the United States.

Bricker, J., Goodman, S., Moore, K. B., and Volz, A. (2021). A wealth of information: Augmenting the survey of consumer finances to characterize the full U.S. wealth distribution. Technical Report Finance and Economics Discussion Series 2021-053, Board of Governors of the Federal Reserve System (U.S.).

Bricker, J., Hansen, P., and Volz, A. H. (2019). Wealth concentration in the U.S. after augmenting the upper tail of the survey of consumer finances. *Economic Letters*, 184.

Bricker, J., Henriques, A., Krimmel, J., and Sabelhaus, J. (2016). Measuring income and wealth at the top using administrative and survey data. *Brookings Papers on Economic Analysis*.

Cagetti, M. and De Nardi, M. (2006). Entrepreneurship, frictions, and wealth. *Journal of Political Economy*, 114(5).

Campbell, R. C. and Robbins, J. A. (2025). The value of private business in the united states. *Journal of Public Economics*, 249:105466.

Clarke, C. and Kopczuk, W. (2025). Measuring income and income inequality. *Journal of Economic Perspectives*, 39(2):103–26.

Compustat (2025). Compustat. Data retrieved from Link: Wharton Research Data Services https://wrds-www.wharton.upenn.edu/.

Cooper, M., McClelland, J., Pearce, J., Prisinzano, R., Sullivan, J., Yagan, D., Zidar, O., and Zwick, E. (2016). *Business in the United States: Who Owns it and How Much Tax Do They Pay?*, volume 30, pages 90–128. MIT Press, Cambridge.

CRSP (2025). CRSP Stocks. Data retrieved from Link: Wharton Research Data Services https://wrds-www.wharton.upenn.edu/.

Di Carlo, R. and Shumovsky, N. (2019). Partnership returns, tax year 2017. *SOI Bulletin*.

Fagereng, A., Guiso, L., Malacrino, D., and Pistaferri, L. (2020). Heterogeneity and persistence in returns to wealth. *Econometrica*, 88(1):115–170.

Gallin, J., Molloy, R., Nielsen, E., Smith, P., and Sommer, K. (2021). Measuring aggregate housing wealth: New insights from machine learning. *Journal of Housing Economics*, 51:101734.

GAO (1995). Tax administration: IRS' partnership compliance activities could be improved. Technical Report GAO/GGD-95-151. Letter report, 06/16/95.

GAO (2015). Partnerships and S Corporations: IRS need to improve information to improve tax noncompliance. Technical Report GAO-14-453.

Guyton, J., Langetieg, P., Reck, D., Risch, M., and Zucman, G. (2021). Tax evasion at the top of the income distribution: Theory and evidence. Technical Report NBER Working Paper 28542, National Bureau of Economic Research.

Internal Revenue Service (2025). Single member limited liability companies. Accessed: 2025-10-09.

IRS (2016). Federal tax compliance research: Tax gap estimates for tax years 2008-2010. Technical Report Publication 1415 (Rev. 5-2016), Washington, DC.

Johns, A. and Slemrod, J. (2010). The distribution of income tax noncompliance. *National Tax Journal*, 63(3):397.

Kartashova, K. (2014). Private equity premium puzzle revisited. *American Economic Review*, 104(10):3297–3334.

Kennickell, A. (1999). Using income to predict wealth. Technical report, Board of Governors of the Federal Reserve System (U.S.).

Krupkin, A. and Looney, A. (2017). 9 facts about pass-through businesses. Technical report, Brookings Institution.

Lian, C., Ma, Y., and Wang, C. (2019). Low interest rates and risk-taking: Evidence from individual investment decisions. *Review of Financial Studies*, 32(6):2107–2148.

Love, M. (2021). Where in the world does partnership income go? evidence of a growing use of tax havens. working paper.

Lui, J., Nissim, D., and Thomas, J. (2002). Equity valuation using multiples. *Journal of Accounting Research*, 40(1):135–172.

Moskowitz, T. J. and Vissing-Jørgensen, A. (2002). The returns to entrepreneurial investment: A private equity premium puzzle? *American Economic Review*, 92(4):745–778.

NIPA (2024). Concepts and methods of the U.S. National Income and Product Accounts. Technical report, BEA (U.S.).

Palazzo, B. (2023). Corporate Profits in the aftermath of COVID-19.

Saez, E. and Zucman, G. (2020). Trends in US income and wealth inequality: Revising after the revisionists. Technical Report NBER Working Paper 27921, National Bureau of Economic Research.

Smith, M., Yagan, D., Zidar, O., and Zwick, E. (2019). Capitalists in the twenty-first century. *The Quarterly Journal of Economics*, 134(4):1675–1745.

Smith, M., Zidar, O., and Zwick, E. (2023). Top wealth in america: New estimates under heterogeneous returns. *The Quarterly Journal of Economics*, 138(1):515–573.

Vermeulen, P. (2018). How fat is the top tail of the wealth distribution? *The Review of Income and Wealth*, 64(2):357–387.

A Appendix

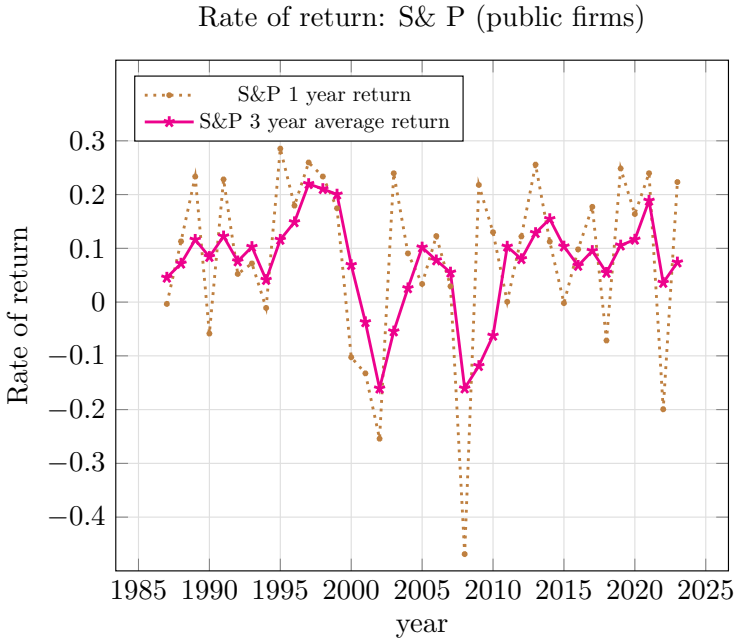
A.1 CRSP/Compustat data

Valuations of public firms are maintained in the CRSP database (CRSP (2025)), while accounting details of each firm are maintained by Compustat (Compustat (2025)). We merge the two datasets to get prices, income, firm size, sales, and other variables on public firms.

We first use the Compustat/CRSP data in figures 4, 4a, and 4b, which use variables *pi* for income, and where capital gains are derived from a market value variables constructed from the product of *csho* and *prcc f*. The red line in figure A.2a uses the variable *rvwretd*.

The data can also provide some context for these earlier figures. For example, we reference both an annual and a 3-year average annualized returns for S&P 500 firms plotted in figure A.1, which uses variable *rsprtrn*.

Figure A.1: Rate of return on S&P 500 firms



Note: author's calculations from CRSP/Compustat data. Figure plots average annualized 3-year returns and 1-year return.

In appendix A.5, we use these data to construct multiples of market value-to-sales and market value-to-income by broad industry categories in each year. As in Bhandari et al. (2020b), we use the pre-tax income variable in Compustat, which is similar to the SCF business income question ("what was the business's total pre-tax net income in [the year prior]?").

Income from private businesses is different from income from public corporate firms found in Compustat. First, the corporate pre-tax income concept (from Form 1120) includes business income along with interest, dividends, rent, and capital gains. Taxable business income for private pass-throughs, though, is generally just business income; any interest, dividends, rent, and capital gains may be included on a pass-through business tax form (1120S, 1165, or Schedule C) but are not included as business income. Second, corporate business income is income that flows from capital, but pass-through business income is a mix of capital income and owners' labor income. Owners of pass-through businesses have an incentive to pay themselves out of business profits rather than through salary because of lower tax rates on capital income (Moskowitz and Vissing-Jørgensen (2002)), leading to other parts of tax code being contaminated with the owners' labor income (Smith et al. (2019), Saez and Zucman (2020), Smith et al. (2023)).

In our comparisons of the SCF private business income and the firms in Compustat, we remove labor income from pass-through business income, in order to isolate capital income and align our measure with corporate income as in the recent literature (Moskowitz and Vissing-Jørgensen (2002), Saez and Zucman (2020), Smith et al. (2019)). For example, we construct value-to-income and value-to-sales multiples from the Compustat data, and when applying these multiples to the SCF data, we apply them only to the capital component of pass-through business income (Smith et al. (2023)). Further, the evidence that we present in figure 2a supports the idea that the SCF business section is capturing more than just ordinary business income for pass-through firms, and in-line with income reported on the corporate form.

A.2 Comparison to Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014)

As noted in these earlier papers, the aggregate SCF private firm values are modified to include data on initial public offerings (IPOs) and mergers and acquisitions (M&A), and both income and values exclude new firm births.[23] Rates of return on private firms are estimated using the geometric average of returns in two periods $r = \sqrt{R_1 \cdot R_2} - 1$:

$$R_1 = \left[\frac{value_t + 3 \times income_{t-1}}{value_{t-1}}\right]^{1/3} \tag{4}$$

$$R_2 = \left[\frac{value_t + 3 \times income_t}{value_{t-1}}\right]^{1/3} \tag{5}$$

where $value$ is the aggregate market value of private firms (after IPO and M&A adjustments), $income$ is aggregate income (adjusted for taxes, retained earnings, and labor share), t is survey year and $t-1$ is year of prior survey (three years prior).

The qualitative results from the earlier papers are still evident: compared to the return on public firms in the CRSP data (the red line), the return on private firms is generally smaller prior to 2001, and larger between 2001 and 2010.

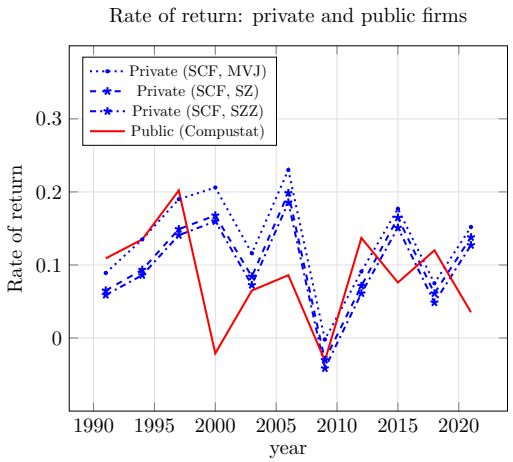
In the post-Financial Crisis era (since 2010), returns to public and private firms alternate in size (figure A.2a). Returns on public firms outpace private firms in the 2010-2013 and 2016-2019 periods, returns on private firms outpace public firms in the 2013-2016 period and 2019-2022 period. These post-Financial Crisis results are somewhat in contrast to those generated from the rate of return formula advocated by Bhandari et al. (2020b), where a clearer picture of public firms outpacing private firms emerges (figure 5).

Looking across the entire SCF time series, the results when using more recent labor adjustments proposed in Saez and Zucman (2020) and Smith et al. (2023) are qualitatively similar to those with the Moskowitz and Vissing-Jørgensen (2002) labor adjustment: public returns outpace private from 1989 to 2001, while private returns outpace public returns from 2004 to 2010 (figure A.2a, dashed blue lines).

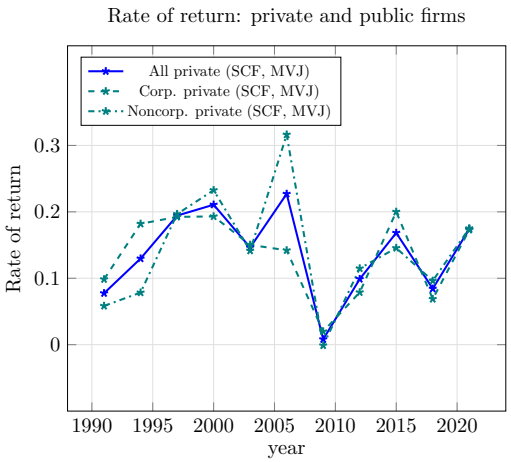
As shown in panel B of figure A.2, aggregate rates of returns for private corporate businesses are generally comparable to returns on non-corporate businesses. Private corporate firms include both S and C Corporations, and non-corporate firms include partnerships, sole proprietors, and LLCs.

[23] Data on IPOs are from Jay Ritter (https://site.warrington.ufl.edu/ritter/ipo-data/) and data from M&A is from SDC, LSEG Data & Analytics (formerly Refinitiv).

Figure A.2: Aggregate overall business return: SCF private, Compustat public business



(a) Private firms, by labor adjustment, and public firms



(b) Private firms, by legal organization

Note: author's calculations from SCF and CRSP/Compustat data. Figure plots overall rates of return for SCF private business and Compustat as in original Moskowitz and Vissing-Jørgensen (2002) and Kartashova (2014). Panel A includes the baseline labor adjustment for wages only (as in Moskowitz and Vissing-Jørgensen (2002) in solid blue line) and alternate labor adjustments as in Saez and Zucman (2020) and Smith et al. (2023). In panel A, SCF aggregate market values augmented with external data on IPOs and M&A are used. In panel B, non-corporate organizational forms include partnerships, sole proprietorships, and LLCs; corporate organizational forms include both C and S Corporations. Panel B wage adjustment accounts for wage labor only (as in Moskowitz and Vissing-Jørgensen (2002).

A.3 Comparison to Bhandari et al. (2020b)

A.3.1 Business income in the SCF and IBD data

Bhandari et al. (2020b) compare net income from SCF businesses to ordinary business income (profits) from the IBD. The following figures replicate panels from figure 1 of Bhandari et al. (2020b) and mirror figure 2 from this paper, but using just ordinary business income (profits) from the IBD (or estimates of ordinary business income in the case of partnerships), in contrast to the broader set of business income distributions (ordinary business income and other capital income) as we do in figure 2a-2d.

Most income from sole proprietors and S Corporations come in the form of profits, so the panel in figure A.3b is nearly identical to figure 2b (sole proprietorships) and figure A.3c is nearly identical to figure 2c (S Corporations). Note: the orange dashed lines here are the amount reported to the IRS after adjusting for under-reporting (and are taken from Bhandari et al. (2020b)).

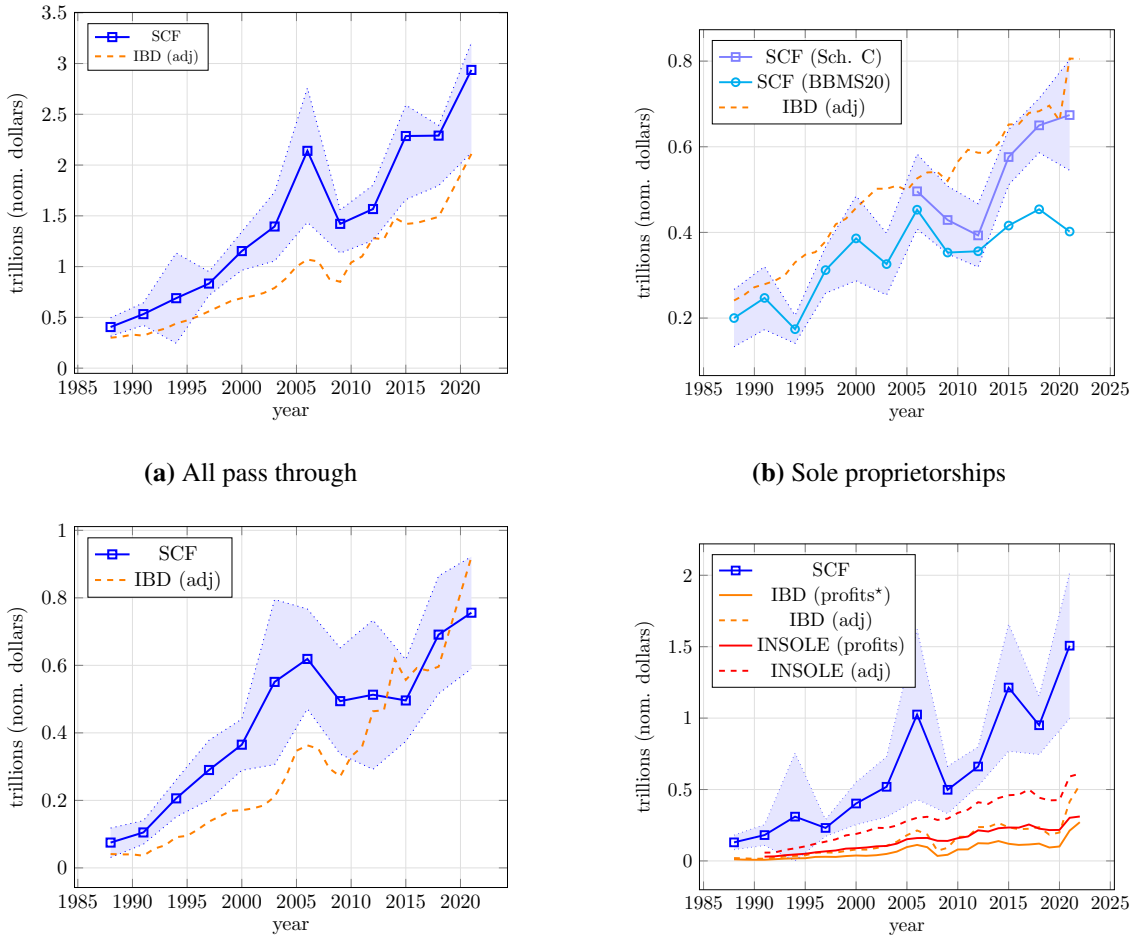
That said, our SCF sole proprietor aggregates are larger than those shown in Bhandari et al. (2020b) figure 1a (and replicated in the light blue line in figure A.3b), as our figure A.3b plots aggregate Schedule C income for all SCF families—including those who do not self-report as a "business owner"—to be as comparable as possible to the IBD, while the light blue line is just the sole proprietors that consider themselves business owners (a subset of all Schedule C filers). The IBD reports the aggregate Schedule C income of all families, even those who would not consider themselves as business owners. Bhandari et al. (2020b) plots Schedule C income just for families who report owning a sole proprietorship, but many families who file Schedule C in the SCF do not report owning a business.

The main divergence, then, comes from partnerships, and is evident in a comparison of figure 2d to figure A.3d. The reliance on the IBD is fraught for understanding families' partnership incomes, as the IBD do not report the amount of business profits that flow to individuals. The best estimates are that 32% to 40% of total partnership income flows to individuals are in the form of business profits (Cooper et al. (2016), Love (2021)); Bhandari et al. (2020b) form their aggregate partnership profits to individuals using the former share.

That said, the INSOLE file contains an estimate of profits from partnerships that flow to individual tax returns; these are publicly-available data in aggregated form and are displayed in figure A.3d in the red line (and red dashed line after applying the Bhandari et al. (2020b) non-corporate under-reporting adjustment).[24]

[24] See https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-line-item-estimates-publication-4801.

Figure A.3: Replication of Bhandari et al. (2020b)



(a) All pass through

(b) Sole proprietorships

(c) S Corporations

(d) Partnerships

Note: author's calculations from Board of Governors of the Federal Reserve System, Survey of Consumer Finances (SCF) and Statistics of Income, Internal Revenue Service, Integrated Business Database (IBD) as in Bhandari et al. (2020b)). In panel A.3d, ⋆ denotes an estimate of business profits from partnerships to individuals (this concept is not reported in the IBD, so Bhandari et al. (2020b) estimate it).

A.3.2 Calculated rates of return on business income

Table 1 attempts to replicate Appendix Table A.12 in Bhandari et al. (2020a), but (a) includes labor-adjusted version of SCF income yields (columns 2-4), and (b) is based on an internal version of the SCF data.

Table 1: Estimated income yields and capital gains, SCF and Compustat

	Income yield (R_t^{inc}, eqn. 2)					KG yield (R_{t+3}^{KG}, eqn. 3)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(Memo)
	SCF	SCF	SCF	SCF	Compu.	SCF	Compu.	Compu.
		Remove labor share from income						
year	All	MVJ	SZZ	SZ	PI	KG_{t+3}	KG_{t+3}	KG_{t+1}
1989	22.6	8.2	4.1	5.2	12.3	—	—	—
1992	25.8	14.2	5.3	6.3	6.6	0.9	13.2	27.2
1995	26.0	17.2	5.9	7.5	8.9	4.0	7.9	-1.1
1998	23.4	14.5	5.1	6.6	6.3	10.5	28.8	31.8
2001	23.0	16.4	5.4	6.9	5.3	12.5	15.6	4.3
2004	19.4	12.1	4.4	6.8	7.0	6.5	-4.8	28.7
2007	19.4	13.8	4.5	6.6	9.0	14.8	9.1	12.7
2010	15.1	8.4	3.6	5.2	6.0	-6.2	-8.6	21.4
2013	17.0	9.5	3.5	5.3	8.7	4.3	9.4	13.8
2016	16.2	7.0	3.7	6.7	5.5	11.8	10.8	-2.5
2019	13.8	8.7	3.1	4.5	6.9	3.4	6.8	-4.5
2022	12.6	5.4	2.6	2.6	6.9	13.0	21.1	20.7

Note: author's calculations from SCF and CRSP/Compustat data. Table 1 is similar to Appendix Table A.12 in Bhandari et al. (2020a) but includes labor-adjusted version of SCF income yields (columns 2-4). Column 1 shows the income yield on private SCF businesses before removing labor share of business income. Column 2 removes the labor component of private business income as in Moskowitz and Vissing-Jørgensen (2002), column 3 removes the labor component of private business income as in Smith et al. (2019), and column 4 the labor component of private business income as in Saez and Zucman (2020). Income yields in each of columns 1-5 are based on equation 2. Column 5 shows the income yield on public firms in the CRSP/Compustat data, using the pre-tax income concept ("PI"). Column 6 estimates aggregate capital gains returns (realized or unrealized) between the SCF survey years (as in equation 3), and column 7 shows the equivalent calculation from Compustat (as in equation 3 and Bhandari et al. (2020b)). The memo column shows the calculation using annual changes (available only in Compustat).

A.4 SCF income data

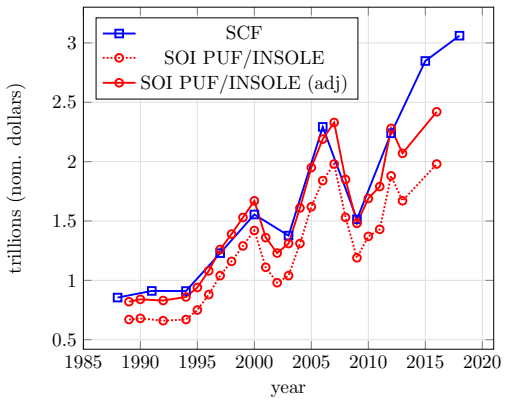
As noted in section 2.1.1, the questionnaire asks all SCF families to enumerate each component of total income from the year prior in an "income section." Questions in this section guide respondents to separately report each of these income components: wages, business profits, dividends, interest, capital gains, rent, pension income, and more. Earlier in the questionnaire, SCF businesses owners were also asked to report their net income from actively- and non-actively-managed businesses, meaning that business owners report a business income concept twice. The responses in this "income section" are consistent with the interpretation that business owners report a broad net income concept in their "business section" responses (figure A.4).

In the SCF income section, the sum of aggregate business income from Schedule C and E and all other sources capital income (interest, dividends, and capital gains) is nearly identical to the same income concepts in individual income tax filings (figure A.4a). When asked to parse out business income filed on Schedule C and Schedule E, the SCF aggregates are just a bit larger than the SOI aggregates (figure A.4b) after adjusting for underreporting on individual tax forms (as in Bhandari et al. (2020b), Guyton et al. (2021), and others).[25] And SCF self-reports of non-business capital income follow the same trends as the income tax data, even as the SCF aggregates tend to be a bit lower than the income tax data (figures A.4c and A.4d).

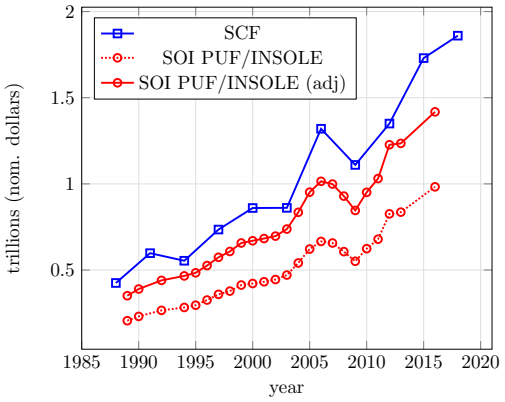
These income section data also show that SCF business owners have interest, dividend, and capital gains income flows on their tax forms, which is consistent with the interpretation that business owners report a broad net income concept in their "business section" responses. The biggest income discrepancy noted in Bhandari et al. (2020b) involves partnership income (as in figure A.3d). But if SCF business owners are reporting all income from businesses—not just profits—in section F of the survey, then we would expect these partners to later report a lot of capital gains and other financial income when they are asked to report income from their tax forms in income section. In figure A.5 we show that this is the case: SCF families that own a partnership also receive 30-50% of capital gains and other financial income in income section of the survey (figure A.5). The share is growing over time, in line with the growth of partnership income reported in Section F of the SCF survey and noted elsewhere (Di Carlo and Shumovsky (2019), Smith et al. (2019)).

[25] Both the income section and business sections refer to income from the prior year, but the business section refers to *current* businesses; in the case where a business started or folded in the current year, there may be a mismatch between income in the business section and the income section due to the differences in timing.

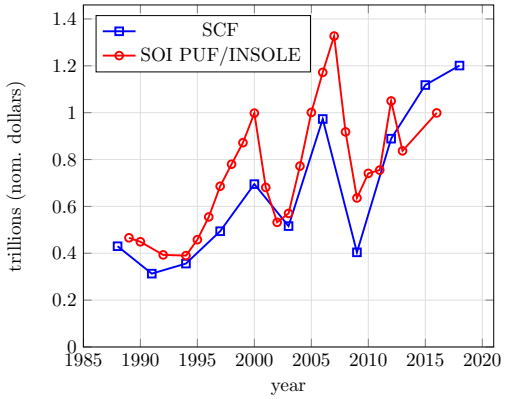
Figure A.4: Aggregate business and capital income: SCF income section and INSOLE personal income tax filings



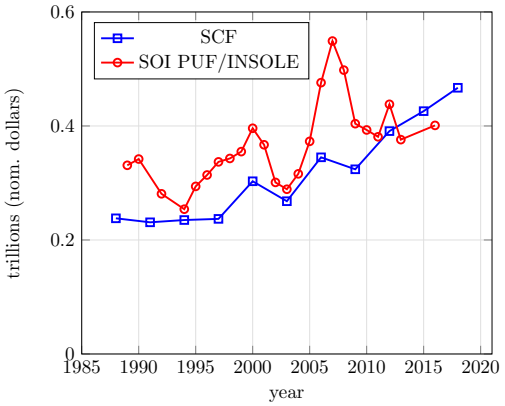
(a) All: pass-though business, capital income



(b) Pass-though business income (Sch. C and E)



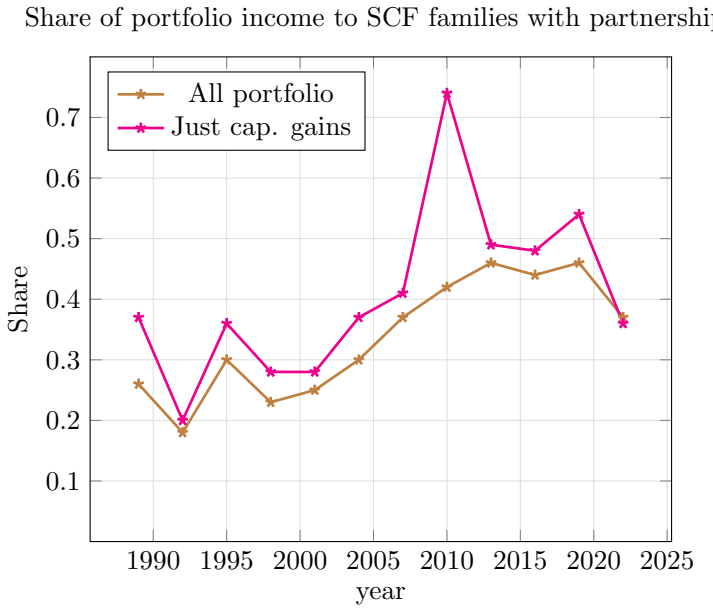
(c) Capital income (incl. cap. gains)



(d) Capital income (excl. cap. gains)

Note: author's calculations from Survey of Consumer Finances and Statistics of Income Individual and Sole Proprietor INSOLE data and PUF data. Light blue line plots aggregate income from SCF income section (Section T). Red lines plot the aggregates from the INSOLE and PUF files. In panel A.4a, dotted red line is aggregate Schedule C and E income (ordinary business income) and capital income including capital gains from individual tax filings, and the red solid line augments these Schedule C and E income aggregates for underreporting (as in Bhandari et al. (2020b)). Panel A.4b repeats panel A.4a but includes only Sch. E and C business income. The bottom panels plot capital income (taxable interest, non-taxable interest, and dividends) with and without capital gains (panels A.4c and A.4d, respectively).

Figure A.5: Share of financial income reported by owners of partnerships in SCF



Note: author's calculations from SCF data. Figure plots share of capital gains (pink line) and capital gains plus dividends, interest and rent (brown line) that owners of SCF partnerships later report in Section T income section.

A.5 Predicted SCF business valuations using Compustat

Absent an ideal benchmark for private firm valuations, we turn to data on public firms as an imperfect gauge of respondent reported SCF valuations. To do so, we first calculate both value-to-sales and value-to-income ratios in each year and for eight broad industry classes from public firms in the CRPS/Compustat data. We then predict business valuations for each private SCF firm by applying these multiples to the sales and income reported in the SCF, as is common in the finance and accounting literature (Lui et al. (2002), Smith et al. (2023)). Our predicted valuations model is a weighted average of these two predictions:

$$\hat{bus}^{SCF} = \sum_{\forall k} \frac{1}{2} \cdot \left[sales_i^{scf} \cdot \left(\frac{\overline{value}}{\overline{sales}} \right)_k^{compu} \right] + \frac{1}{2} \cdot \left[\theta inc_i^{scf} \cdot \left(\frac{\overline{value}}{\overline{income}} \right)_k^{compu} \right] \quad (6)$$

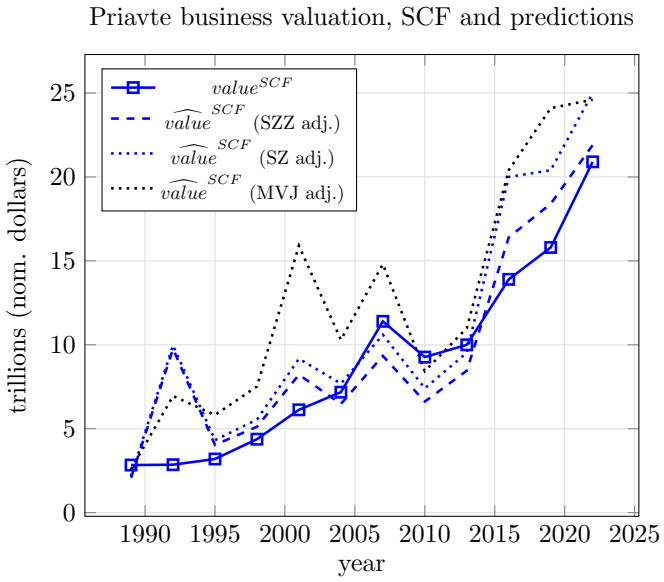
where $(\frac{\overline{value}}{\overline{sales}})_k^{compu}$ and $(\frac{\overline{value}}{\overline{income}})_k^{compu}$ are generated from Compustat/CRSP linked data for eight industry classes (k) for each SCF year. The scalar θ describes the share of income that is retained after removing the labor income inherent in pass-through business income. Unlike corporate profits, pass-through business income are often a mix of capital and labor income (Smith et al. (2019)). For example, income paid out as labor is subject to the payroll tax, while profits are not. In recent years, preferential tax treatment of pass-through income—in the form of lower rates—has been codified into tax law.

Predicted SCF private business wealth described by the above equation are shown in the blue lines in figure A.6, using multiple approaches to separate labor and capital income for business owners.[26] In Moskowitz and Vissing-Jørgensen (2002), for SCF business owners who do not report being paid a wage, we remove from their business profits a predicted wage income. SCF business values predicted under this correction are shown in the dotted line. More recently, Smith et al. (2019) estimate that 75 percent of pass-through business income should be classified as labor income. The long-dashed line in figure A.6, then, predicts business valuations when retaining 25 percent of business income (allocating 75 percent to labor, as in Smith et al. (2019)). The short-dashed line keeps the capital-labor allocation of Smith et al. (2023) for small firms but retains 75 percent of business income in larger firms, following the findings in Saez and Zucman (2020). Overall, the Saez and Zucman (2020)-based method classifies about 50 percent of business income as labor income, similar to Bhandari and McGrattan (2021).

There are several notable features of figure A.6. First, the predicted SCF private business values using Compustat multiples are generally similar, though often larger than the

[26] This figure uses only actively managed businesses which all have data on industry, income and sales information used in the predictions.

Figure A.6: Predicted aggregate valuations



Note: author's calculations from Survey of Consumer Finances and data from CRSP (2025) and Compustat (2025)). Solid line is SCF aggregate (for active businesses with industry codes only), and dashed blue lines are predicted from equation 6.

actual self-reported SCF values. We note here that there are numerous reasons why these Compustat multiples may over-predict, especially if the mix of small and large firms in the SCF is not comparable to the firms in Compustat. Most of the small firms in Compustat have negative income, for example, but these are firms that may want to realize losses in the quest for growth—the SCF firms of a similar size or industry may face different incentives or priorities.

Second, the predicted business values are more responsive to the business cycle than the self-reported values around the Great Recession period: each has a greater percent decline from 2007-2010 relative to self-reported values, and each has a greater increase from 2010-2013. These predictions based on public firms may be overly pessimistic, especially if self-reported values are better at incorporating the future stream of profits or discounting the current low-income realization of the business. The predicted values rely on the current measures of annual income, which may incorporate temporary distress.