CAPITALISTS IN THE TWENTY-FIRST CENTURY*

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How important is human capital at the top of the U.S. income distribution? A primary source of top income is private "pass-through" business profit, which can include entrepreneurial labor income for tax reasons. This article asks whether top pass-through profit mostly reflects human capital, defined as all inalienable factors embodied in business owners, rather than financial capital. Tax data linking 11 million firms to their owners show that top pass-through profit accrues to working-age owners of closely held mid-market firms in skill-intensive industries. Pass-through profit falls by three-quarters after owner retirement or premature death. Classifying three-quarters of pass-through profit as human capital income, we find that the typical top earner derives most of her income from human capital, not financial capital. Growth in pass-through profit is explained by both rising productivity and a rising share of value added accruing to owners. *JEL* Codes: D31, E01, H2, J3, L26.

> [The human capital hypothesis] is far less consequential than one might imagine. ..."non-human" capital seems almost as indispensable in the twenty-first century as it was in the eighteenth or nineteenth, and there is no reason why it may not become even more so. —THOMAS PIKETTY (2014)

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I. Introduction

In the last few decades of the twentieth century, the primary driver of rising top incomes was wage income growth (Piketty and Saez 2003). Since then, rising capital income has shifted focus to the role of capital and financial wealth (Piketty, Saez, and Zucman 2018).[1] Understanding the nature of top incomes is essential for explaining their evolution and assessing policy implications. Are America's top earners financial-capital rich—those who derive most of their income from nonhuman capital—or are they human-capital rich—entrepreneurs and wage earners who derive most of their income from their human capital?

This article uses deidentified administrative tax data to characterize top incomes and their rise in the twenty-first century. Throughout, we measure income using directly observed fiscal income from tax returns following Piketty and Saez (2003) and imputed national income following Piketty, Saez, and Zucman (2018) (PSZ).[2] We first establish how much top earners make from three broad sources: wage income, business income, and other capital income such as interest and rent payments. In 2014, most income at the very top is nonwage income, the primary source of which is business income.

Most top business income comes from private "pass-through" businesses that are not taxed at the entity level; instead, income passes through to the owners who pay taxes on their share of the firm's income. This feature allows us to build a new data set linking pass-through firms (S-corporations and partnerships, defined below) to their owners for 11 million firms between 2001 and 2014. This data set enables us to ask whether top pass-through income should primarily be thought of as human capital income accruing to entrepreneurs or as financial capital income accruing to investors. We define human capital broadly to refer to all

1. Piketty (2014) analyzes how capital accumulation can lead to increasing inequality. Karabarbounis and Neiman (2014) document rising capital shares. Saez and Zucman (2016) use capitalized income flows to show that wealth concentration in the United States has been increasing, in contrast to the flat path of wealth concentration based on estate tax returns in Kopczuk and Saez (2004). Piketty and Zucman (2014) document rising capital-output ratios. Rognlie (2016) and Caballero, Farhi, and Gourinchas (2017) discuss interpretations.

2. Fiscal income equals total tax return income minus realized capital gains and is measured at the household level. Imputed national income ("Distributional National Accounts") includes additional imputed components of national income and is measured at the individual level. Section II contains more detail.

inalienable factors embodied in business owners, including labor supply, networks, reputation, and rent-extraction ability. Overall, we find that top earners are predominantly human-capital rich rather than financial-capital rich, and that 52% of top 1% income accrues to the human capital of these wage earners and entrepreneurs.

The first part of the article describes who earns business income and the salient features of their firms. The data reveal a striking world of business owners who prevail at the top of the income distribution. Most top earners are pass-through business owners. In 2014, over 69% of the top 1% and over 84% of the top 0.1% earn some pass-through business income. In absolute terms, that amounts to over 1.1M pass-through owners with fiscal income over $390K and 140,000 pass-through owners with fiscal income over $1.6M. In both number and aggregate income, these groups far surpass that of top public company executives, who have been the focus of much inequality commentary (see Edmans and Gabaix 2016 for a survey). Typical firms owned by the top 1–0.1% are single-establishment firms in professional services (e.g., consultants, lawyers, specialty tradespeople) or health services (e.g., physicians, dentists). A typical firm owned by the top 0.1% is a regional business with $20M in sales and 100 employees, such as an auto dealer, beverage distributor, or a large law firm.

Most pass-through business income accrues to undiversified, working-age owners of mid-market firms in skill-intensive industries. Specifically, an individual's pass-through income typically derives from one firm with one to three owners and amounts to a large share of her total income. The age distribution of these owners closely mirrors that of high-income wage earners; in contrast, the owners of more passive forms of capital skew much older. Most pass-through business income derives from firms with $5M to $500M in sales operating across diverse geographies and sectors. Despite this diversity, most profits are earned in relatively labor-intensive industries, especially in those that demand skilled labor. In contrast, non-pass-through businesses (C-corporations) are more prevalent in manufacturing and capital-intensive industries, with profits concentrated among firms with more than $500M in sales. Together, these facts support the notion that most top pass-through earners are human-capital rich.

The second part of the article uses quasi-experimental event studies to quantify the extent to which pass-through profits reflect

returns to owner human capital rather than to nonhuman financial capital. The ideal experiment would be to measure the profit impact of exogenously forcing pass-through owners to withdraw their human capital from their firms. We approximate this ideal with two natural experiments: one measures the profit impact of owner deaths and another measures the profit impact of owner retirements.

In the first natural experiment, we identify nonelderly owners who died 2005–2010 and who earned over $1 million in the year before their death. We then match their firms to similar counterfactual firms that did not experience an owner death. Profits at owner-death firms track counterfactual firms closely in the preperiod and then fall immediately and persistently upon owner death. The effect is an 82% decline in firm profits.

In the second natural experiment, we study the event of owner retirement, inferred when the firm transitions from four straight years of paying at least one owner W-2 wages to two years of paying no owner wages. The presumption is that these owners replace themselves with nonowner managers whose compensation is entirely reported as wages and bonuses, not profits. Profits at owner-retirement firms track counterfactual firms closely in the preperiod then fall immediately and persistently upon owner retirement. The effect is an 83% decline in firm profits. Our baseline specification is equal weighted. Dollar-weighted approaches deliver similar estimates, although the standard errors increase with dollar-weighting. Averaging our estimates across top 1%, million-dollar-earner, and top 0.1% groups, we conclude that approximately three-quarters of top pass-through profits are returns to owner human capital.

Pass-through owners have a tax incentive to receive their compensation as profits rather than wages and bonuses, whereas owners of traditional C-corporations do not. We find that firms that switch from C-corporation form to pass-through form reduce wage bills and increase profits. This result provides evidence consistent with a tax explanation of pass-through profits reflecting returns to owner human capital.

We use our three-quarters estimate for the labor (human capital) share of pass-through income to conduct a person-level analysis of top earners. Is the typical top earner a human capitalist or a financial capitalist? That is, if you run into a very high earner on the street, does she likely earn most of her income from labor or

from capital? When ignoring pass-through income, a minority of top earners are human-capital rich. However, when defining labor income as wages plus three-quarters of pass-through income, this assessment reverses: most top earners are human-capital rich, not financial-capital rich. For example, among million-dollar earners in imputed national income, 67% derive most of their income from labor income, but only 35% derive most of their income from wages alone. Hence, the human capital component of pass-through income transforms one's view of the typical top earner.

Some individuals with wage and pass-through income may provide little human capital services, perhaps drawing a salary or ownership share from a family firm as a way to avoid estate taxes. To address this consideration, we use the parent-child links of Chetty et al. (2019) to classify whether individuals aged 32–34 are "self-made," which we conservatively define as top earners whose parents were not in the top 1%. These individuals are unlikely to receive large financial inheritances or inter vivos gifts. We find that more than 75% of top earners in the parent-linked sample are self-made.

We also use our three-quarters estimate to conduct a novel aggregate analysis of top income. How much is labor income? How much is entrepreneurial income (pass-through income plus W-2 wages paid to owners)? How do these amounts compare with other income components? While dollar-level aggregates are more uncertain, two findings stand out. First, holding other assumptions constant, our classification of three-quarters of pass-through income as labor income reduces the top capital share in imputed national income by 7 percentage points from 55% to 48%.[3] Second, top entrepreneurial income and its human capital component are large. In every top income group and income definition, entrepreneurial income rivals or exceeds both nonowner wage income and non-pass-through capital income. The human capital component of entrepreneurial income itself exceeds top public equity income.

To complement our cross-sectional analysis of top incomes, we conclude by investigating the evolution of top entrepreneurial

3. PSZ's top 1% capital share is 55% in their Figure VIII, Panel B (based on data in Online Appendix Table TB2f, which they use to discuss our article in their Online Appendix C.2). PSZ also report an alternative top 1% capital share of 59% in their Figure VIII, Panel A which draws on data in their Online Appendix Table TB2d that allocates more pension income to capital for top earners.

income, which has risen substantially over time. We use our linked firm-owner-worker data to decompose the growth of top entrepreneurial income and shed light on how it has increased since 2001. Approximately 30% of the growth in entrepreneurial income reflects businesses reorganizing from C-corporation to pass-through form. Adjusting for this fact, we find no role for a larger workforce in driving higher entrepreneurial income. Instead, both labor productivity and a rising share of value added accruing to owners account for the growth of top entrepreneurial income. Thus, explaining the rise of top entrepreneurial income requires both a growing pie and an expanding owner-manager slice.

This study's main contribution is to the income inequality literature. Piketty and Saez (2003) use fiscal income to show that labor drove the rise in top incomes in the second half of the twentieth century. PSZ use imputed national income to find that capital has been driving the rise since 2000 in top income and now exceeds labor income at the top. An innovation of our article relative to past work is that we use microdata to ask person-level and dollar-level questions. PSZ's focus is a dollar-level analysis of top incomes, but their findings raise the possibility that the financial-capital rich have displaced the human-capital rich as the typical top earner.[4] However, we find that the typical top earner is human-capital rich. This finding depends crucially on how one treats top pass-through income—a large component of top "capital" income and 30% to 40% of top 1% income. We classify 75% of pass-through income as human capital income. In contrast, PSZ assume a labor share of 0% for one type of pass-through income (S-corporation) and 70% for the rest (partnership and other pass-through).

Our approach also affects conclusions about the composition of top incomes (i.e., for dollar-level questions). Under our approach, the top 1% labor share of imputed national income in 2014 increases from 45.4% in PSZ to 52.1%. Of the 6.8 percentage point change, the S-corporation adjustment contributes 4.9 percentage points, the partnership and other pass-through adjustment contributes 1.1 percentage points, and correcting an inaccurate

4. PSZ occasionally provide person-level interpretations of their results: "[In] the post-World War II decades, *most top earners* derived their income from assets. From the 1970s and 1990s, *the fraction of top earners* deriving their income from work grew. This process culminated in 2000. . . Since then, the capital share has bounced back" (Piketty, Saez, and Zucman 2018, 595–597, emphasis added).

extrapolation in PSZ contributes 0.9 percentage points.[5] Applied to the time series, our classification yields qualitatively similar results to PSZ: the top 1% labor share rose from the 1960s, peaked in 2000, and then returned to 1990 levels.

Our findings draw attention to a class of entrepreneurs hidden from public view who prevail among top earners and whose human capital income is key for understanding top incomes. An important role for human capital is consistent with the view that the demand for top human capital has outpaced its supply, with the returns to top human capital increasingly taking the form of business income.[6] However, we stress that returns to top owner-managers need not be socially optimal and can include returns to unproductive behavior like rent-seeking (Krueger 1974; Murphy, Shleifer, and Vishny 1991) or returns to elite connections (Fisman 2001; Khwaja and Mian 2005; Zimmerman 2019).

For the literature on rising firm profitability, we provide evidence on the relative impact of productivity growth and the distribution of surplus between workers, managers, and owners. Our finding that productivity explains an important part of entrepreneurial income growth aligns with recent work emphasizing the role of efficiency improvements in driving firm profitability (Autor et al. 2017; De Loecker and Eeckhout 2017). Entrepreneurial income is also increasing due to a rising share of value added accruing to owners. In our data, the owners appear to be managers and key workers, which contrasts with the separation of ownership and control in public company governance. Thus, our results point to channels other than zero-sum bargaining between executives and corporate boards for rising owner pay.[7]

Our results inform three other literatures. First, a long-standing literature debates the relative importance of inherited wealth versus self-made wealth (Kotlikoff and Summers 1981;

5. In 2014, top 1% total income amounts to \$3T in imputed national income, so these three adjustments amount to \$149B, \$33B, and \$27B, respectively. See Section II and Online Appendix D for additional discussion.

6. See Katz and Murphy (1992), Autor, Katz, and Kearney (2008), Goldin and Katz (2009), and Murphy and Topel (2016) for some prominent articulations of this view. Kaplan and Rauh (2013) argue that the broad-based rise in top incomes reflects market-driven forces, such as an increased return to skill.

7. Gabaix and Landier (2008), Piketty, Saez, and Stantcheva (2014), and Piketty (2014) highlight the role of bargaining for the growth of top executive pay among public and other companies with delegated management. See Edmans and Gabaix (2016) for a survey of executive pay trends.

Modigliani 1986; Piketty 2011; Piketty, Postel-Vinay, and Rosenthal 2014). We use parent income to infer whether individuals are likely self-made. Second, we find that firm-level variation in profitability amplifies measured top income inequality among firm owners, and much of their human capital returns take the form of profits rather than wages.[8] Third, we contribute to a literature on the impact of taxes on economic measurement, the composition of top incomes, and corporate organization, which we discuss in the conclusion.[9]

Last, we make two methodological contributions that may improve distributional income and wealth estimates. First, the Online Appendix explores alternative methods for imputing retained earnings to individuals. Second, top wealth estimates based on capitalized income flows and a constant returns assumption can be improved by accounting for the higher profitability of top-owned firms.

The article is organized as follows. Section II describes the institutional background and data. Section III documents the importance of pass-through income for top income inequality, and then presents descriptive statistics on the prevalence of top pass-through ownership and the sizes and industries of those businesses. Section IV presents event studies, which estimate whether and the extent to which pass-through profits reflect the return to owner human capital. Section V uses these estimates to characterize top earners as human-capital rich or financial-capital rich, to estimate the share of top earners that are self-made, and to quantify top income shares by income source. Section VI analyzes the evolution of top entreprenuerial income and the contributions of changing labor productivity, scale, and factor shares. Section VII concludes.

8. An active literature documents firm- and industry-level variation in profitability and links firm performance and wage inequality (Hall 1988; Foster, Haltiwanger, and Syverson 2008; Hsieh and Klenow 2009; Syverson 2011; Abowd, Kramarz, and Margolis 1999; Card, Heining, and Kline 2013; Song et al. 2019) as opposed to income inequality, which includes business income. Fagereng et al. (2016) document heterogeneous and persistent returns in Norway, finding a key role for closely held firms at the top of the income distribution.

9. See, for example, Gordon and MacKie-Mason (1994), Slemrod (1996), MacKie-Mason and Gordon (1997), Gordon and Slemrod (2000), Alstadsaeter et al. (2016), Auten and Splinter (2018), DeBacker and Prisinzano (2015), Cooper et al. (2016), Clarke and Kopczuk (2017), Prisinzano and Pearce (2017), and Dyrda and Pugsley (2018).

II. Institutional Background and Data

II.A. How U.S. Businesses Are Organized and Taxed

There are three major types of formal businesses: C-corporations, S-corporations, and partnerships. All three forms provide limited liability to their owners, but they differ in their ownership rules, tax treatment, and profit measurement. C-corporations and partnerships may be owned by individuals, businesses, nonprofits, and foreigners, whereas S-corporations face ownership restrictions. Firms with more than 100 owners, with owners who are not U.S. individuals, or with more than one class of stock cannot be S-corporations. These restrictions bar public companies and corporations with complex ownership structures (such as venture capital–financed startups) from being S-corporations. Separate restrictions also bar almost all partnerships from being publicly traded. Prominent pass-throughs include the Hobby Lobby Corporation, home improvement retailer Menards, Fidelity Investments, and the U.S. arm of PricewaterhouseCoopers.

C-corporations pay the corporate income tax on annual taxable income, and taxable shareholders pay dividend taxes on dividends and pay capital gains taxes on gains realized from selling shares. S-corporations and partnerships, collectively known as pass-through businesses, pay no entity-level tax. Instead, taxable business income "passes through" to shareholders' tax returns where it is taxed as ordinary income in the year it is earned by the firm. When actually distributed to owners, pass-through dividends are untaxed. Since 1986, pass-through income typically has enjoyed a lower tax burden than C-corporation income.[10] As a result, most businesses—even those with over $500 million in revenue—are now pass-throughs and most taxable business income is pass-through income, even though almost no pass-throughs are publicly traded.[11] Among pass-throughs, S-corporations generate more business income than partnerships.

Finally, organizational forms differ in how owner compensation is reported on tax returns. The wages of S-corporation owners

10. In the pre-2018 period we study, pass-throughs were strongly tax-advantaged. The 2017 Tax Cuts and Jobs Act reduced taxes on both pass-throughs and C-corporations. There remains a clear tax preference for pass-throughs in some industries and an ambiguous one in others.

11. By 2011, 54.2% of U.S. taxable business income was earned by formal pass-throughs and sole proprietorships (informal businesses also taxed at the owner level) and only 45.8% by C-corporations (Cooper et al. 2016).

are legally required to be "reasonable" and to reflect the market value of labor services, while profit is supposed to reflect residual earnings. However, in practice, owner-managers enjoy considerable discretion in how their compensation is categorized as wages or profits. Owner-managers of C-corporations enjoy a lower tax burden when paid in wages, but owner-managers of pass-throughs enjoy a lower burden when paid in profit.[12] See Online Appendix A for additional institutional detail.

II.B. Data on Top Incomes

We use two data series on the U.S. income distribution 1962–2014. PSZ assembled these data based on stratified random samples of personal tax returns.

Fiscal income is directly observed income on personal tax returns. We use the main fiscal income definition of Piketty and Saez (2003) (PS), which measures fiscal income at the level of the tax unit (typically a single adult or a married couple) and equals Form 1040 total income minus realized capital gains, unemployment compensation, and taxable Social Security benefits. The series includes synthetic records for individuals who do not file income tax returns, thereby reflecting the full U.S. adult population.

Imputed national income ("Distributional National Income" in PSZ, sometimes INI) imputes components of national income not observed in personal tax data such as employer-provided health insurance, rent from owner-occupied housing, and C-corporation retained earnings (i.e., earnings not distributed to owners as dividends). We use PSZ's main definition, which measures pre-tax-and-transfer imputed national income at the level of the individual adult and equally splits each income component between spouses. Imputed national income aggregates across individuals to equal national income (GDP minus capital depreciation plus net income received from abroad) in the National Income and Product Accounts. See Online Appendix C for a comparison of our top pass-through statistics with PSZ's Online Appendix C.2, and Online Appendix D for a quantitively important correction that

12. Legal rules mandate that most partnership owner compensation be reported as profits even when compensation for labor supply. Owners of C-corporations avoid dividend taxation when paid in wages. Owners of pass-throughs face no dividend tax and may avoid payroll taxation when paid in profits.

we make to the published PSZ data.[13] Note that national income includes unrealized capital gains in the form of corporate retained earnings but not in the form of expectations-induced asset price growth. Integrating such asset price effects into an analysis of inequality is a useful direction for future research.

Our analysis considers top 1% earners and several interesting subgroups, including million-dollar earners and the top 0.1%. In 2014, the top 1% and top 0.1% thresholds in the fiscal income series are $390K and $1.58M, respectively and in the imputed national income series are $420K and $1.88M. We add the million-dollar-earner group as a salient midpoint between the top 1% and top 0.1% groups.

For each data series, we follow PS and PSZ in defining income sources. Within each series, wages plus business income plus other capital income equals total income. For fiscal income, wage income (sometimes "wages") includes Form 1040 wages, salaries, and tips; pension distributions; and annuities. Pass-through income includes S-corporation income, partnership income, and sole proprietor's income. Entrepreneurial income equals pass-through income plus owner wages, defined in the next subsection.[14] Business income equals pass-through income plus C-corporation dividends. Other capital income includes interest, rents, royalties, and estate and trust income.

For imputed national income, wages includes Form 1040 wages, salaries, and tips; imputed unreported wage compensation; payroll taxes; imputed nontaxable employee benefits like employer-provided health insurance; a portion of sales and excise taxes; and a portion of pension income. Pass-through income includes S-corporation income, partnership income, sole proprietor's income, imputed unreported income from unincorporated

13. Some exhibits and numbers in the published version of PSZ, including those described in their Online Appendix C.2 that discusses our article, used an extrapolation for 2011 through 2014 that materially underestimated top pass-through income. We have updated their series based on actual, unextrapolated data.

14. We follow earlier work (e.g., Piketty and Saez 2003) in including all pass-through income as entrepreneurial income, even though some pass-through income accrues to nonfounders. Note that hedge fund and private equity pass-throughs earn much income in the form of dividends, retained earnings, interest, and rental income. Such income retains its character as it flows through pass-through firms and is classified as either C-corporation income or other capital income, not pass-through income, which is exclusively an operating profit concept.

businesses, a portion of sales and excise taxes, and a portion of corporate taxes. Business income equals pass-through income plus C-corporation dividends, imputed C-corporation retained earnings, a portion of sales and excise taxes, and a portion of corporate taxes. Entrepreneurial income equals pass-through income plus owner wages, defined in the next subsection. Other capital income includes interest, imputed underreported interest income, rents, imputed rental income (including imputed rent from owner-occupied housing), a portion of sales and excise taxes, and a portion of pension income.[15]

We and PSZ classify wages as labor income (i.e., a return to human capital) and classify other capital income as capital income (i.e., a return to financial or physical capital). An important contribution of our article is an estimate of the share of pass-through income that is in fact labor income rather than capital income. PSZ assume that 0% of S-corporation income is labor income and that 70% of the remainder of pass-through income is labor income. We estimate below that 75% is labor income.[16]

We present our income distribution findings in both fiscal income and imputed national income. Fiscal income has the advantage of being directly observed on personal income tax returns, but has the disadvantage of understating top capital income because some components do not appear on personal tax returns. Imputed national income has the advantage that it sums to national income, but has the disadvantage of relying on imputation assumptions. PSZ employ several assumptions to impute missing national income to individual adults—a path-breaking prototype to which they encourage ongoing refinement. Relevant

15. With reference to PSZ's top incomes decomposition (their Online Appendix Table TB2f), wages equals compensation of employees plus the labor component of pension income. Pass-through income equals S-corporation dividends plus the capital and labor components of mixed income. Business income equals pass-through income plus C-corporation dividends plus C-corporation retained earnings. Other capital income equals interest and rents plus the capital component of pension income. Our INI replication matches PSZ's top income totals but allocates slightly less to C-corporation income and slightly more to interest and rents.

16. More specifically, PSZ assume that 70% of the remainder of pass-through income is labor income, but tax adjustments under the assumption that business capital bears 100% of the nonhousing capital tax yields a final tax-inclusive labor share of approximately 65% in recent years (see their Figure VIIIb and Online Appendix Tables TB2b and TB2f). Following their assumptions but using a 75% pretax labor share yields a tax-inclusive labor share of 70% in our imputed national income analysis.

to our analysis, we believe the available evidence suggests that imputed national income may overstate top capital income. These competing considerations motivate the presentation of our findings in both series, likely (in our view) bounding the truth. Our qualitative results hold in both series.

Top capital income in imputed national income may be overstated because of the following consideration regarding C-corporation retained earnings. When a C-corporation distributes less in dividends than it makes in after-tax income, it retains earnings within the firm.[17] Those retained earnings ($649B in 2014) are a substantial part of national income but do not appear on personal tax returns and thus are not in fiscal income. PSZ allocate the household share of aggregate retained earnings to individuals in proportion to the sum of the individual's observed dividends and realized capital gains. The rationale is that when C-corporation income does appear on personal tax returns, it appears as either dividends or realized capital gains. However, published IRS reports indicate that at least 25% and as much as 75% of realized capital gains are not from the sale of C-corporate stock and are instead gains from real estate and other asset sales or carried interest. This fact can explain how total realized capital gains ($732B in 2014) vastly exceeds the total household share of retained earnings ($306B in 2014). Realized capital gains are much larger than dividends and much more concentrated among top earners. Hence, imputing retained earnings in proportion to each individual's sum of dividends and 100% of realized capital gains may allocate too much retained earnings to top earners and not enough to lower earners.[18] See Online Appendix E for a full discussion and Online Appendix F for retained earnings imputations under alternative assumptions.[19]

17. Pass-throughs are measured as having no retained earnings, with effectively 100% dividends.

18. Saez and Zucman (2016) conduct a related analysis and report wealth estimates using dividends only. Relative to using dividends alone, their Tables B35 and B37 imply that imputing wealth using dividends and 100% of realized capital gains increases 2012 top 0.1% equity wealth by 28%. This adjustment modestly increases total top 0.1% wealth, which is the primary focus of Saez and Zucman (2016), by 9.2% (page 535).

19. It is valuable to note that all imputations have imperfections. For example, imputations of retained earnings based on observed dividends and realized capital gains allocate too little to concentrated owners of C-corporation stock that pay no dividends and are not sold and therefore too much to other owners. Direct links of C-corporations to their owners would improve measurement, as in Norway (Alstadsaeter et al. 2016).

II.C. Data on Firms Linked to Owners and Workers

We construct a novel data set on the universe of S-corporations and partnerships linked to owners and workers using deidentified data from income tax records spanning 2001–2014. Unlike the top incomes data, these data are available on the full population. We construct these linked firm-owner-worker data as follows.

We first merge the population of firm-level S-corporation business income tax returns (Form 1120S) to the population of S-corporation information returns (Form 1120S, Schedule K-1) that link the firms to their owners.[20] We merge the 1120S records onto the K-1 records by masked EIN to yield linked firm-owner data. We follow similar steps to construct the partnership linkage to owners. Specifically, we merge the population of firm-level partnership business income tax returns (Form 1065) to the population of partnership information returns (Form 1065, Schedule K-1). Unlike S-corporations, partnerships can be owned by business entities and by non-U.S. individuals. We focus on direct partnership-owner links in which the partner is a U.S. individual.

Then, for both S-corporations and partnerships, we further merge on information about the owners and workers. We use Form 1040 to merge on each owner's fiscal income. We use data from W-2 forms to measure owner wages—W-2 wage payments from S-corporations and partnerships to individual owners—and to calculate firm-level aggregates of the total number of employees. We merge owner wages onto our top incomes data as mentioned in the previous subsection.[21]

The full sample comprises 158.8M firm-owner-year observations (71.8M S-corporation-owner-year observations and 87.0M

20. These information returns list each owner's share of the corporation's income. S-corporations are required to submit to the IRS a K-1 on behalf of each owner of the S-corporation when the corporation submits its Form 1120S business income tax return. Each owner receives a copy of her K-1, which she uses to report S-corporation income on her Form 1040, Schedule E, and compute her tax liability. Each 1120S includes the firm's masked Employer Identification Number (EIN), and each K-1 includes the firm's masked EIN as well as the owner's masked Social Security Number (SSN).

21. Some firms deduct wages from their business tax returns but cannot be linked to any W-2s, for example because they use a different EIN to file taxes and pay workers. We therefore impute missing owner wages using the owner wages share of individual wages of similar firms' owners. This imputation is minor and used only for Figure VIII below. See Online Appendix B for details.

partnership-owner-year observations) on 11.1M firms with positive sales (7.3M S-corporations and 3.9M partnerships) and with 22.6M owners (9.8M S-corporation owners and 12.8M partnership owners). In 2014, the sample comprises 10.3M firm-owner-year observations (4.9M S-corporation-owner-year observations and 5.4M partnership-owner-year observations) on 5.0M firms with positive sales (3.7M S-corporations and 1.4M partnerships) and with 10.3M owners (4.9M S-corporation owners and 5.4M partnership owners).

No data source systematically links C-corporations to their owners. To compare pass-through activity to C-corporation activity, we supplement the linked data with the Statistics of Income (SOI) sample of corporate income tax returns from 1980 to 2014.[22] Together, these data provide a comprehensive account of the major forms of business activity in the United States. Online Appendix B provides further variable definitions.

III. Business Income and Top Income Inequality

This section shows that business income is the most important source of income at the top of the income distribution. Most top business income is pass-through income. We then describe who earns pass-through income and the salient features of their firms: most pass-through income accrues to working-age owners of mid-market firms in relatively skill-intensive industries. These descriptive facts are consistent with pass-through income reflecting the returns to human capital.

III.A. The Sources of Top Income

How much do top earners make from wage income, business income, and other capital income? Figure I, Panel A plots the share of top earners in each income bin who earn the majority of their income from each source. Figure I, Panel B plots the share of aggregate income from each source. Three patterns emerge. First, from the 90th to the 99th percentile of the income distribution, wage income dominates business and other capital income. At the 90th percentile of the income distribution, over four out of five people earn mostly wage income. Wage income represents over 75 cents of every dollar earned by those at the 90th percentile of

22. See Yagan (2015) and Zwick and Mahon (2017) for detail on these weighted, stratified random samples.

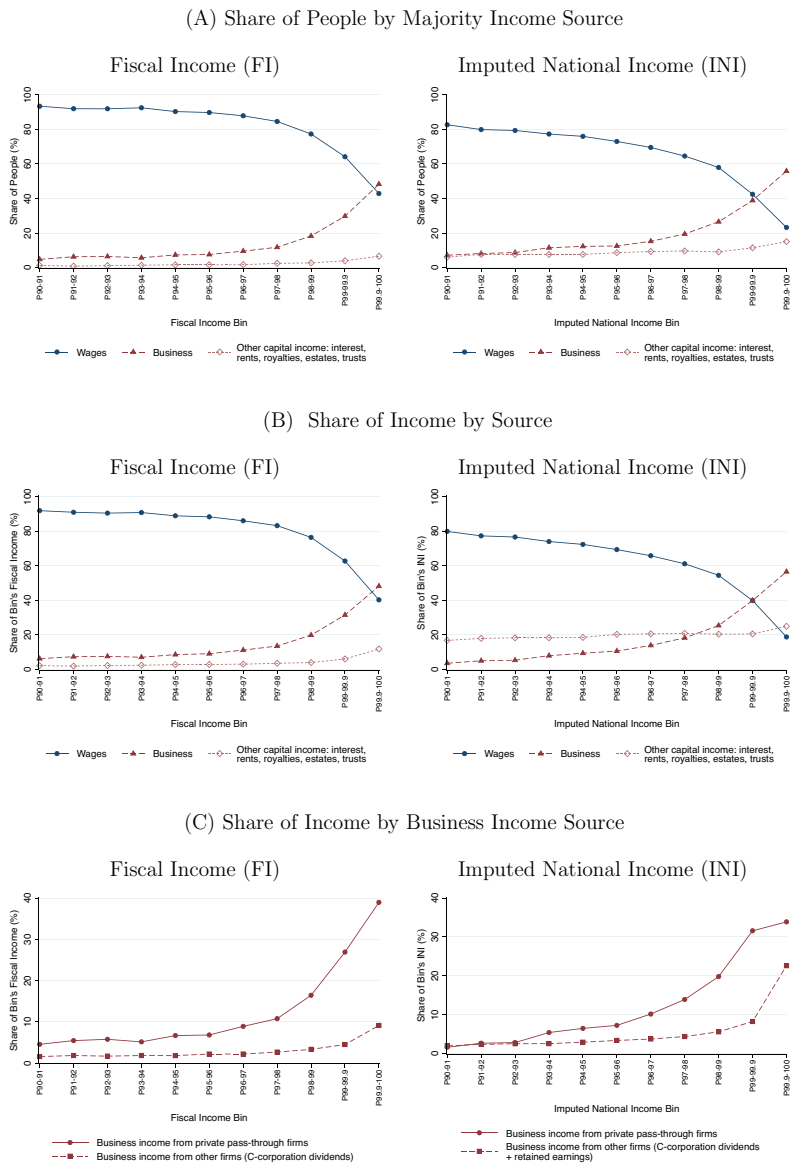

FIGURE I

Income Sources of Top Earners in 2014

FIGURE I (*Continued*). This figure uses our 2014 top-incomes data to show the relative importance of different income sources for top earners using fiscal income (i.e., directly observed tax data) and imputed national income. Panel A plots the share of tax units (fiscal income) or adult individuals (imputed national income) in each income bin who earned the majority of their income in 2014 from wages, business income, or other capital income. For fiscal income, wages includes wages-salaries-and-tips, pension distributions, and annuities, as in Piketty and Saez (2003); business income includes pass-through income (S-corporation income, partnership income, and sole proprietor's income) and C-corporation dividends; other capital income includes all other income sources (interest, rents, royalties, and estate and trust income). For imputed national income, we use analogous definitions from Piketty, Saez, and Zucman (2018), which includes imputed employer-provided health insurance (included in wages), imputed rents from owner-occupied housing (included in other capital income), and imputed C-corporation retained earnings (included in business income) among other components of national income that do not appear on tax returns. Panel B plots the share of total top income in the form of wages, business, and other capital income for each income bin. Panel C separates the business income series into contributions from pass-through business and C-corporation income.

the income distribution. Second, business income is much more prevalent higher up in the income distribution. At the very top of the income distribution, wage income falls to 40% of fiscal income (19% of INI) and business income accounts for 48% of fiscal income (56% of INI). Third, other capital income is less important and amounts to 12% to 25% of income at the very top. Fewer than one in six people in the 99.9th percentile derive most of their income from interest, rents, and other capital income. Thus, at both the person-level and dollar-level and regardless of income definition, the main source of income at the very top of the income distribution is business income.

Figure I, Panel C decomposes the business income series into contributions from pass-through businesses and C-corporation income. Both components' share of income rises with income rank, however pass-through income is more important than C-corporation income throughout the distribution. At the top, pass-through income alone represents nearly 40% of total income and rivals or exceeds the size of wage income.

The importance of business income from C-corporations differs between fiscal income, which only measures C-corporation dividends, and imputed national income, which includes both dividends and PSZ's imputation of retained earnings. In fiscal income, 9.1% of top income comes from C-corporation dividends, whereas in imputed national income, 22.6% comes from C-corporation dividends and retained earnings. We show that all key results below hold under both income measures.

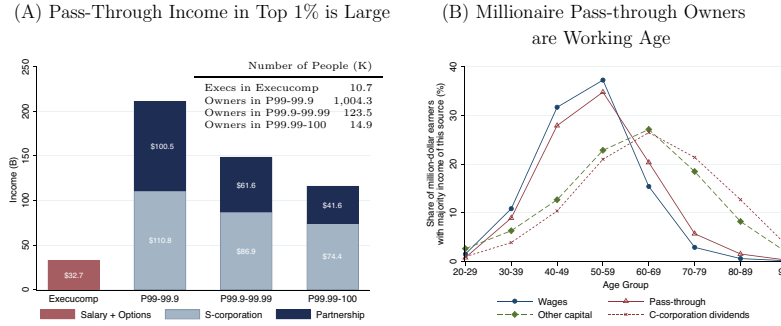

FIGURE II

Working-Age Pass-Through Owners Prevail at the Top of the Income Distribution

Panel A uses our 2014 top incomes data to plot the aggregate pass-through income within the top 1% by fiscal income bin and compares that quantity to aggregate salary plus options compensation for all executives in the Execucomp database in 2014. Panel B uses our 2014 top incomes data to plot the share of tax units with over $1 million in fiscal income who earn the majority of their fiscal income in 2014 from either wages, pass-through income, C-corporation dividends, or other capital income by age (i.e., the age of the single tax filer or the mean age of married spouses filing jointly).

Quantifying top retained earnings inherently presents considerable uncertainty as direct ownership data for C-corporations is unavailable and estimates are sensitive to imputation assumptions. Online Appendix F explores PSZ's method and alternative assumptions for allocating retained earnings. Regardless of the income measure, these facts indicate that understanding the nature of business income—and especially the pass-through sector—is imperative for understanding top incomes.

III.B. The Prevalence and Nature of Top Pass-through Ownership

Figure II, Panel A demonstrates that pass-through income is prevalent within the top 1% in 2014. For example, among the top 0.1%, 84% earn pass-through income. That is 139,000 taxpayers, with aggregate pass-through income of $264B.[23] For comparison, in Execucomp in 2014, the top 10,700 executives working at the S&P 1500 earned a combined $33B. The scale of top pass-through

23. Among the top 1%, 69% earn pass-through income. That is 1,140,000 taxpayers, with aggregate pass-through income of $476B. Among the top 0.01%, 90% earn pass-through income. That is 15,000 taxpayers, with aggregate pass-through income of $116B. Pass-through prevalence is even higher in imputed national income, not shown in Figure II.

income far surpasses that of top CEOs, who have been the focus of much inequality commentary.

Figure II, Panel B compares the age distributions of million-dollar earners who differ in the majority source of their income. Most top earners whose primary income source is wage income are between 40 and 59 and very few top workers are older than 70. This distribution contrasts with the much older distribution of top earners whose primary income source is other capital income. Fifty-six percent of the latter group are older than 60, and nearly 30% are older than 70. The age distribution of pass-through owners is much younger—28% are older than 60 and only 7% are older than 70—and is nearly identical to the distribution of top laborers. The population of pass-through owners does not include very many old people or children, whom one might associate with estates and inherited wealth. C-corporation dividends skew much older, distributed more similarly to the other capital earners. Overall, pass-through owners resemble workers, while C-corporation owners resemble other capital earners.[24] The age distributions are consistent with top pass-through earners being human-capital rich.

III.C. Firm Size and Ownership Varies by Organizational Form

Table I provides summary statistics from our linked firm-owner-worker data, restricted to firms with positive sales and nonzero profits. Panel A presents statistics on distinct firm-year observations, and Panel B presents statistics on distinct owner-year observations.

In the 2001–2014 pooled sample of all pass-throughs, the average firm earned $31K in profits on sales of $1.8M in 2014 dollars, employed 13 workers, and had 2.3 owners. Pass-throughs that have at least one top 0.1% owner are much larger and more profitable—these firms earned $1.6M in profits on $17.5M in sales with 74 employees—yet they typically remain closely held, with the median firm having 2 owners. The average number of owners is skewed by a few partnerships (e.g., a large law firm or consultancy) with many owners: when restricting focus to S-corporations, the average number of owners of top 0.1%-owned firms is 3.4.[25]

24. Online Appendix Figure I.2 shows similar results for the top 1% and top 0.1%.

25. Online Appendix Tables J.1 and J.2 show summary statistics separately for S-corporations and partnerships.

TABLE I

SUMMARY STATISTICS ON PASS-THROUGHS AND THEIR OWNERS (2001–2014)

	A. All Firms				B. Firms with Top 1–0.1% Owners				C. Firms with Top 0.1% Owners			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Panel A: Firm summary statistics												
Sales	1,809	13	229	2,487	3,660	20	946	8,309	17,496	19	1,772	34,668
Profits	31	−30	12	194	237	−40	83	717	1,602	−145	127	3,302
Profit margin	0.05	−0.29	0.05	0.48	0.12	−0.12	0.08	0.59	0.13	−0.16	0.09	0.71
Assets	1,347	0	51	1,119	1,997	4	291	3,852	17,696	20	1,223	21,314
Employees	12.9	0.0	1.0	23.6	27.7	0.0	3.7	60.7	74.3	0.0	1.6	141.3
Employees | Employees > 0	21.9	1.0	5.0	40.1	43.3	1.5	13.0	90.1	140.0	2.5	32.9	249.3
Number of owners	2.3	1.0	1.5	3.0	2.8	1.0	2.0	5.0	14.2	1.0	2.0	12.0
Number of owners, S-corp only	1.6	1.0	1.0	2.4	2.2	1.0	1.2	4.0	3.4	1.0	2.0	6.1
Number of owners, Pship only	4.4	1.0	2.0	4.0	4.0	1.0	2.0	7.1	27.8	1.0	3.0	21.2
Sales per worker	196.1	20.6	86.5	363.3	314.0	26.5	134.1	625.4	761.8	22.9	164.9	1,094.0
Profits per worker	16.1	−6.3	3.9	49.1	39.5	−3.5	9.8	113.2	122.0	−10.7	8.8	177.5
Profits per owner	−27.6	−19.3	8.0	127.3	131.8	−18.5	42.0	428.2	620.2	−48.7	41.2	1,623.0
Entrepreneurial income	144	−19	28	291	338	−23	162	943	.	−96	143	.
Entrep. income per owner	77.5	−11.9	18.7	192.3	190.0	−10.2	79.9	569.8	634.2	−31.2	45.7	1,813.0
Entrep. income per worker	33.8	−2.2	11.8	82.2	65.9	−0.7	21.5	187.3	155.6	−6.0	13.9	246.6
Entrep. income / profit	1.50	0.43	1	3.22	1.68	0.57	1	3.01	1.24	0.40	1	1.60
Entrep. income / sales	0.12	−0.31	0.11	0.64	0.18	−0.18	0.15	0.78	0.15	−0.36	0.10	0.87
Number of firm-years		58,933,472				7,379,599				2,464,603		

TABLE I
CONTINUED

	A. All Owners				B. Top 1–0.1% Owners				C. Top 0.1% Owners			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Panel B: Owner summary statistics												
Income	235	13	98	476	655	393	571	1,089	4,687	1,559	2,430	7,879
Age	51.1	34.3	50.7	69.6	52.4	38.9	51.9	67.4	54.5	40.6	53.9	70.4
Number of firms owned	1.3	1.0	1.0	2.0	1.5	1.0	1.0	2.8	2.2	1.0	1.0	4.5
Wage income	76	0	21	165	203	0	123	537	932	0	226	2,256
Pass-through income	51	−12	3	113	166	−6	51	530	1,074	−15	162	2,638
Entrepreneurial income	75	−8	8	181	231	−3	108	667	.	−11	258	.
Pthru income / entrep. income	0.81	0.19	1	1	0.85	0.35	1	1	0.91	0.70	1	1
Wage income / income	0.63	0	0.20	0.95	0.32	0	0.21	0.89	0.24	0	0.08	0.89
Entrep. income / income	2.07	−0.08	0.12	0.99	0.35	−0.01	0.19	0.97	0.32	0	0.09	0.96
Entrep. inc. / inc., S-corp owners only	0.73	−0.08	0.39	1.01	0.50	0	0.51	1	0.48	0	0.49	0.98
Entrep. inc. / inc., Pship owners only	3.85	−0.08	0.01	0.79	0.21	−0.01	0.01	0.90	0.18	−0.01	0	0.87

TABLE I
CONTINUED

	A. All Owners				B. Top 1–0.1% Owners				C. Top 0.1% Owners			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Business income / income	0.22	−0.13	0.10	0.92	0.37	0	0.35	0.91	0.47	0	0.57	0.94
Only earns passive income	0.11	0	0	1	0.11	0	0	0.87	0.07	0	0	0
Number of owner-years		108,575,625				11,793,249				2,329,024		

Notes. This table presents summary statistics for our linked firm-owner data, comprising pass-through firms linked to owners in 2001–2014. Dollar values are in thousands of 2014 dollars. The main sample comprises 109M firm-owner-year observations with positive sales and nonzero profits. Panel A pools distinct firm-year observations. Panel B pools distinct owner-year observations. All statistics are unweighted, unless otherwise specified. All variables are annual and are available in all years. Year refers to calendar year, which by law is also each pass-through's fiscal year. Sales is the firm's operating revenue (gross sales minus returns) as listed on the firm tax return. Passively earned income (e.g., interest on bank deposits) is excluded. Profits is the firm's ordinary business income, equal to operating revenue minus costs as listed on the firm tax return. Profit margin equals profits divided by sales. Employees and number of workers equals the number of individuals who received a W-2 from the firm that year. A quantity per worker equals the quantity divided by the number of workers. Entrepreneurial income equals pass-through income plus W-2 wages paid to pass-through owners. Income is short for fiscal income and is the main income concept used in Piketty and Saez (2003) and equals Form 1040 total income minus Form 1040 capital gains minus Form 1040 unemployment compensation minus Form 1040 taxable social security benefits. Age is age as of December 31, based on year of birth from Social Security records housed alongside tax records. An owner is a top 1–0.1% owner or a top 0.1% owner if her fiscal income lies in the top 1% but not the top 0.1%, or the top 0.1% of all tax units in the year, respectively. Wage income equals W-2 income. Pass-through income equals the owner's share of the profits from all pass-throughs she owns. Business income is total pass-through business income and equals total Form 1040, Schedule E income. An owner's pass-through income is active if the owner reports she materially participates in the operations of any of her pass-through businesses and is passive otherwise. For these summary statistics, two variables are winsorized in the underlying data at the unweighted 1st percentile and the unweighted 99th percentile of the annual distributions: Entrep. income/profit, and Business income/income. Two variables are winsorized below at −1 and above at 1: Profit margin, Entrep. income/sales, and Entrep. income/value added. Assets is set to missing for the very few observations in which assets are over one trillion.

Pass-through businesses are not only closely held but also undiversified: most top owners own just one firm. If pass-through owners were only contributing financial capital, one might expect them to hold portfolios with shares of many firms. However, the data suggest this strategy is uncommon. Moreover, nearly all owners report being active, that is, materially participating in the business. For example, the share of top 0.1% owners who report earning only passive income from their pass-throughs is 7%.[26]

Most top-owned pass-through businesses are mid-market in size. Figure III, Panel A explores the firm size distribution among top-owned pass-throughs and compares it to the distribution for all C-corporations. The profit distributions are markedly different across corporate forms. Eighty percent of the pass-through income for million-dollar earners derives from firms with between \$1M and \$500M in sales. Moreover, 72% of top-1% owned pass-through profits come from firms with less than \$50M in profits. In contrast, the distribution of C-corporations has substantially more concentration in the right tail. Ninety-six percent of C-corporation profits in 2014 come from firms with more than \$500M in sales. Only 19% of millionaire-owned pass-through profits come from firms in this size bin.

The characteristics of pass-throughs—closely held, undiversified in ownership, and mid-market in size—supports a narrative of top pass-through income that differs from those for C-corporation income. The C-corporation profit distribution is so skewed that diffuse ownership can nevertheless yield significant income to individual owners. In contrast, pass-through owners tend to earn high incomes via concentrated ownership of one mid-market firm. The pass-through narrative is consistent with active owner-management.

An alternative narrative of top incomes emphasizes how managers set their pay by bargaining with a corporate board that represents diffuse shareholders. This story also does not resonate for explaining pass-through income. Pass-throughs have concentrated ownership, which minimizes principal-agent failures—especially if the CEO is a majority owner. Agency explanations may account for more of the growth in CEO and top manager compensation for public companies, which have thousands of owners.

26. However, as we describe in Online Appendix B, there is a tax incentive to report oneself as being active rather than passive.

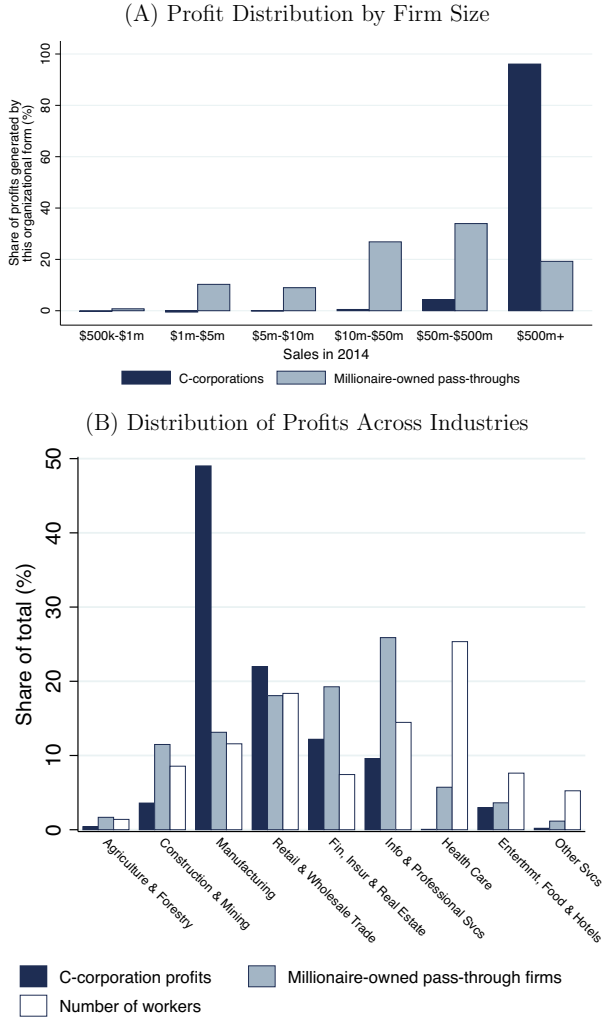

FIGURE III

Top-Owned Firms Are Mid-Market and Broad-Based across Industries

This figure uses our 2014 linked firm-owner data and our SOI C-corporation data to plot the distribution of profits by firm size and industry in 2014 by organizational form. Panel A plots the distribution of aggregate profits by firm sales for C-corporations, and separately for pass-throughs owned by tax units with at least $1 million in fiscal income. Panel B plots the distribution of profits generated by each organizational form across one-digit NAICS sectors. We split NAICS 5 into two subcategories: Finance, Insurance, and Real Estate (FIRE), which encompasses NAICS codes 52 and 53; and Information and Professional Services,

FIGURE III (*Continued*). which includes NAICS 51, 54, and 56. Since NAICS 55 (Management of Companies and Enterprises, i.e., holding companies) includes activity from several industries, we exclude it here. See Online Appendix Figure I.3 for versions with top 1% and top 0.1% pass-through owners.

III.D. The Industry Composition of Business Income

Figure III, Panel B compares the distributions of total profits across one-digit NAICS sectors for pass-through firms owned by million-dollar earners to the distributions of C-corporation profits and of all workers from the Current Population Survey.[27] Top pass-through profits are earned broadly across sectors and are similarly distributed as the overall distribution of workers, relative to C-corporations.[28] Compared to C-corporation profits, pass-through profits are underrepresented in manufacturing and overrepresented in information, professional services, and health care. Less than 20% of top pass-through profits are earned in finance.

Table II presents a more granular analysis of the industry composition of business income at the four-digit NAICS level. The left panel lists the top 30 industries in aggregate profits earned by million-dollar-owned pass-through firms, along with the aggregate flow of 2014 profits apportioned pro rata to owners. For each industry, we compare the top pass-through flow to the flow of C-corporation profits and the industry-level profits rank within the C-corporation sector. The right panel repeats this exercise for the top 30 industries in aggregate profits earned by C-corporations.

White-collar, skilled service industries dominate the pass-through sector, whereas more capital-intensive industries, especially manufacturing, dominate the C-corporation sector. The five largest industries for millionaire-owned pass-through profits are legal services ($28.6B), other financial investment activity ($28.2B), other professional and technical services ($8.2B),

27. We divide the service sector 5 into two subsectors: finance, insurance, and real estate (FIRE); and information and professional services. In this section, we exclude firms in the residual category NAICS 5511 (Management of Companies and Enterprises). The category refers to firms that often own related but formally distinct nonfinancial firms. Among public companies for example, General Electric classifies its industry as a holding company (based on public 10-K financial filings).

28. Online Appendix Figure I.5 compares the distribution of state population to the distributions across states of total profits of top-owned pass-throughs and all C-corporations. Pass-through profits are broadly distributed and comparable to the population distribution.

TABLE II

INDUSTRIAL COMPOSITION OF MILLION-DOLLAR-OWNED PASS-THROUGH AND ALL C-CORPORATION PROFITS (2014)

		Top passthru	C-corp				C-corp	Top passthru	
	Industry (NAICS)	Profit ($M)	Rank	Profit ($M)		Industry (NAICS)	Profit ($M)	Rank	Profit ($M)
1	Legal services (5411)	28,643	144	477	1	Petroleum/coal products mfg. (3241)	98,696	109	441
2	Other financial investment activity (5239)	28,207	13	17,712	2	Pharmaceutical/medicine mfg. (3254)	63,295	112	403
3	Other professional/technical services (5419)	8,196	248	−480	3	Nondepository credit intermediation (5222)	46,573	26	1,957
4	Offices of physicians (6211)	8,018	250	−727	4	Other telecommunications (5179)	35,288	254	2
5	Automobile dealers (4411)	6,712	64	3,121	5	Computer/peripheral equipment mfg. (3341)	33,250	106	448
6	Oil/gas extraction (2111)	6,290	12	18,375	6	Other general merchandise stores (4529)	27,027	139	283
7	Management/technncl consulting services (5416)	5,940	56	4,388	7	Druggists' goods merchant wholesalers (4242)	25,191	94	497
8	Activities related to real estate (5313)	5,209	110	1,012	8	Aerospace product/parts mfg. (3364)	22,997	136	290
9	Computer sys design/related services (5415)	4,771	253	−5,446	9	Semiconductor/electronic component mfg. (3344)	21,460	69	709
10	Other specialty trade contractor (2389)	4,730	123	769	10	Motor vehicle mfg. (3361)	20,521	179	152
11	Misc. durable goods merchant wholesalers (4239)	3,853	98	1,419	11	Soap, cleaning compound/ toiletry mfg. (3256)	20,326	163	189

TABLE II
CONTINUED

	Top passthru	C-corp			C-corp	Top passthru	
Industry (NAICS)	Profit ($M)	Rank	Profit ($M)	Industry (NAICS)	Profit ($M)	Rank	Profit ($M)
12 Other fabricated metal prod mfg. (3329)	3,754	37	7,636	12 Oil/gas extraction (2111)	18,375	6	6,290
13 Other miscellaneous mfg. (3399)	3,328	76	2,300	13 Other financial investment activity (5239)	17,712	2	28,207
14 Accounting/bookkeeping services (5412)	3,129	59	3,741	14 Grocery/related product wholesalers (4244)	15,945	35	1,519
15 Insurance agencies/brokerages (5242)	2,934	44	6,167	15 Software publishers (5112)	15,010	99	472
16 Architectural/engineering services (5413)	2,933	70	2,802	16 Ag., constr/mining machinery mfg. (3331)	14,814	105	452
17 Nonresidential building construction (2362)	2,899	140	555	17 Other information services (5191)	14,684	70	707
18 Building equipment contractors (2382)	2,891	97	1,442	18 Activities related to credit intermediation (5223)	14,503	142	266
19 Residential building construction (2361)	2,742	55	4,489	19 Restaurants (7225)	14,137	20	2,690
20 Restaurants (7225)	2,690	19	14,137	20 Basic chemical mfg. (3251)	14,136	86	550
21 Other heavy construction (2379)	2,669	240	−109	21 Health/personal care stores (4461)	13,448	33	1,594
22 Misc. nondurable goods merchant wholesalers (4249)	2,440	54	4,494	22 Traveler accommodation (7211)	12,761	45	1,229

TABLE II
CONTINUED

	Top passthru	C-corp			C-corp	Top passthru	
Industry (NAICS)	Profit ($M)	Rank	Profit ($M)	Industry (NAICS)	Profit ($M)	Rank	Profit ($M)
23 Security contracts broker (5231)	2,268	30	10,530	23 Building material/supplies dealers (4441)	12,758	61	902
24 Plastics product mfg. (3261)	2,140	119	799	24 Converted paper product mfg. (3222)	11,287	90	523
25 Machinery/supply merchant wholesalers (4238)	1,958	33	9,022	25 Beverage mfg. (3121)	11,274	63	871
26 Nondepository credit intermediation (5222)	1,957	3	46,573	26 Motion picture/video industries (5121)	11,253	92	507
27 Indie artists, writers, performers (7115)	1,915	229	−25	27 Grocery stores (4451)	11,005	53	1,035
28 Other investment pools/funds (5259)	1,854	72	2,509	28 Depository credit intermediation (5221)	10,948	55	976
29 Support activity for mining (2131)	1,820	41	6,480	29 Radio/television broadcasting (5151)	10,920	148	253
30 Advertising, PR/related services (5418)	1,792	90	1,748	30 Security contracts broker (5231)	10,530	23	2,268

Notes. This table presents statistics on the level of million-dollar-owned pass-through profits and total C-corporation profits in 2014 by four-digit industry. The rows are sorted by the level of top pass-through profits on the left and C-corporation profits on the right. These statistics apportion pass-through profits pro rata to owners and then aggregate those apportioned profits by four-digit industry. Rank columns indicate the rank of that four-digit industry within a particular group of firms. Profits columns indicate the level of profits in millions of 2014 dollars.

offices of physicians ($8.0B), and auto dealers ($6.7B). The five largest industries for C-corporation profits are petroleum and coal product manufacturing ($98.7B), pharmaceutical manufacturing ($63.3B), nondepository credit intermediation ($46.6B), other telecommunications ($35.3B), and computer and peripheral equipment manufacturing ($33.3B).[29]

The C-corporation sector includes many well-known listed companies, which are broadly held within the household sector and by pensions, nonprofits, and foreign investors. In some industries, such as restaurants, retailers, and wholesalers, firms operate in both pass-through and C-corporation form (e.g., Menards versus Home Depot; Yagan 2015). Remarkably, certain industries that are prevalent and large for pass-through profits, such as law firms, doctors, and consultants, have negative or nearly zero aggregate profits in the C-corporation sector.

Table III presents a disaggregated analysis of pass-through profits for the top industries in the S-corporation and partnership sectors. We define top industries by the 2014 level of profits flowing to either top 1–0.1% or top 0.1% owners. This focus on the industries of top-owned firms complements Bakija, Cole, and Heim (2012), who study the occupations of top earners using personal income tax returns and find a large role for professional services, finance, and closely held businesses.

Top pass-through profits comprise human-capital-intensive service professions and to a lesser extent nonmanufacturing industries that depend on financial and physical capital, such as real estate and oil and gas. Typical firms owned by the top 1–0.1% are single-establishment firms in professional services (e.g., consultants, lawyers, specialty tradespeople) or health services (e.g., physicians, dentists). For example, in the top 1–0.1%, the largest S-corporation industry is offices of physicians ($9.1B) and the largest partnership industry is legal services ($21.3B). A typical firm owned by the top 0.1% might be a regional business with $20M in sales and 100 employees, such as an auto dealer, beverage distributor, or a large law firm. There is significant

29. In recent years, the aggregate composition of business income is roughly evenly split between the pass-through and C-corporation sectors (Cooper et al. 2016). Adjusting the C-corporation profit figures for the share of C-corporation wealth owned by the household sector (equal to $11T/$23.4T = 47%) and the top 1% share of C-corporation dividends (49% in 2014), top 1% pass-through profits are roughly double the size of top 1% C-corporation profits.

TABLE III

INDUSTRIAL COMPOSITION OF PASS-THROUGH PROFITS (TOP 1–0.1% VERSUS TOP 0.1%, 2014)

	S-corporation industry (NAICS)	Top 1–0.1% profit ($M)		S-corporation industry (NAICS)	Top 0.1% profit ($M)
1	Offices of physicians (6211)	9,063	1	Other financial investment activity (5239)	5,786
2	Other professional/technical services (5419)	4,778	2	Automobile dealers (4411)	5,176
3	Offices of dentists (6212)	4,317	3	Oil/gas extraction (2111)	4,820
4	Other specialty trade contractors (2389)	3,893	4	Other professional/technical services (5419)	4,186
5	Legal services (5411)	3,485	5	Offices of physicians (6211)	3,621
6	Insurance agencies/brokerages (5242)	2,678	6	Computer sys design/related services (5415)	3,206
7	Computer sys design/related services (5415)	2,662	7	Management/technncl consulting svc (5416)	3,185
8	Architectural/engineering services (5413)	2,642	8	Other specialty trade contractors (2389)	3,086
9	Building equipment contractors (2382)	2,595	9	Legal services (5411)	2,847
10	Restaurants (7225)	2,421	10	Misc. durable goods merch whlsl (4239)	2,836
11	Management/technncl consulting svc (5416)	2,196	11	Other fabricated metal prod mfg. (3329)	2,727
12	Nonresidential building constr (2362)	1,906	12	Other miscellaneous mfg. (3399)	2,477
13	Offices of other health practitioners (6213)	1,886	13	Activities related to real estate (5313)	2,286
14	Misc. durable goods merch whlsl (4239)	1,684	14	Other heavy construction (2379)	2,248
15	Other fabricated metal prod mfg. (3329)	1,670	15	Nonresidential building construction (2362)	1,940

TABLE III
CONTINUED

	Partnership industry (NAICS)	Top 1–0.1% profit ($M)		Partnership industry (NAICS)	Top 0.1% profit ($M)
1	Legal services (5411)	21,320	1	Other financial investment activity (5239)	20,220
2	Offices of physicians (6211)	5,923	2	Legal services (5411)	18,200
3	Accounting/bookkeeping services (5412)	5,316	3	Activities related to real estate (5313)	2,534
4	Other financial investment activity (5239)	3,395	4	Other professional/technical services (5419)	2,254
5	Other professional/technical services (5419)	1,641	5	Oil/gas extraction (2111)	2,035
6	Outpatient care centers (6214)	1,449	6	Management/technncl consulting svc (5416)	1,637
7	Activities related to real estate (5313)	1,357	7	Security contracts broker (5231)	1,485
8	Management/technncl consulting svc (5416)	1,263	8	Other investment pools/funds (5259)	1,372
9	Oil/gas extraction (2111)	1,139	9	Accounting/bookkeeping services (5412)	1,166
10	Restaurants (7225)	694	10	Offices of physicians (6211)	1,026
11	Offices of other health practitioners (6213)	670	11	Automobile dealers (4411)	693
12	Offices of dentists (6212)	574	12	Residential building construction (2361)	689
13	Insurance agencies/brokerages (5242)	573	13	Lessors of real estate (5311)	685
14	Computer sys design/related services (5415)	563	14	Computer sys design/related svc (5415)	585
15	Architectural/engineering services (5413)	550	15	Fruit/tree nut farming (1113)	482

Notes. This table presents statistics on the level of S-corporation and partnership profits for top earners in 2014 by four-digit industry. We present statistics for two groups of firms: firms owned by the top 1–0.1% and firms owned by the top 0.1%. The rows are sorted by the level of firm profits for firms owned by the top 0.1% and top 1–0.1%, respectively. These statistics apportion profits pro rata to owners in either the top 0.1% or the top 1–0.1% and then aggregate those apportioned profits by four-digit industry. Profits columns indicate the level of profits in millions of 2014 dollars.

overlap between top S-corporations and top partnerships. However, partnership profits are more concentrated and skew more toward certain high-skilled services, especially legal services and other financial investment activity, which includes private equity, venture capital, and hedge funds.[30] Overall, most top pass-through businesses do not operate in finance and instead actively produce goods or services across diverse industries.[31]

III.E. Pass-through Profitability Is Higher for Top Owners

This section explores how profitability of pass-through firms varies with an owner's position in the income distribution. While other explanations of heterogeneous returns exist, showing that top owners generate excess profitability provides evidence that is consistent with profits reflecting in part the returns to human rather than physical and financial capital. A scale-limiting factor, like the time or personal relationships of a skilled owner-manager, may lead higher demand to manifest itself through higher prices (profits per worker), rather than higher quantities (more workers).

To test whether top-owned firms generate especially high profitability, we begin by binning year-2014 owners in the linked firm-owner-worker data by their fiscal income. We confine attention to the top fiscal income decile, where the vast majority of pass-through income accrues. The bins are 1 percentile wide, except in the top 1%, where we consider bins between the 99th percentile and 99.5th percentile, the 99.5th percentile and 99.9th percentile, and the top 0.1%.

We then compute mean profitability—measured as profits per worker—across firms owned by individuals within each personal income bin, with and without controls, as follows. When not using controls, we compute the mean profitability across owner-firm

30. These tables only include ordinary business income, not dividends, interest, or capital gains, which we separately account for in the top incomes data. Online Appendix Table J.3 presents statistics on the number of firms and owners for both S-corporations and partnerships in each industry in Table III.

31. Online Appendix Table J.4 formalizes this observation by presenting a set of correlations at the NAICS four-digit level, which relate aggregate profits by corporate form to industry-level measures of human capital and nonhuman capital (e.g., physical capital) intensity. Top pass-through profits are most strongly correlated with measures of human capital intensity, whereas C-corporation profits are less correlated with human capital and most correlated with physical capital intensity at the industry level.

observations within each bin weighting by firm scale (the number of workers). Our main specification controls for industry (four-digit NAICS), removing profitability variation across owner income bins that is correlated with industry fixed effects (see the figure note).

Figure IV, Panel A plots the results. Firms owned by top 0.1% earners enjoy profitability ($14K per worker) that is over twice as large as the profitability ($5K per worker) of firms owned by individuals in the bottom half of the top decile. The graph displays similar patterns without controls and when also controlling for firm size.

Figure IV, Panel B demonstrates that high firm profitability is a persistent and systematic characteristic of high earners. It replicates Panel A in the subsample of pass-through startups, plotting the profitability-income gradient using owner income ranks from the year before the owner founded the startup. A firm qualifies as a startup in year t if it filed an income tax return in year t and did not file an income tax return of any kind before year t. We find all such owner-startup observations in years 2001–2010 and define the owner's income rank using her fiscal income in the year before she founded the startup. Then for each startup year, we produce a profitability-income gradient net of industry fixed effects, using profitability from the startup's fifth year of existence and conditioning on startups that survive for at least five years. We then average those gradients evenly across years and plot the mean gradient in circles in Figure IV, Panel B.

Startups founded by top earners go on to be much more profitable in their fifth year than those started by other lower earners.[32] The panel also shows that we find similar results when including all startups regardless of how long they survive, computing each startup's profitability as total profits in the startup's first five years divided by total annual workers in the startup's first five years. Hence, superior firm profitability is a persistent and systematic characteristic of high earners.[33]

32. Note that these firms have existed for only five years, so the magnitude of performance advantages may differ relative to the full sample of top-owned firms for firm life-cycle reasons.

33. Online Appendix H.1 addresses the question of whether high profitability at top-owned firms reflects payment for higher undiversifiable risk. Based on ex post survival probabilities and Sharpe ratio–like risk adjustments, higher risk does not explain higher profitability among top-owned firms.

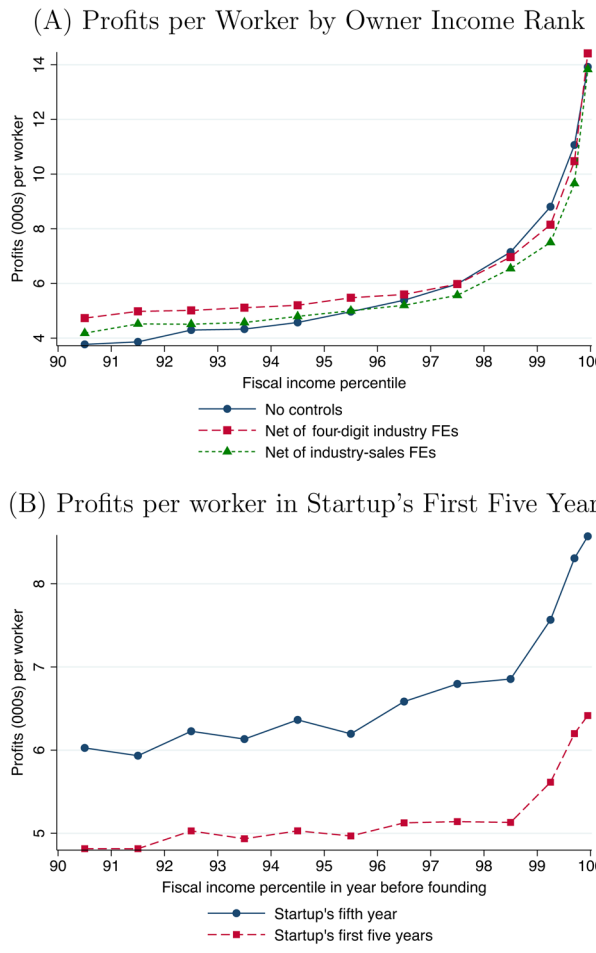

FIGURE IV

Profitability Rises with Owner Income Rank

Panel A plots firm profitability (profits per worker) by owner fiscal income across owner-firm observations in the 2014 linked firm-owner data. The bins are 1 percentile point wide in fiscal income, except in the top 1% where we consider bins of ranks between the 99th percentile and 99.5th percentile, the 99.5th percentile and 99.9th percentile, and the top 0.1%. Means are weighted by scale (the firm's number of workers). Industry fixed effects denote four-digit NAICS indicators. Sales fixed effects denote ventile indicators (i.e., 5-percentile point bins in the firm sales distribution). Panel B plots the equivalent of Panel A's within-industry series using the population of pass-through startups 2001–2010. It ranks owners by their fiscal income in the year before founding a new pass-through. It plots in blue circles (color version available online) profits per worker in the firm's fifth year of existence, conditional on the firm surviving five years. It plots in red squares

FIGURE IV (*Continued*). the startup's sum of its first five years of annual profits divided by the startup's sum of its first five years of annual number of workers, imputing zeros for profits and workers in years after a startup exits. We focus on firms with positive workers. We winsorize profitability at the 1st and 99th percentiles across the year's top-decile owner-firm observations. We apportion profits and workers to owners according to ownership shares. To take out fixed effects, we compute profitability at the owner-firm level for all owners in the top personal income decile, regress profitability on industry fixed effects weighted by the number of workers, compute residuals, add a constant to the residuals such that the sum of the product of the residuals and the number of workers equals total profits, and then compute the employment-weighted mean of each bin's residuals. The addition of the constant ensures that the overall employment-weighted mean profitability is constant across specifications.

III.F. Summary of Descriptive Evidence

Together, this section's descriptive statistics show that a large share of top earners are owners of mid-market firms in skill-intensive industries in the pass-through sector. Pass-through participation is pervasive among top earners who are working age and own undiversified positions in closely held firms. Statistics by industry show that many pass-through firms operate in industries that rely more on human capital than on financial capital. That pass-through activity is in many sectors and in firms that are not especially large is at odds with passive capital stories implying that most profitable activity may be concentrated among a few firms.

IV. THE HUMAN CAPITAL SHARE OF PASS-THROUGH INCOME

This section presents three event studies: two to quantify the extent to which pass-through income reflects the return to owners' human capital, and a third to test a candidate mechanism. We use the term "human capital" to refer to all factors embodied in the owner, as opposed to nonhuman factors, such as physical capital, intangible transferable assets (such as patents or brands), or market position. The return to human capital includes the return to labor supply, the owner's network, her retention and recruiting skill, her reputation, and her ability to extract rents. This distinction between labor income—the flow return to human capital—and capital income—the flow return to nonhuman capital—accords with the definitions in PSZ and elsewhere in the literature. Empirically, the flow return to an owner's human capital

includes wages, which are directly observable, and the share of profits deriving from human capital, which must be estimated.

IV.A. The Profit Impact of Owner Deaths

To estimate human capital's share of pass-through profits, an experimental ideal would be to measure the profit impact of exogenously forcing pass-through owners to withdraw their human capital from their firms. We approximate this ideal with a natural experiment in which we measure the profit impact of premature owner deaths. We find that the average premature death of a million-dollar-earning owner causes an 82% decline in firm profits.

1. Analysis Sample and Variable Definitions. We construct an owner deaths analysis sample—comprising firms with owner deaths matched to firms without owner deaths—as follows. We obtain owner year of death from Social Security Administration files housed alongside tax records. We refer to a firm-owner-year observation in the linked-firm-owner data as experiencing a year-t owner death when (i) the owner was aged 64 or younger at the end of year t, owned at least 20% of the firm in $t-1$, and had over \$1 million in $t-1$ fiscal income; (ii) the owner died in year $t \in [2005, 2010]$; (iii) the firm had no other owners 2001–2014 who died; and (iv) the firm had \$100,000 in sales in $t-1$, the firm had positive sales in all years $[t-4, t-1]$, and the firm had positive employment in some year $[t-4, t-1]$.[34]

We then match each such owner-death firm-owner-t observation to all "counterfactual" firm-owner-t observations that satisfy the following criteria: (i) the firm never had an owner die in the year of or immediately after being an owner; (ii) the firm had at least \$100,000 in sales in $t-1$, the firm had positive sales in all years $[t-4, t-1]$, and the firm had positive employment in some year $[t-4, t-1]$; and (iii) the observation matches the owner-death observation along five dimensions. Those five dimensions are: (i) the owners were in the same five-year age bin in year t, (ii) the owners were in the same fiscal income bin (99th to 99.5th percentile, 99.5th to 99.9th percentile, or top 0.1%) in $t-1$, (iii) the firm had the same three-digit NAICS industry code, (iv) the firm

34. Most dying owners have a firm-owner observation in the year of death. We also include owner deaths that occur one year after the last year the owner appears in our data.

had the same sales decile (defined after applying all other sample restrictions) in $t - 1$; and (v) the firm had the same organizational form (i.e., S-corporation versus partnership).

The sample restrictions and matching procedure serve the following purposes. Restricting to ages below 65 ensures that we examine owner deaths representative of typical owners (who are working-age) rather than typical dying owners (who skew older). Restricting attention to deaths in 2005–2010 allows us to construct a balanced panel of firm observations between four years before and four years after the death using our 2001–2014 data. Restricting to firms with substantial preperiod sales and positive employment focuses our analysis on economically active firms. Restricting to owners who own at least 20% of the firm helps exclude firms with many owners that typically replace departing owner-managers with new owner-managers, such as large law firms. Such replacement would bias toward 0 our estimates of the dying owner's human-capital contribution to firm profits, as her human capital supply is simply replaced by a new owner's.[35] Matching on the various dimensions assists in identifying counterfactual firms that would plausibly exhibit common trends to owner-death firms in the absence of the owner's death. The matching procedure is similar to other death-based event studies (Jäger 2016; Jaravel, Petkova, and Bell 2018) except that it uses all matched counterfactual observations rather than selecting one at random.

After conducting the matches, we construct a balanced panel of firm outcomes for each owner-death firm j and each counterfactual firm j' for every year between four years before and four years after the death. If a firm exits (i.e., no longer files a Form 1120S or Form 1065 income tax return), it is coded as having 0 profits and 0 sales in exited years, except for the reorganization correction defined below. Our owner deaths analysis sample comprises 581,508 matched pair-year observations: nine years of observations on each of 765 firms with a dying million-dollar-earning owner and 64,612 counterfactual firms. We also report results in a broader sample of top 1% owner deaths (2,609,973 observations with 2,436 owner-death firms) and a narrower sample of top 0.1% owner deaths (194,787 observations with 435 owner-death firms).

35. This restriction excludes few firms, and the main coefficient estimate is slightly larger in absolute magnitude when including them. Firms with a very large number of owners are excluded by the restriction that only one owner died 2001–2014.

Online Appendix Table J.5 provides a waterfall showing how sample restrictions yield our analysis sample size.

Our main outcome is profits per preperiod worker. This quantity in a year s equals firm profits in s divided by the firm's mean annual workers across years $[t-4, t-1]$ where t denotes the owner death year. Scaling profits by the average annual number of preperiod workers permits comparison across firms of different predeath size. Because the denominator is defined using only predeath observations, postdeath changes in the number of workers do not directly affect the outcome. For example, a firm with constant profits that happens to replace employees with equally compensated independent contractors would exhibit zero change in profits per preperiod worker. We also analyze firm survival, equal in a year s to an indicator for whether the firm has positive sales in s.

Forty-one percent of the owner-death firms and 17% of counterfactual firms exit the sample between t and $t+4$. Some of these exits do not represent firm shutdowns and instead represent firm reorganizations under a different employer identification number either through bankruptcy or sale. We do not directly observe firm reorganizations. However, we can infer reorganizations by whether most of the exiting firm's workers subsequently appear as coworkers at another firm. Specifically, for every firm that had 0 sales in year $t+4$ and denoting its first year of zero sales (i.e., its first fully exited year) by r, we identify the largest single employer other than the exiting firm across years r and $r+1$ of the firm's $r-1$ workers excluding the dying owner.[36] We find that 22% of exiting owner-death firms and 28% of exiting counterfactual firms with at least two $r-1$ workers were reorganizations: the largest single employer following the owner death employed over half of the exiting firm's $r-1$ workers. We account for these reorganizations by simply replacing the firm's profit in years $[r, t+4]$ with the firm's profit in year $r-1$.[37]

36. We measure employer as the EIN listed on the W-2. Because we use W-2 EIN to identify both the owner-death firm's $r-1$ workers and the firms subsequently employing those workers, employer is consistently measured before and after the owner death. We search for the largest single employer across all of a worker's r and $r+1$ employers, not just the highest-paying one.

37. This correction is analogous to how Chetty and Saez (2005) correct for firms that delist from stock exchanges, thereby exiting their analysis sample. Moreover, we neither observe nor infer division spinoffs, which would reduce measured profits at the surviving owner-death firm despite no real reduction in economic activity.

2. Estimates. We use our owner deaths analysis sample of matched owner-death and counterfactual firms to estimate difference-in-differences impacts of owner deaths, as follows. Let j denote an owner-death firm and j' denote one of its matched counterfactual firms. For each matched pair-year observation, we compute the difference in the outcome of interest between the owner-death firm and the counterfactual firm in the given year, that is, $\Delta Y_{jj's} \equiv Y_{js} - Y_{j's}$. We then regress that difference on event-time indicators in an event study specification:

$$\Delta Y_{jj's} = \sum_{k \in \{-4,-3,-2,0,1,2,3,4\}} \beta_k D^k_{js} + \varepsilon_{js}, \tag{1}$$

where D^k_{js} is an indicator for owner-death firm j having experienced an owner death k years in the past. The coefficients of interest β_k provide the time path of mean owner-death firm outcomes relative to the year before the owner death, which is normalized to 0. Note that because there are no controls, the coefficients β_k are raw differences-in-differences of the outcome means between owner-death firms and counterfactual firms between year $t-1$ and other years. We ensure that each owner-death firm carries equal weight in the regression by weighting each $jj's$ observation by one over the number of counterfactual (j') firms matched to the owner-death firm (j). We cluster standard errors by owner-death firm j.

Figure V, Panel A plots our main owner-death result: point estimates and 95% confidence intervals from equation (1) for the outcome of profits per preperiod worker. The flat preperiod trend corroborates the common trends assumption underlying our difference-in-differences analysis—that in the absence of the owner death, profits per preperiod worker among owner-death firms and among counterfactual firms would have trended similarly. The graph shows that profits per preperiod worker decline immediately and persistently at owner-death firms relative to counterfactual firms on owner death.[38] The immediate decline in

However, we believe that spinoffs are likely rare for the medium-sized firms we study. To explain the very large effects we find below, very large shares of most owner-death firms would have to have been spun off. Online Appendix H.2 tests robustness of punchline calculations to potential bias.

38. Although the graph shows a flat time series of dollar estimates, percentage estimates scaled by the outcome of mean of counterfactual firms exhibit a slight downward trend as profits at counterfactual firms secularly decline over time.

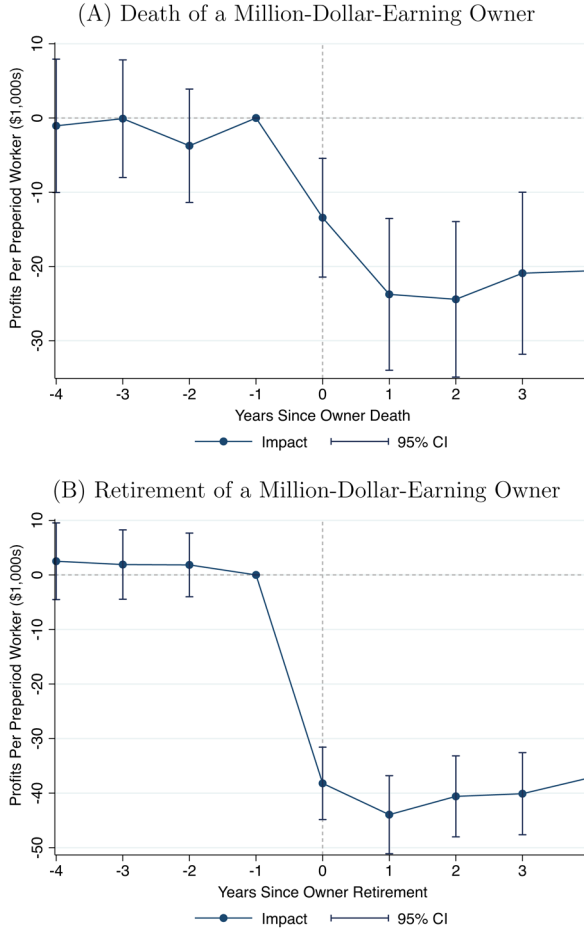

FIGURE V

Profit Effects of Owner Deaths and Retirements

For Panel A, we identify all 765 "owner-death" firms in our linked-firm-owner-worker data that (i) have an owner in a year $t \in [2005, 2010]$ who was under age 65, died in year t, and had over \$1 million in $t-1$ fiscal income; (ii) had no other owner deaths 2001–2014, at least \$100,000 in sales in 2014 dollars in $t-1$, positive sales in all years $[t-4, t-1]$, and the firm had positive employment in some year $[t-4, t-1]$; and (iii) has at least one "counterfactual" firm of the same organizational form that met the same $[t-4, t-1]$ firm requirements, match the owner-death firm on three-digit industry and $t-1$ sales decile, and have a year-t owner who matches the dying owner on $t-1$ income fractile and five-year age bin. For Panel B, we identify all 5,312 "owner-retirement" firms that satisfy requirements similar to those for owner-death firms except that instead

FIGURE V (*Continued*). of death, we measure retirement as the firm having at least one owner receiving W-2 wages in consecutive years $[t-4, t-1]$ and no one receiving wages $[t, t+1]$. Counterfactual firms had at least one owner receiving W-2 wages $[t-4, t+1]$. Each panel presents simple difference-in-differences estimates of the event (death or retirement) impact on annual firm profits ($K) per mean annual preperiod worker. Displayed 95% confidence intervals are based on standard errors clustered at the firm level. See Online Appendix Figures I.6 for analogous graphs for top 1% and top 0.1% owners.

profits can derive from a number of mechanisms. The firm could contract (e.g., by closing one of many store fronts) in response to worse managerial inputs. Owner charisma or connections may have kept key employees at the firm until her death. Or a firm could replace its dead owner-manager (compensated in profits) with a hired nonowner manager (compensated in wages), yielding a decline in measured profits. In each case, the withdrawal of the owner's human capital caused profits to decline.

The graph's rightmost data point, also reported in Table IV, Panel A, column (1), is our main estimate: the average death of a top-earning owner caused a $20,591 decline in profits per preperiod worker four years after the owner death. This estimated impact has a t-statistic of 3.5. The bottom rows of the column transform the estimated dollar impact into a percentage impact as follows. The mean profits per preperiod worker at counterfactual firms in $t+4$ was $38,401. The average dying owner had an ownership share of 65.7% and thus, on average, may have withdrawn only 65.7% of the firms' owners' human capital contributions. Dividing −$20,591 by $38,401 and by 65.7% yields an estimated impact of an effective 100% owner death of −81.6%, our preferred percentage impact.

Columns (2) and (3) separate column (1)'s main effect into extensive and intensive margins. Column (2) finds that the mean death of a top-earning owner caused her firm to be 19.8 percentage points less likely to have survived four years after the owner death, relative to counterfactual firms. This extensive-margin effect size has a t-statistic of 11.6. Column (3) restricts the sample to firms that survive through $t+4$, finding an intensive margin effect of −$13,252 that is marginally significant with a t-statistic of 1.9.[39] Comparison of bottom-row values of columns (1)–(3)

39. The analogous t-statistic among top 1% owner deaths is 4.6, as the sample is substantially larger (Online Appendix Table J.7). While conditioning on survival entails conditioning on an endogenous outcome, we nevertheless report it for interpretation in combination with columns (1)–(2).

TABLE IV

IMPACT OF OWNER DEATHS AND RETIREMENTS ON FIRM PROFITS

	Million-dollar-earning owners							Top-1% owners	Top-0.1% owners
	Profits per preperiod worker ($/worker)	Firm survival (pp)	Profits per preperiod worker ($/worker)					Profits per preperiod worker ($/worker)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Owner deaths									
Impact	−20,591	−0.198	−13,252	−13,843	−25,960	5,205	−23,900	−12,920	−29,543
	(5,886)	(0.017)	(7,074)	(6,763)	(9,096)	(4,450)	(6,896)	(1,831)	(10,582)
Surviving firms only			X						
Minority owner				X					
Majority owner					X				
Death before 65	X	X	X	X	X		X	X	X
Death after 75						X			
S-corporations only							X		
Observations	581,508	581,508	236,241	208,107	373,401	57,060	519,804	2,609,973	194,787
Owner deaths	765	765	390	339	426	725	658	2,436	435
R^2	0.003	0.072	0.001	0.001	0.006	0.000	0.004	0.004	0.005
Mean of counterfactual firms	38,401	0.881	41,813	36,919	39,580	18,494	38,886	27,258	48,221
Dying owners ownership %	65.7%	65.7%	57.7%	39.4%	86.7%	59.6%	68.5%	65.0%	66.4%
Preferred percentage impact	−81.6%	−34.2%	−55.0%	−95.2%	−75.6%	47.2%	−89.7%	−72.9%	−92.3%

TABLE IV
CONTINUED

	Million-dollar-earning owners							Top-1% owners	Top-0.1% owners
	Profits per preperiod worker ($/worker) (1)	Firm survival (pp) (2)	Profits per preperiod worker ($/worker) (3)	(4)	(5)	(6)	(7)	Profits per preperiod worker ($/worker) (8)	(9)
Panel B: Owner retirements									
Impact	−37,210	−0.263	−23,192	−29,483	−40,109		−39,774	−17,150	−45,861
	(4,000)	(0.007)	(5,003)	(7,296)	(4,771)		(4,051)	(1,027)	(7,286)
Surviving firms only			X						
Minority owner				X					
Majority owner					X				
S-corporations only							X		
Observations	442,566	442,566	214,722	116,064	326,502		422,370	1,432,179	255,897
Owner retirements	5,312	5,312	2,969	1,449	3,863		4,974	16,548	3,176
R^2	0.004	0.107	0.002	0.003	0.005		0.005	0.005	0.003
Mean of counterfactual firms	59,996	0.924	67,044	52,344	62,866		60,464	37,780	84,573
Retiring owners ownership %	75.2%	75.2%	75.8%	40.1%	88.3%		76.6%	76.2%	75.6%
Preferred percentage impact	−82.5%	−37.9%	−45.6%	−140.4%	−72.2%		−85.9%	−59.6%	−71.7%

Notes. This table estimates the impact of an owner "exit," embodied in an owner death or retirement, on firm performance four years after the event. Panel A uses the owner deaths sample to analyze the impact of owner deaths on firm performance four years after owner death relative to one year before owner death, relative to the matched counterfactual firms. Columns (1)–(2) report the right-most coefficients plotted in Figure V, Panels A and B. See the notes to that figure for details. Column (3) repeats column (2) on the subset of matched pairs of owner-death firms and counterfactual firms that survived four years after the owner death. Column (4) repeats column (2) on the subset of matched pairs where the dying owner had 50% or less ownership in the owner-death firm; column (5) repeats column (2) on all other pairs. Column (6) repeats column (2) in an identically constructed sample of matched owner-death firms that is based on owners who died at age 75 or greater. Column (7) repeats column (1) in an identically constructed sample of matched owner-death S-corporations. The outcome mean of counterfactual firms is the weighted mean four years after owner death (see the text for the weight). The ownership share of dying owners is measured in the year before owner death. Panel B repeats Panel A for the subset of owner-retirement and counterfactual firms. See Sections III.A and III.B for more details.

suggests that most of the column (1) impact is along the intensive margin.

Columns (4)–(7) report heterogeneity and placebo results that corroborate the interpretation of owner death impacts as reflecting the withdrawal of the owner's human capital services. One might expect majority owners to be more likely to actively manage their firms than minority owners, implying that a majority owner death causes a larger decline in firm profits than a minority owner death. Columns (4) and (5) test this prediction by repeating column (1) on the subset of owner-death firms with dying minority owners (those with less than or exactly 50% ownership) and firms with dying majority owners (all others), respectively. Both columns reveal large and statistically significant profit impacts, but the dying-majority-owner impact is nearly twice as large as the dying-minority-owner impact. This pattern is consistent with profit impacts of owner deaths stemming from the withdrawal of human capital services.

Recall that our owner deaths analysis sample restricts to owners below age 65. Nonelderly owners are more likely to be active managers than elderly owners. We therefore construct a sample of elderly owner deaths—exactly analogous to the main owner deaths analysis sample, except restricting to owners who died at age 75 or greater and to counterfactual firms with similarly aged owners. Column (6) repeats column (1) in the elderly owner deaths sample. We find an insignificant and near-zero impact of an elderly owner death on firm profits.

Earlier work has assumed that 0% of S-corporation profits is labor income (Karabarbounis and Neiman 2014; PSZ) but that 70% of partnership profits is labor income (PSZ). Although the partnership assumption is close to our main estimate, the S-corporation assumption is not. Column (7) repeats column (1) while restricting the sample to S-corporations. The resulting estimate is similar to the main estimate, indicating that the main estimate is not simply driven by partnerships.[40]

Finally, columns (8) and (9) repeat column (1) in our broader and lower-mean-income top 1% sample and our narrower and higher-mean-income top 0.1% sample.[41] Effects are ordered

40. Our sample is dominated by dying S-corporation owners, due in large part to the 20% ownership share threshold and to requiring that the firm had positive preperiod workers.

41. The million-dollar-earner sample includes everyone in the top 0.1% sample; the top 1% sample includes everyone in the million-dollar-earner sample.

across our three top groups in both dollar and percentage terms. In particular, we find a −72.9% impact of top 1% owner deaths and a noisier −92.3% impact of top 0.1% owner deaths, compared to the −81.6% impact of a million-dollar-earner death.[42] See Online Appendix Table J.7 for full top 1% and top 0.1% owner-death results.

IV.B. The Profit Impact of Owner Retirements

A natural concern is that because an owner death may be unanticipated, the prior section's results may primarily reflect a chaotic disruption rather than the withdrawal of the owner's human capital. We therefore complement our owner-deaths analysis by estimating the impact of inferred orderly transitions of owners out of employment at their owned firms ("retirement").

Specifically, we follow the owner-deaths sample frame and matching procedure detailed in Section IV.A, with four amendments. First, rather than defining an owner-death event, we define an owner-retirement event in year t as the firm transitioning from consecutive years $[t-4, t-1]$ with at least one owner receiving W-2 wages (perhaps different owners in different years) to years $[t, t+1]$ with no owner receiving W-2 wages while still having positive sales. Second, we match owner-retirement firms to counterfactual firms at which at least one owner received W-2 wages in consecutive years $[t-4, t+1]$. Third, we allow owners to be any age because elderly owners working at their firms may nevertheless be representative of typical owners. Fourth, we require owner-retirement and counterfactual firms to have positive sales $[t-4, t+1]$ rather than merely $[t-4, t-1]$ because exited firms cannot be classified into owner-retirement or counterfactual categories. We make no restrictions on owner-retirement or counterfactual firms in years $[t+2, t+4]$. The owner-retirements sample is substantially larger than the owner-deaths sample, with 5,312 owner-retirement firms compared with 765 owner-deaths firms. Online Appendix Table J.6 provides a waterfall showing how sample restrictions yield our analysis sample size.

Our owner-retirements research design has strengths and weaknesses relative to our owner-deaths research design. Its primary strength is that it may identify instances where an actively participating owner is replaced by a hired nonowner

42. An earlier draft reported a smaller impact for top 1% owner deaths (see Online Appendix H.4 for details).

manager, without the disruption of an unanticipated death. Replacement of an actively participating owner by a nonowner manager rather than by another owner is helpful for our analysis. This replacement can induce a change in compensation: profits to the owner manager replaced by the salary of a nonowner manager. In contrast, replacing an active owner with another equally productive active owner could yield no change in profits despite profits entirely reflecting returns to owner human capital. On the other hand, death is measured with almost no error from vital records, whereas retirement is only inferred. In fact, we find suggestive evidence that many inferred retirements are not actual retirements: 13% of retirement firms issued a W-2 in $t + 4$ to at least one of its owners. Thus, our owner-retirement estimates may understate the true effect of withdrawing owner human capital.

We estimate our event study specification equation (1) in our owner retirements sample and report the results in Figure V, Panel B and Table IV, Panel B. Figure V, Panel B's flat preretirement trend corroborates our identifying assumption that in the absence of retirement, owner-retirement firms and counterfactual firms would exhibit common trends in profits per preperiod worker. Profits per preperiod worker decline immediately and persistently in the year of retirement.

The rightmost estimate in Figure V, Panel B is reported in column (1) of Table IV, Panel B: an estimated causal impact of −$37,210 with a t-statistic of 9.3. The bottom row follows the same calculations used in Panel A to arrive at our preferred owner-retirement percentage impact of −82.5%. This preferred estimate is nearly identical to our owner-deaths estimate of −81.6%. Columns (8) and (9) present analogous estimates for top-1%-owner retirements and top-0.1%-owner retirements: −59.6% and −71.7%, respectively (see Online Appendix Table J.8 for full results).

1. Discussion. Our analysis below requires an estimate of the share of top pass-through income that is a return to owner human capital. Million-dollar earners are the middle of the three top groups on which we focus; both the owner-deaths and owner-retirements specifications for this group suggest an estimate of 82%. The estimated owner-retirement effects are monotonic across top income groups in dollar terms but not in percentage terms. Motivated by the possibility of specification noise and

effectively weighting high earners the most, the average of the six percentage impacts (top 1%, million-dollar-earners, and top 0.1% across both owner deaths and retirements) is 76.8%.

To further explore the robustness of these estimates, Online Appendix Table J.9 compares the equal-weighted estimates in Table IV for the top 1% to alternative specifications that weigh observations using average pre-event profits. Recall that top-owned pass-throughs are much smaller than public companies: 72% of top-1% pass-through profits accrue to firms with less than $50M in profits (see Figure III and Online Appendix Figures I.3 and I.4 for distributions by firm size). Superstar firms such as Amazon are not prominent, even on a dollar-weighted basis, within the pass-through sector. Thus, equal-weighted estimates within the pass-through sector are a priori likely to be close to dollar-weighted estimates.

To explore this point, we consider multiple dollar-weighting schemes and subsample analyses to evaluate how sensitive the overall estimates are to how we treat the largest firms. First, weighting by the log of preperiod profits increases the estimated percentage impact in both the owner-death and owner-retirement samples with little loss of precision. Second, we implement a bounding exercise in which we estimate dollar-weighted treatment effects for all but the largest firms and bound the overall effect by assuming the full range of treatment effects from 0% to 100% for the largest firms. For owner deaths, we find a dollar-weighted treatment effect for firms with less than $50M in pre-event profits of 87.1%. Such firms generate 72% of total top 1% pass-through profits, so we bound the overall effect from 62.4% $(= 0.72 \times 87\% + (1 - 0.72) \times 0\%)$ to 90.8% $(= 0.72 \times 87\% + (1 - 0.72) \times 100\%)$. Owner retirements deliver larger estimates.

Overall, dollar-weighted approaches deliver similar if not larger estimates relative to the equal-weighted analysis, although the standard errors do increase with dollar-weighting. For the next section's analysis, we use 75% as a round number robustly supported by all weighting approaches. We also report analyses using smaller shares in both the person-level and dollar-level calculations.[43]

43. We use fiscal income in defining the owners' groups for Table IV. The top 1% estimates are smaller than the estimates based on higher earners, so it is likely that the top 1% estimates defined using imputed national income—whose thresholds are higher than fiscal income thresholds—would be larger.

The findings in this and the previous section contribute to a literature on the effect of managers and CEOs on firm performance using research designs based on retirements, family succession, and CEO deaths. Johnson et al. (1985), Pérez-González (2006), and Bennedsen et al. (2007) find that when replacing an outgoing CEO, choosing an external CEO increases firm value and performance relative to choosing a within-family CEO. In Danish administrative data, Bennedsen, Pérez-González, and Wolfenzon (forthcoming) use CEO deaths and hospitalizations, respectively, to show that these events cause significant declines in profitability, with larger effects for CEOs who are younger and more likely to be actively involved in the firm's operations.[44]

The estimates from our owner death design are considerably larger than estimates from these studies, which find average effects of professional CEOs between 10% and 25% in terms of operating profitability. Two factors can naturally explain the discrepancy. First, previous work has tended to estimate the effect of one CEO being replaced by another CEO, thereby identifying only the difference in human capital returns between two managers. In contrast, our estimates aim to measure the full human capital return of a manager appearing in profits, as a firm replaces an owner manager (whose human capital return may for tax reasons appear in profits) with a hired manager (who would be compensated in wages). Second, previous work has often estimated effects among especially large or publicly traded companies that may be more capital intensive than the typical firm in the economy. Capital-intensive firms (like an oil extraction firm) may depend less than other firms on managerial talent. Becker and Hvide (2017) find large effects of entrepreneur deaths on quite small firms in Norway. Relative to their work, our study broadens the scope of analysis to much larger firms with high-income owners in a different institutional context that directly informs the character of top U.S. incomes.[45]

44. Consistent with our findings, Jäger (2016) uses German data to show that manager deaths cause a decline of average yearly wages among incumbent workers of approximately 1%. However, his article does not estimate effects on firm performance.

45. Among our million-dollar-owner-death firms, the mean number of employees is 172 and the median is 41. Among Becker and Hvide's owner-death firms, the median number of employees is 4. Becker and Hvide find statistically significant effects of owner deaths on firms in the first four quintiles of firm size but not on firms in the largest quintile (those with more than eight employees).

IV.C. The Profit and Wages Impacts of Corporate-Form Switching

We have found that most pass-through profits represent the returns to human capital. We now test a tax-incentive mechanism for these returns being reported on business tax returns (and thereby recorded in National Accounts) as pass-through profits, rather than as wages paid to the owner. As discussed in Section II.A, private firms have considerable leeway in how they pay owners and face differing tax incentives to use that leeway: C-corporations face tax incentives to pay owners in wages, while pass-throughs face tax incentives to pay owners in profits. We investigate the tax-incentive mechanism by testing for a sudden divergence in profit and wage trends after firms transition from C-corporation form to pass-through form.

We collect data on the population of businesses that switch from C-corporation to S-corporation form between 2001 and 2014.[46] On average, approximately 67,000 C-corporations switch each year, corresponding to between 3% and 5% of all C-corporations. We study total wage payments or profits as a fraction of contemporaneous firm sales in an event study framework:

$$Y_{it} = \sum_{k\in\{-5+,-4,-3,-2,0,1,2,3,4,5+\}} \gamma_k D^k + \alpha_i + \delta_t + \varepsilon_{it}, \tag{2}$$

where γ_k is the coefficient vector of interest on event time indicators, α_i are firm fixed effects, and δ_t are calendar year fixed effects.[47] Wage payments equals salaries and wages plus compensation of officers as listed on the business income tax return.[48] The analysis sample includes 157,272 firms that switched from C-corporation to S-corporation between 2001 and 2010. The sample includes all firms that existed for at least four years prior to and four years following the switch and generated at least $100K in sales in the year prior to the switch.

46. Over this time period, the vast majority of transitions were from C- to S-corporation form, rather than from S- to C- or from C- to partnership. There are few in the former case because of tax preference for the S-corporation form that began in 1986. There are few in the latter case because of rules requiring the firm to unincorporate in the event of these transitions.

47. We cannot directly study changes in owners' wage payments because C-corporations are not linked to owners.

48. This sum should typically equal total W-2 payments, except for manufacturing firms, which deduct production-worker wages on a separate form unavailable to us.

Figure VI, Panel A plots the impacts on profits and wage payments for all firms in the switchers analysis sample. Despite a preperiod trend in profits, the graph shows a sharp divergence between profits and wages in the year of the switch. Wage payments fall sharply in the switching year by 2.29% on average relative to sales, and this decline in wage payments is offset by an average profit margin increase of 1.70%. In words, nearly 2% of sales are suddenly paid as profits instead of wages upon switching to S-corporation form. This pattern is consistent with the tax-incentive mechanism for pass-through owners' human capital returns being paid as profits.

Figure VI plots two heterogeneity analyses that further support the tax-incentive mechanism. S-corporation profits must be distributed pro rata to ownership share. A firm with one active owner-manager supplying human capital and a passive owner supplying none would therefore be relatively unlikely to characterize human capital returns as profits. Instead, the active owner-manager would likely insist on being paid in salary or bonus—sacrificing taxes so as not to share her human capital returns with a passive owner. Nonmajority-owned firms are relatively likely to have at least one passive owner, so we would expect such firms to exhibit a smaller change in profits and wage payments after a C-to-S switch. Figure VI, Panel A shows that expectation is indeed the case empirically. When limiting the sample to the 14,600 firms with no owner in the year of the switch having at least a 50% ownership share, the change in profits and wage payments is markedly less pronounced than in the full sample.

Human capital is a primary factor of production in high-skilled service-sector firms, such as medical practices and consultancies. Owners of such firms may be especially likely to also serve as a manager rather than hiring a nonowner manager, and the labor share of value added tends to be higher at such firms. High-skilled service-sector firms may therefore exhibit especially large changes in profits and wage payments after a C-to-S switch. Figure VI, Panel B shows that that is indeed in the case. When limiting the sample to the 53,220 firms with two-digit NAICS $\in \{51, 52, 54, 56, 61, 62\}$ in the year of the switch, the change in profits and wage payments is markedly more pronounced than in the full sample. We conclude that the data support the tax-incentive explanation for human capital returns being recharacterized as pass-through profits.

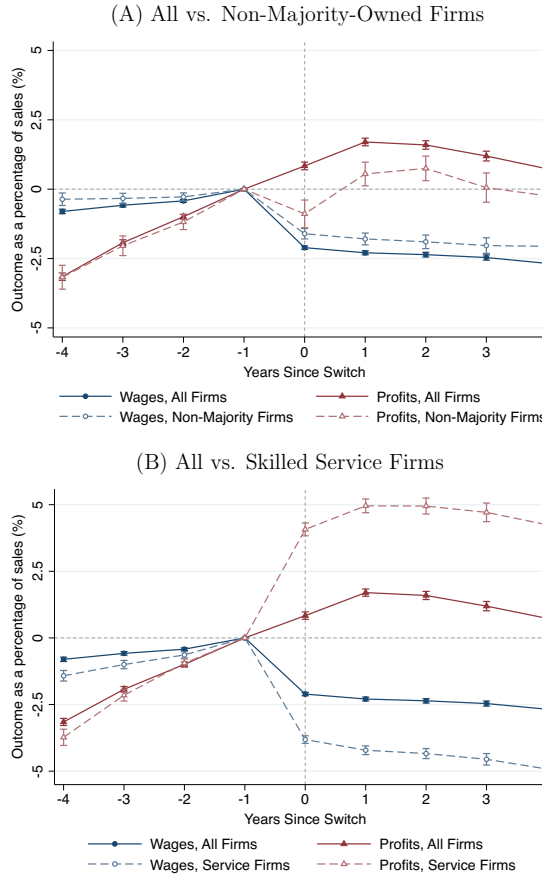

FIGURE VI

Impact of Organizational-Form Switch on Profits and Wage Payments

This figure uses our linked firm-owner data to display how wage payments and profits change when a firm changes organizational form from C-corporation to S-corporation. The sample includes all 157,272 S-corporations that switched from C-corporate to S-corporate form between 2001–2010; had at least $100K in sales in the year prior to the switch; and were active in the four years before and four years following the switch. The No Majority series plot changes for the 14,600 firms that had only minority owners (i.e., with less than 50% ownership) in the switch year. The Service series plot changes for switch events for the 53,220 firms that were in high-skilled service industries, defined as having two-digit NAICS $\in$ {51, 52, 54, 56, 61, 62}. We study two outcomes: annual profits divided by contemporaneous sales, and annual wage payments (including officer compensation) divided by contemporaneous sales. Each plotted series comprises difference estimates for the outcome of interest relative to $t - 1$, conditional on firm and calendar year fixed effects. Displayed 95% confidence intervals are based on standard errors clustered at the firm level.

V. Characterizing Top Earners and Incomes

V.A. *Most Top Earners Are Human-Capital Rich*

This subsection uses our estimates to characterize top earners as human-capital rich or financial-capital rich. The question is whether a very high earner you might meet likely earns most of her income from her human capital or her financial capital. The answer plays a key role in debates about taxation. Kuziemko et al. (2015) find that survey respondents assess tax policy in part based on how income is earned. Moreover, traditional models of optimal taxation provide rationales for higher tax rates on labor income than on capital income (Atkinson and Stiglitz 1976; Judd 1985; Chamley 1986). To the extent that "capital" income is characterized as labor income, higher capital tax rates may be optimal (Piketty and Saez 2013).

We classify a top earner as human-capital rich if the majority of her income derives from her human capital, which we refer to as labor income as in PSZ and elsewhere in the literature. We measure labor income as the sum of wage income (as defined in Section II.B) and 75% of pass-through income (based on our owner-death and owner-retirement event studies). We use our two measures of personal income—fiscal income and imputed national income—and report results for three top income groups—the top 1%, million-dollar earners, and the top 0.1%. Recall that the unit of observation in fiscal income is the tax unit and in imputed national income is the individual. Because imputed national income uses imputed C-corporate retained earnings and other passive capital income, labor income is lower when using the imputed national income measure.

Figure VII displays the results for 2014. Panel A shows how the results in Figure I, Panel A change when adding the human capital share of pass-through income within the top decile, and Figure VII, Panel B focuses on our three top income groups. As a benchmark, we first plot the share of top earners who earn a majority of their income in wages. If 0% of pass-through income is labor income, the wage-earner share would equal the human-capital-rich share. Within the top decile, the share of people earning most of their income from wages falls dramatically at the top. Across five of the six top income groups, a minority of top earners are wage earners. For example among million-dollar earners, 46.8% are wage earners in the fiscal income definition and only 35.3% are wage earners in the imputed national income

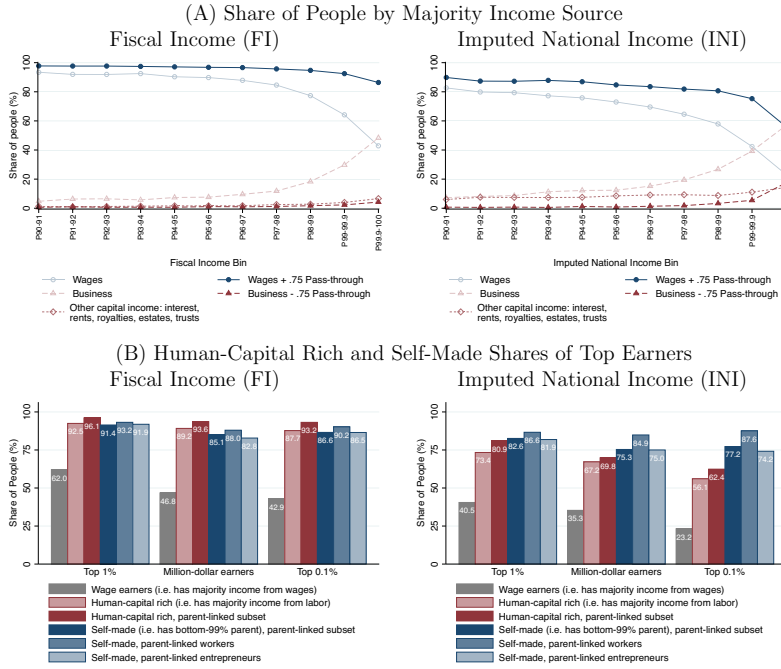

FIGURE VII

Are Top Earners Human-Capital Rich?

The left figure in Panel B uses our top-incomes data to classify top earners (tax units) in the 2014 fiscal income series. The right figure in Panel B classifies top earners (individual) in the 2014 imputed national income series. Wage earners are those earning a majority of their income from wages. Human-capital rich are those earning a majority of their income from labor income, defined as wages plus 75% of pass-through income (before INI tax allocations that reduce the INI top 1% pass-through labor share to 70%). The parent-linked subset comprises 32–34-year-olds who can be linked to parents. The self-made bars plot the share of top earners in the indicated subset who had a parent earning in the bottom 99% of the income distribution. Entrepreneurs are earners who earned a majority of their income as pass-through entrepreneurial income, defined as pass-through income plus owner wages (i.e., W-2 wages earned from owned pass-throughs). The Panel B legends describe the bars from left to right.

definition. Thus, when ignoring pass-through income, a minority of top earners appear to be human-capital rich.

That conclusion reverses when classifying 75% of pass-through income as labor income. The share earning most of their income from human capital falls much less within the top decile. The figure's "human-capital rich" series reveal that most top

earners are human-capital rich, not financial-capital rich. For example among million-dollar earners, 89.2% are human-capital rich in the fiscal income definition and 67.2% are human-capital rich in the imputed national income definition. Even among the top 0.1% in the imputed national income series, 56.1% are human-capital rich, relative to only 23.2% being primarily wage earners. We conclude that the human capital component of pass-through income transforms one's view of whether the typical top earner is human-capital rich.

Online Appendix H.2 provides two robustness analyses. The first uses the minimum estimate of the labor share of pass-through income by income group in Table IV, rather than the mean of 75%. The second classifies all private C-corporation wages as capital income. In 12 permutations, a majority of top earners are human-capital rich.

Finally, we may in fact understate the human-capital-rich share of top owners because pass-through income is not the only form of "capital" income that includes recharacterized wages. In particular, there are prominent tax-advantaged ways to use C-corporation retained earnings to compensate entrepreneurs, hired managers, private equity, and angel investors for their human capital services.[49] Estimating the human capital content of C-corporation income is a priority for future work.

V.B. Most Top Earners in the 1980–1982 Cohort Are Self-Made

A potential concern with the preceding analysis is that some people with high wages may in fact be providing little human capital services, even when not earning wages from a private C-corporation. In particular, drawing a salary from a family pass-through can be an effective way for a rich family to avoid estate

49. First, private equity managers often receive compensation for their management services via high retained earnings of portfolio companies. Second, entrepreneurs like Bill Gates are often compensated in "sweat equity" (Bhandari and McGrattan 2018), thereby earning a much larger share of C-corporation income than nonmanager investors who contributed identical financial inputs. Third, hired executives at midstage startups can be compensated with special underpriced shares such that the executive receives a large capital gain if not fired. Fourth, startups permit angel investors and other venture capitalists to invest at discounts as compensation for the investors' human capital services, such as operating advice and business connections.

taxes. In such cases, an individual could be erroneously labeled as human-capital rich.

We therefore analyze the concept of being self-made, as opposed to being a financial heir. Analogous to Piketty, Postel-Vinay, and Rosenthal (2014), we define an individual as self-made if she earns most of her income from her human capital or from savings out of her previous human capital returns, rather than from inherited financial capital. U.S. tax data lack detailed information on inheritances. However, we can link young top earners to their parents. In the parent-linked sample, we can therefore compute a likely conservative estimate of the self-made share of top earners under the assumption that top earners with sufficiently low-earning parents almost surely do not have high incomes through financial inheritance.

Specifically, we attempt to link all of the individuals born 1980–1982 in our top incomes data to parent-income percentiles, using parent-child links and parent income percentiles provided by Chetty et al. (2019). The year 1980 is the first birth cohort for which parent income can be measured. We match 83% of top 1% individuals born in 1980–1982 to their parents; parent income is unavailable for individuals who immigrated to the United States after their teenage years. Parent income is defined as mean adjusted gross income of the child's parents when the child is aged 15–19. Parent-income percentiles are defined within birth cohorts, with the top 1% ranging between $511K and $552K in 2014 dollars. Bottom 99% parents are therefore unlikely to have assets above the 2014 estate tax exemption of $5.3 million and are unlikely to make large enough financial bequests to place a child into a top income group. We therefore classify an individual as self-made if her parents were not in the top 1%. This is a conservative classification, as many children of the top 1% do not work for their parents' firms and do not receive especially large financial inheritances.[50]

Figure VII, Panel B plots the results. A slightly larger share of the parent-linked sample is classified as human-capital rich than in the overall sample, but the differences are small. The figure shows that across income definitions and top income groups,

50. Averaging parent incomes over five years smooths out fluctuations in parental income, for example, due to temporary business losses. While it is possible that children receive large inheritances from rich grandparents, it is unlikely that the middle generation (the parents) would have relatively low income.

more than three out of four of top earners in the parent-linked sample did not have top 1% parents. For example among million-dollar earners, 85.1% in the fiscal income series and 75.3% in the imputed national income series are self-made. The remaining bars plot similar statistics for human-capital rich (i.e., those with majority income from labor) and entrepreneurs (i.e., those with majority income from pass-throughs). In all cases, at least 74% are self-made. Thus, children of the top 1% are very disproportionately represented among young million-dollar-earners but do not constitute a majority. Recall that these self-made statistics are likely lower bounds, as many adult children of the top 1% are also not dependent on financial inheritance. Although we can measure these outcomes only for the 1980–1982 cohorts, the results support the conclusion that our human-capital-rich statistics are robust to excluding any financial inheritances recharacterized as labor income.

Note that Chetty et al. (2014) (CHKS) published a 100-by-100 appendix transition matrix that suggests an even higher self-made share of 90.4%. Yet because they measure child income within the 1980–1982 birth cohorts rather than nationally, many of their top 1% children (measured at approximately age 30) were not in the overall (i.e., across all ages) top 1% and in particular were not million-dollar earners or in the top 0.1%. Our self-made statistics reach further into the tail of the income distribution and are computed in both fiscal income (as in CHKS) and in imputed national income.[51]

V.C. Top Labor Income and Entrepreneurial Income Are Large

This subsection uses our labor-versus-capital classification of pass-through income to characterize the labor share and the entrepreneurial share of top incomes. One reason the top 1% are of interest is that their earnings constitute a disproportionate share of the economy and tax base. Therefore, it is useful to conduct a

51. CHKS find that children's income ranks stabilize by their early 30s, suggesting that most of their top 1% children will eventually lie in the overall top 1% as their incomes grow over the lifecycle. CHKS measure parent and child incomes using fiscal income. They do not publish their top 1% child income threshold, but their top 1% child income mean ($423K in 2014 dollars) is nearly the same as our top 1% fiscal income threshold ($390K), which implies that their top group encompasses substantially lower earners than ours.

dollar-level analysis of top earners that complements our person-level analysis.

We divide top pass-through income into labor and capital portions and then add other sources of labor and capital income to account for total top income. As before, we allocate 75% of top pass-through income to labor and the rest to capital.[52] We also use our linked firm-owner-worker files to determine how much W-2 wage income accrues to pass-through business owners, which enables us to quantify total top entrepreneurial income. These contributions enable a more comprehensive analysis of the nature of top earners' income—how much is labor income, how much is entrepreneurial income, and how these amounts compare to other income components—than has been possible. We find that top labor income and top entrepreneurial income are substantial and larger than previously documented.

Figure VIII, Panel A shows how the results for the top decile from Figure I, Panel B change when combining wage income and the human capital component of pass-through income. Figure VIII, Panel B shows results for our top income groups. We present two findings. First, despite the fact that capital income accrues disproportionately to top earners, we find that a large share of top income is labor income. In particular, 77% of top 1% fiscal income and 52% of top 1% imputed national income is classified as labor income. Hence, our classification of three-quarters of pass-through income as labor income reverses the earlier finding in PSZ that a minority (45%) of top 1% imputed national income is labor income. Even among million-dollar earners, 71% of fiscal income and 47% of imputed national income is labor income. In the top 0.1%, labor income shares fall to the still large numbers of 69% and 42%, respectively.[53]

Second, top entrepreneurial income is large. We define entrepreneurial income as the sum of two components: (i) pass-through income, and (ii) W-2 wage payments to pass-through

52. See Online Appendix Figure I.8 for results using alternative labor shares. See also Online Appendix Figure I.10 for alternative results when reclassifying all wages from private C-corporations as capital.

53. To evaluate the robustness of these results, we consider two conservative scenarios. Online Appendix Figure I.8 shows that the top 1% labor share in imputed national income is 48% when classifying only 59.6% (56% after tax imputations) of pass-through income as labor income. Online Appendix Figure I.10 shows that the top 1% labor share in imputed national income is 47% when very conservatively reclassifying all private C-corporation wages as profits.

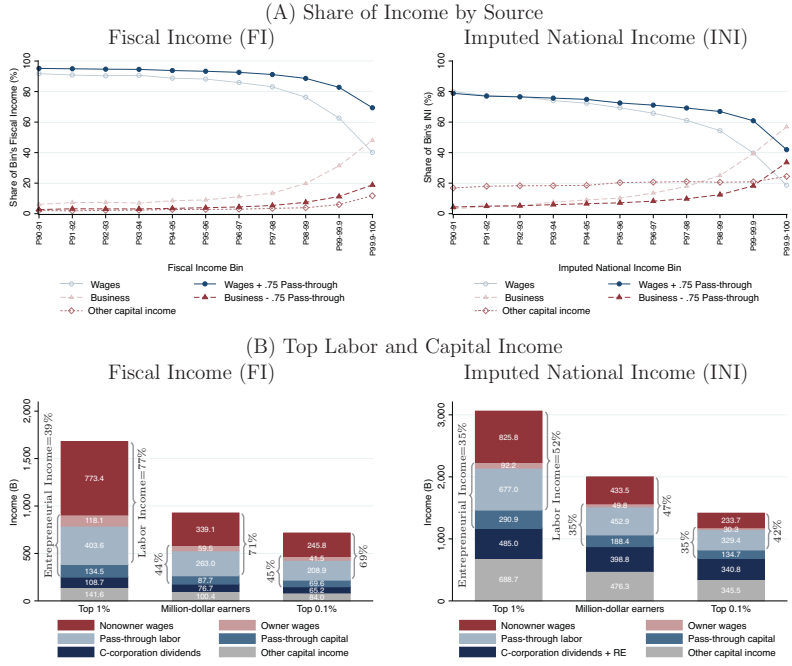

FIGURE VIII

How Do Top Earners Earn Their Income?

This figure uses our top-incomes data to quantify sources of top incomes in 2014. Wages, pass-through income, and C-corporation income (dividends, or dividends and retained earnings), and other capital income are defined as in Figure I. Pass-through labor income equals 75% of pass-through income (before INI tax allocations that reduce the INI top 1% pass-through labor share to 70%); pass-through capital income equals the remainder of pass-through income. Owner wages equal W-2 wages paid to owners from pass-throughs they own; nonowner wages equal the remainder of wages. The Panel B bars list Nonowner wages on top, then Owner wages, etc., as listed in the legends.

owners. Figure I showed that 32%–39% of top 1% and top 0.1% fiscal income is pass-through income. Adding owner wage payments, which has not been previously possible, increases top entrepreneurial income to 35%–45%. Note that some portion of C-corporation income also accrues to founders, so a broader definition of entrepreneurial income would yield larger estimates.[54]

54. A large share of C-corporation income is earned by publicly traded companies and does not accrue to founders in the year it is earned. For example, Jeff Bezos

Top entrepreneurial income is large relative to all other income components. In every top income group and income definition, entrepreneurial income rivals or exceeds both nonowner wage income and non-pass-through capital income. For example among million-dollar earners, 44% of fiscal income and 35% of imputed national income is pass-through entrepreneurial income. In contrast, 37% of fiscal income and 22% of imputed national income is nonowner wage income, and 19% of fiscal income and 44% of imputed national income is non-pass-through capital income. Notably, entrepreneurial income far exceeds C-corporation (and therefore public equity) income, which amounts to 8% of fiscal income and 20% of imputed national income. Hence, entrepreneurial income constitutes a large portion of U.S. top incomes.

VI. The Growth of Top Entrepreneurial Income

This section puts the cross-sectional results on top business income in the context of how top income inequality has evolved over the past five decades. We find that top pass-through income has grown dramatically over time, even after adjusting for tax-induced organizational form switching. We then use our linked firm-owner-worker data from 2001–2014 to decompose this growth into three components—labor productivity, redistribution from workers to owners, and sectoral scale. We find important roles for the growth in labor productivity as well as redistribution from workers to owners.

VI.A. The Sources of Top Income Growth

As in Section III.A, we decompose top incomes into three sources: wage income, business income, and other capital income. Figure IX, Panel A plots the time series of these sources using top fiscal income and imputed national income. Figure IX, Panel B plots the time series of the two components of business income: pass-through income and C-corporation income. Figure IX, Panel C plots the time series of the top 1% labor share, defined either

became 2018's richest person in the world largely by founding Amazon. He owned 48% of Amazon prior to its 1997 IPO but sold most of that stake by 2018, so the vast majority of Amazon's 2018 profits accrued to people other than Bezos. Hence, even if C-corporations could be linked to owners, the national income concept has limitations in classifying entrepreneurial income. The Haig-Simons income concept, which includes price-driven capital gains omitted from the national income concept, could prove fruitful in future work.

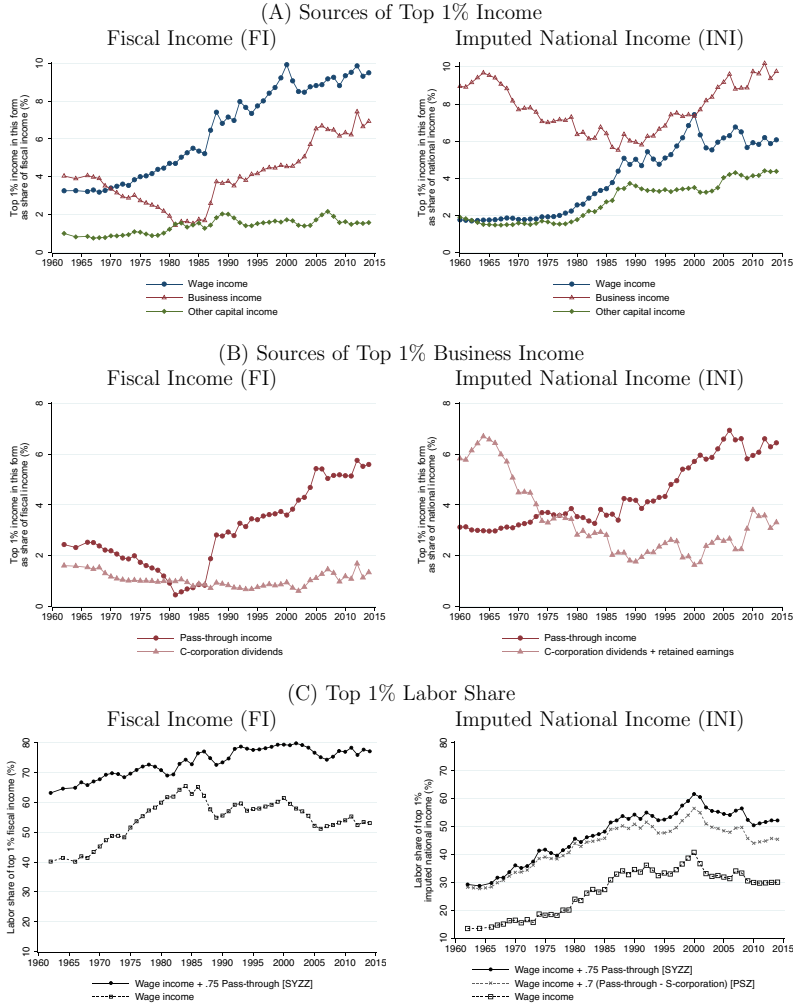

FIGURE IX

Business Income and Rising U.S. Income Inequality (1960–2014)

This figure uses our top-incomes data to show the relative importance of different income sources for the evolution of top-income shares. See the notes to Figure I for definitions.

with or without the human capital component of pass-through income.

Three facts emerge. First, the second half of the twentieth century saw a spectacular rise in wage income for top earners.

However, since the late 1990s, rising top wage income ceded to rising top nonwage income.

Second, the vast majority of rising top nonwage income came in the form of business income.[55] In both fiscal and imputed national income, the path of top wage income mirrors the path of top business income, suggesting that some of the observed slowdown in top wage growth manifested in faster business income growth. Indeed, adding 75% of pass-through income to wage income in defining the top 1% labor share substantially attenuates the decline in top labor income since the 1990s. Specifically, the top 1% labor share in fiscal income exceeds 75% without much of a trend since the late 1980s. In imputed national income, the top 1% labor share is lower (52%), having surged above 60% in the late 1990s and returned to its post-1985 average in recent years.

Third, within business income, most of the growth took the form of pass-through income, rather than C-corporation income. The enduring impact of the Tax Reform Act of 1986 (TRA86) on the distribution of business income is clearly visible in these series (Gordon and MacKie-Mason 1994; Slemrod 1996; MacKie-Mason and Gordon 1997; Gordon and Slemrod 2000; Clarke and Kopczuk 2017). Because the reform raised the burden on traditional C-corporations and lowered top personal income rates, pass-through income jumped and has been steadily rising ever since, as new and growing businesses are more likely to choose pass-through form. Pass-through income growth features centrally in both the fiscal income and imputed national income series, which also includes imputed C-corporation retained earnings.

In Online Appendix F, we quantitatively evaluate the relative contributions to top income growth and business income growth over 1990–2014 and 2000–2014 of various business income sources under alternative approaches for imputing retained earnings. We estimate that pass-through accounts for 60%–73% of the business income growth since 1990 and 38%–56% of the business income growth since 2000.[56] Retained earnings account

55. In both fiscal income and imputed national income, the components of nonwage income not included in business income are much less consequential. The fiscal income shows essentially no growth in this category, whereas the imputed national income series shows modest growth, though some disagreement remains about the size of this increase. See Auten and Splinter (2018) and Bricker et al. (2016).

56. The year 2000 appears to be a local minimum for C-corporation income, likely driven by business cycle fluctuations. The more robust fact is the reversal of

for more than two-thirds of C-corporation income growth, which underscores the importance of including retained earnings when studying top income growth. Understanding the rise of retained earnings, how it contributes to the aggregate capital share, and the rise of superstar firms is an important topic for ongoing and future research.

1. Pass-through Growth Is Not Just a Reporting Phenomenon. Rising top pass-through income partly reflects a type of relabeling of business income, as preexisting businesses reorganized from C-corporation to pass-through form and entrants increasingly chose pass-through form following TRA86. Focusing on 2001–2014, during which our linked firm-owner data are available, the pass-through share of total business sales—which rose from approximately 10% in the mid-1980s to 20% in 1990 to 35% in recent years—indicates that some share of rising top pass-through income is an artifact of changes in the organizational form through which business income is reported. We now quantify how much of the rise in top pass-through income is in fact a real economic phenomenon. Online Appendix H.3 contains more detail.

To correct for the effect of differential net entry into the pass-through sector, we construct a counterfactual pass-through profit series that assumes the level of pass-through sales remains a constant share of total business sales (including S-corporations, C-corporations, and partnerships) throughout the time period. In 2014, the share of profit levels due to organizational-form changes is approximately 26%, while 74% of pass-through profits remain under the constant share assumption. In terms of growth, actual top 0.1% profits increased 240% between 2001 and 2014 in real terms, and counterfactual profits rose 178%. Thus, most of the growth in top profits remains after adjusting for organizational form reorganization.[57] We note for the next subsection that although we adjust the level of pass-through income of organizational-form changes, we make no adjustments for any compositional effects.

C-corporation income and pass-through income in the overall contribution to top income inequality over the past 50 years.

57. We consider an alternative approach to measuring the role of organizational-form switching using the population of businesses that switch from C-corporation to S-corporation form between 2001 and 2014. We find that 70% of the growth in S-corporation profits is due to firms that did not switch from C-corporation form during this time.

VI.B. How Is Entrepreneurial Income Rising? Productivity versus Redistribution

Investigating the relative contributions of the growth and distribution of income can shed light on how entrepreneurial income has increased in recent years. Entrepreneurial income growth can come from two sources: growth in value added and growth in owners' share of value added. Value-added growth can support explanations that emphasize technological progress, and owner share growth can support explanations that emphasize zero-sum compensation bargaining. A combination of value-added growth and owner share growth could also partly reflect managerial-skill-biased technological change. For example, an increase in the output elasticity of owner labor or network connections would result in both more value added and a larger owner share.

We can decompose the overall growth in entrepreneurial income I into value-added growth and redistribution to owners:

$$\Delta I = \overbrace{\underbrace{\Delta \frac{VA}{L}}_{\text{Labor Productivity}} + \underbrace{\Delta L}_{\text{Scale}}}^{\text{Value-Added Growth}} + \overbrace{\Delta s_{owner}}^{\text{Redistribution}}, \tag{3}$$

where ΔX denotes the log change in X, value-added growth sums growth in labor productivity and scale, and s_{owner} is the share of value added that accrues to owners in either the form of owner wages or profits. We measure labor productivity as value added per worker, where value added equals profits plus W-2 wages and where the number of workers equals the number of W-2s issued by the firm. We measure scale as the number of workers.[58]

Figure X presents data on the creation and distribution of income in the pass-through sector among firms with top owners. Panels A and B focus on the components of value-added growth. Panel A shows how labor productivity (measured as value added per worker) and entrepreneurial income per worker have evolved

58. Gabaix and Landier (2008) emphasize firm size of competing firms as an important driver of CEO pay growth. Online Appendix Table J.10 implements a similar firm-level analysis to theirs. We find that top entrepreneurial income is increasing in firm size, but own-firm size is more important than the reference firm. These results suggest that top entrepreneurial income strongly depends on how large their firms are but somewhat less on factors that influence the market for CEO pay of the largest firms in the economy.

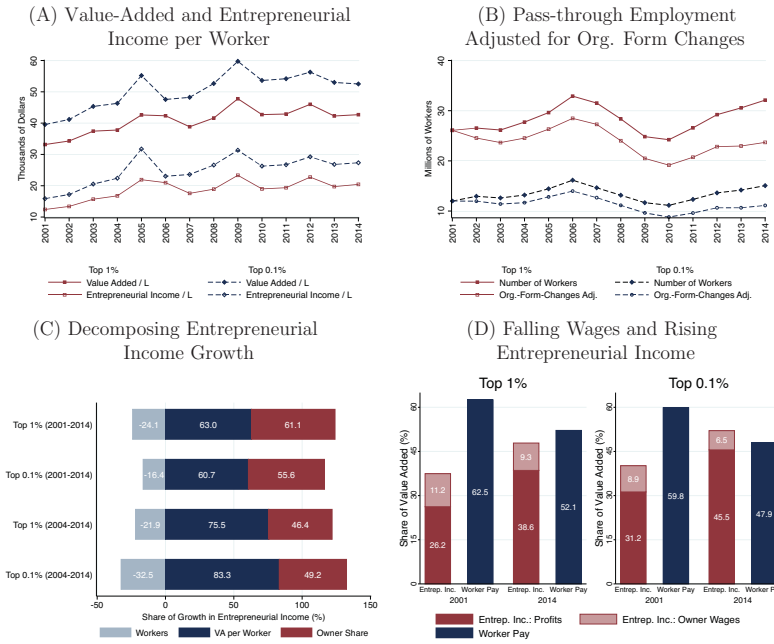

FIGURE X

Why Is Entrepreneurial Income Rising? Productivity, Scale, or Redistribution

Panel A uses our linked firm-owner data to plot aggregate value added per worker and entrepreneurial income (equal to pass-through income plus owner wages) per worker for top 1% and top 0.1% pass-through businesses. Panel B plots pass-through employment (the annual number of W-2s) for top 1% and top 0.1% pass-throughs. The Org.-Form-Changes Adjusted series reduces the main series' growth by a factor equal to the pass-through sales share of total business sales in 2001 divided by the contemporaneous pass-through sales share. For 2014, this procedure reduces growth since 2001 by 24%. Panel C uses equation (3) to decompose the total growth in top entrepreneurial income into contributions from growth in value added per worker, in the owner share of value added, and in total employment adjusted for organizational-form changes. Results for total growth from 2001 to 2014 and from 2004 to 2014 are shown. Panel D shows the distribution of value added accruing to owners (in the form of profits and owner wages) and to nonowner workers (in the form of wages) for top-owned firms in 2001 and in 2014.

since 2001. Panel B shows how the aggregate number of workers employed by top pass-throughs has evolved since 2001. We also present an adjusted series to account for organizational-form switching. Following this analysis, the adjusted series scales actual employment by a factor equal to the pass-through sales share of total business sales in 2001 divided by the contemporaneous

pass-through sales share. For example, in 2014, this procedure reduces employment growth since 2001 by 24%.

Labor productivity of top-owned firms has grown substantially from $33K to $43K. This increase in value added per worker is consistent with explanations of top-pay growth that emphasize technological progress, demand-driven growth in the service sector, or higher markups. Entrepreneurial income has tracked the evolution of labor productivity closely, suggesting that an important part of overall top entrepreneurial income growth is due to these drivers of value-added growth. Aggregate pass-through employment has increased more modestly and fluctuates considerably with the business cycle. Adjusting for organizational-form changes leaves the size of the workforce in top-owned firms essentially unchanged from 2001 to 2014. This pattern contrasts with the strong growth in top-owned profits even after adjusting for organizational-form changes. Increasing profits without commensurate employment growth is consistent with the recent pattern of "scale without mass" observed in large public firms (Brynjolfsson et al. 2008; Autor et al. 2017).

Figure X, Panel C uses equation (3) to divide the total growth in top entrepreneurial income into contributions from growth in value added per worker, in the entrepreneurial income share of value added, and in total employment adjusted for organizational-form changes. We measure these changes as the growth from the level in 2001 to the level in 2014. Because there was a recession in 2001 and not in 2014, we also show the growth from the level in 2004.

For top 1% pass-throughs, value added per worker, employment, and the owner share increased by 25.3%, −9.7%, and 24.5%, respectively, from 2001 to 2014, after adjusting this employment growth for organizational-form changes.[59] Thus, 63% of the growth in top 1% entrepreneurial income (equal to $\frac{25.3\%}{25.3\%-9.7\%+24.5\%}$) comes from rising labor productivity, −24% comes from lower employment, and the remaining 61% comes from a growing owner share of value added. Overall growth for top 0.1% firms was larger, though the relative contributions from productivity and entrepreneurial income are similar.[60] Using 2004 as the

59. The unadjusted employment growth is 23.1%.

60. Specifically, 61% of the overall top 0.1% pay growth comes from rising labor productivity, −16% comes from lower employment, and 56% comes from owner share growth.

reference year modestly increases the importance of labor productivity growth, but the results are similar.

Figure X, Panel D shows that the share of value added going to nonowner workers fell substantially among top-owned pass-throughs from 2001 to 2014. Over this period, the owner share increased from 37% to 48% of value added for top 1% firms and from 40% to 52% for top 0.1% firms. The figure also shows how the composition of entrepreneurial income evolved over this time period, with owners paying themselves less in wages and more in profits. The share of value added going to owners in the form of wages fell by 1.9 percentage points for top-owned firms. Thus, interpreting the fall of wage income in value added as reflecting income lost by workers would overstate the decline in the labor share; some of the fall reflects the rise of recharacterized owner wages.

Overall, growth in entrepreneurial income is explained by both rising labor productivity and a rising share of value added accruing to owners. In contrast, after accounting for the growth due to organizational-form changes, rising firm scale in the form of employment plays no role in the growth of top entrepreneurial income. Economic explanations that emphasize growing the pie, rather than zero-sum bargaining over its distribution, are necessary to fit the facts. Yet such explanations would be incomplete without rationalizing how, as labor productivity grows, owner-managers appear to capture an increasing share.

VII. Conclusion

We have used deidentified U.S. tax records, including novel linked firm-owner-worker data, to investigate the importance of human capital at the top of the U.S. income distribution. The data reveal a striking world of business owners who prevail at the top of the income distribution. We find that most private business profits reflect the return to owner human capital. Overall, top earners are predominantly human-capital rich, and the majority of top income accrues to the human capital of wage earners and entrepreneurs, not financial capital.

We highlight three directions for future research. First, the presence and growth of recharacterized labor income mechanically reduces the measured labor share in the U.S. corporate sector. More broadly, economic measurement of labor and capital income depends on the incentives and reporting structure of the

tax system. Future research on top inequality should continue to engage with the role of entrepreneurial income amid a real-world environment of changing tax policy, including by investigating the human capital component of other forms of capital income such as C-corporation income and rental income. To the extent that labor income is characterized as capital income, there may be a rationale for aligning capital and labor income tax rates (Piketty and Saez 2013).

Second, linking C-corporations to their owners would improve measurement of top income and wealth inequality. The Online Appendix explores various methods of allocating C-corporation retained earnings, which can be used to improve corporate wealth estimates in the absence of direct ownership data. Linking unreported profits from unincorporated businesses to their owners would also improve measurement. Top wealth estimates based on capitalized income flows and a constant returns assumption can be improved by accounting for the higher profitability of top-owned firms.

Third, much rising top income inequality remains consistent with rising private returns to top human capital, but we stress that our findings are silent on the social value of those returns. For example, private returns to owner-manager factors can exceed social returns because of rent seeking, elite connections, and unequal access to the opportunity to enter certain professions, industries, or markets. Normative conclusions about the social value of top human capital therefore require data and assumptions beyond the scope of this article. Future research should investigate the link between private and social returns, an important next step in explaining their evolution and assessing policy implications.

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Supplementary Material

An Online Appendix for this article can be found at *The Quarterly Journal of Economics* online. Code replicating tables and

figures in this article can be found in Smith et al. (2019), in the Harvard Dataverse, doi:10.7910/DVN/1GIPCL.

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For Online Publication

This appendix supplements our paper "Capitalists in the Twenty-First Century" with the following sections:

- Section A provides institutional detail.
- Section B details variable definitions and additional data construction steps.
- Section C uses the Piketty, Saez and Zucman (2018) (henceforth PSZ) published appendix to illustrate that pass-through income is large in top imputed national income.
- Section D explains our replacement of PSZ's extrapolated wealth data 2011–2014 with actual aggregate wealth estimates, which affects the composition of top equity incomes in imputed national income.
- Section E documents that realized capital gains often do not reflect C-corporation income and that using 100% of realized capital gains to impute retained earnings may allocate too much retained earnings to top earners.
- Section F studies the relative importance of pass-through and C-corporation income under different assumptions for imputing C-corporation retained earnings. This section explains and replicates the imputed national income estimates for business income in PSZ. It then quantifies the level and growth of top 1% retained earnings under alternative scenarios.
- Section G discusses other types of capital income in imputed national income that do not appear in fiscal income.
- Section H contains supplemental robustness analyses.
- Section I contains appendix figures.
- Section J contains appendix tables.

A Detail on How U.S. Businesses Are Organized and Taxed

A.1 Detail on how U.S. Businesses Are Organized and Taxed

This subsection provides additional detail on sole proprietorships, the tax treatment of different business entities and types of compensation, and more background on policy changes.

Sole proprietorships There are other types of businesses besides C-corporations, S-corporations, and partnerships.[61] For example, sole proprietorships (e.g., self-employed house cleaning enterprises) are unincorporated business entities owned by individual taxpayers. Their annual income is taxed at ordinary personal income tax rates at the owner level on Form 1040, Schedule C. Sole proprietors lack limited liability and sole proprietorship dividends are not taxed.[62]

Tax Treatment by Corporate Form We describe the tax treatment as of 2014, which is the most recent year for which tax data are available.

Considering only federal taxes for simplicity, C-corporations pay the corporate income tax, which is a nearly flat 35% rate on their annual taxable income, and their owners are liable for the dividend income tax or capital gains tax (23.8% in the top personal bracket, which includes the 2013 Affordable Care Act (ACA) surtax of 3.8% on investment income) on the remaining 65% of income when it is distributed to owners. These taxes amount to an estimated all-in top tax rate on C-corporations of 44.7%.[63] Partnerships typically enjoy lower taxes than identical C-corporations: annual partnership income is taxed at the owner level at ordinary income tax rates and self-employment tax rates (totaling 43.4% at the top),

[61] Other entity types include regulated investment companies (RICs), real estate investment trusts (REITs), real estate mortgage investment conduits (REMICs), and disregarded entities.

[62] Note that, as pointed out by Thomas Brennan, one can use an LLC and check the box to treat sole-proprietorships as a disregarded entity. We thank him for his close reading of the institutional detail section and many helpful comments.

[63] Economists typically assume that half of distributions face the statutory dividend tax rate while the other half is taxed at one quarter of the capital gains tax rate due to tax deferral from retained earnings and other avoidance. The estimate 44.7% equals $35\% + 65\% \times (.5 \times 23.8\% + .5 \times \frac{1}{4} \times 23.8\%)$.

with no other income taxes or taxes on distributions.[64]

S-corporations usually face the weakly lowest taxes. S-corporation income is taxed identically to partnership income, except that if the owner "materially participates" in the firm's operation, the income is classified as active ("non-passive") income and faces only the ordinary income tax (39.6% at the top).[65] Owners determine their material participation status, which typically requires the owner to supply at least 500 hours of labor to the firm in the year the income was earned. Owners face tax incentives to classify themselves as material participants in order for their income to be deemed active and face lower taxes.[66] Note that whereas a partnership owner typically faces identical taxes when receiving her income as W-2 wage income and business income, an S-corporation owner faces lower taxes when receiving her income as business income.

Policy Changes Historically, U.S. business activity was largely organized in one of two forms: sole proprietorships (accounting for 25% of 1985 taxable business income) or C-corporations (accounting for 75%) (Cooper, McClelland, Pearce, Prisinzano, Sullivan, Yagan, Zidar and Zwick, 2016; Clarke and Kopczuk, 2017).

The Tax Reform Act of 1986 lowered the top individual tax rate below the corporate tax rate and raised relative tax burdens on C-corporations. These rate and base changes resulted in the steady growth of the pass-through sector. There are other policy changes the affected S-corporations and other pass-throughs.[67] In 1993, the cap on wage taxes for Medicare was removed, which provided additional incentive to receive compensation in the

[64]This tax treatment applies to general partners. Limited partners are exempt from self-employment taxes but are subject to the Net Investment Income Tax, which also yields a top rate of 43.4%. Limited partners can sometimes be classified as non-passive and therefore taxed at 39.6% at the top, like non-passive S-corporation owners. However, owner-managers typically must be classified as general partners.

[65]Passive S-corporation owners are subject to the Net Investment Income Tax, which yields a top rate of 43.4%.

[66]An S-corporation owner-manager's W-2 compensation is required to be "reasonable" and to reflect the market-value of labor services. The IRS rarely adjusts tax liabilities by deeming W-2 compensation to be unreasonable. Before the Net Investment Income Tax of 2013 that assessed a surtax on passive but not active S-corporation income, the incentive to declare one's S-corporation income as active rather than passive was limited to deducting active losses from one's other active income like wage and salary income. Auten, Splinter and Nelson (2016) document shifting of passive to active S-corporation income in response to the 2013 change.

[67]We thank Thomas Brennan for pointing out many of these changes, some of which we hadn't highlighted in the previous version of the draft. Nelson (2016) provides a detailed account of how rules governing S-corporations have evolved over time and have generally made adopting this form more favorable.

form of S-corporation profit as S-corporation profits do not face the 2.9% Medicare tax. From 2001 to 2003, the top rate on personal income declined from 39.6% to 35%, which increased the relative attractiveness of pass-through corporate forms. However, over that same period, the dividend tax rate was cut from 39.6% to 15%, increasing the relative attractiveness of C-corporations. In 2004, the AJCA relaxed S-corporation rules in the following ways: up to 100 owners were allowed, "families" count as one owner, ESOP restrictions were relaxed, bank S-corporations were allowed, and IRA ownership of bank S-corporations were allowed. From 2009-2015, there were reductions in the holding period required for built-in-gains. Finally, as mentioned above, the introduction of ACA taxes in 2013 includes an effective 3.8% tax on wages and dividends, but active S-corporation income does not face this additional 3.8% tax.

B Data Appendix

Variable Definitions

This appendix subsection defines variables in the linked firm-owner-worker data, introduced in Section 1.3. All variables are annual and are available in all years. Year refers to calendar year, which by law is also each S-corporation's and partnership's fiscal year. All dollar values are inflated to 2014 dollars. Deflators were calculated using price data from the BEA Table 1.1.4 ("Price Indexes for Gross Domestic Product").

1. Firm-level. A *firm* is an S-corporation or partnership. *Sales* is the firm's operating revenue (gross sales minus returns) as listed on the 1120S or 1065. For example, see Form 1120S line 1a-1b. Passively earned income (e.g., interest on bank deposits) is excluded. *Profits* is the firm's ordinary business income, equal to operating revenue minus costs as listed on the 1120S or 1065. *Costs* equals the sum of inputs (cost of goods sold), employee and owner wage compensation, rent, interest, capital asset tax depreciation, and other deductions related to ordinary business. Profits are divided among owners (pro rata according to ownership stakes at S-corporations) on Forms K-1, which owners then include on their Form 1040, Schedule E. Hence, except for Form 1040 loss limitations, profits are exactly the S-corporation and partnership income concept that appears as pass-through income on personal income tax returns.

Profits per worker equals profits divided by the number of workers. *Number of workers* and *number of employees* equals the number of individuals who received a W-2 from the firm that year. *Industry* is the four-digit North American Industry Classification System (NAICS) code reported by the firm on its 1120S or 1065 as corresponding to its principal business activity. A firm is a *top-owned firm* if it has an owner in the top 1% or top 0.1% of the income distribution. Million-dollar owners are with over one million dollars in income.

2. Owner-level. A firm owner is a *top 1% owner*, a *top 1-0.1% owner*, or a *top 0.1% owner* if her tax unit's fiscal income lies in a year's top 1%, the top 1% but not the top 0.1%, or the top 0.1% of all tax units in the year, respectively. She is a million-dollar earner

if her tax unit's fiscal income exceeds one million dollars. *Pass-through income* equals the owner's share of the profits from the pass-through. *Owner wages* equals W-2 payments from the pass-through, as reflected in merged W-2 records. *Entrepreneurial income* equals pass-through income plus owner wages. An owner's pass-through income is reported as *active* if the owner reports any of her pass-through income in the personal income tax return boxes indicating material participation (typically at least 500 hours over the calendar year) in the operations of any of her pass-throughs and is reported as *passive* otherwise. Owners face tax incentives to classify themselves to classify themselves as material participants in order for their income to be deemed active and face lower taxes.[68]

Imputations for Owner Wages

Before merging owner wages from our linked-firm-owner data to our top incomes data, we impute owner wages to some rows. As explained in Section 1.3, some firms pay W-2 wages but cannot be linked to any W-2s. We start by dividing all individuals in the linked-firm-owner-worker data into two groups: candidates for imputation and non-candidates for imputation. We define candidates for imputation as all owners of firms that (a) deducted salaries-and-wages, officer compensation, or guaranteed payments to partners from their pass-through tax returns and (b) were not linked to any W-2s. All other individuals are non-candidates for imputation. For every non-candidate, we compute the owner-wages share of the owner's total wages.[69] Many non-candidate observations have owner-wages share of 0.

We then impute owner wages to candidates for imputation as follows. We group all firm-owner observations into bins defined by year, organizational form (S-corporation or partnership), type and number of owners (passive, active and the firm has only 1 owner, active and the firm has 2 owners, active and the firm has 3-4 owners, or active and the firm has

[68] Before the Net Investment Income Tax of 2013 that assessed a surtax on passive but not active S-corporation income, the incentive to declare one's S-corporation income as active rather than passive was limited to deducting active losses from one's other active income like wage and salary income. After the NIIT, active S-corporation income enjoyed lower taxes than passive S-corporation income; the same distinction was not applied to partnership income. Auten, Splinter and Nelson (2016) document shifting of passive to active S-corporation income in response to the 2013 change.

[69] An owner who received wages only from a firm she owns has an owner-wages share of 1. An owner who received no owner wages has an owner-wages share of 0. An owner who received owner wages and wages from another firm has an owner-wages share $\in (0, 1)$.

5 or more owners), and firm sales bin ($0-100K, $100-500K, $500K-1M, $1M-5M, $5M-50M, and $50M+). Then for every candidate observation, we find the non-candidate observation within the same group that has the closest total owner wages and impute owner wages equal to the product of the non-candidate's owner-wages share and the candidate's total wages.[70] This procedure ensures that the distribution of imputed owner wages exactly replicates the distribution of directly observed owner wages, including numerous zeros. Finally, we merge owner wages from the linked data to the top incomes data by owner-masked SSN. If an individual in the top incomes data does not match to the linked data, she is assigned owner wages of zero.

Imputations for Private C-Corporation Wages

Our second robustness analysis of Section H.2 required us to identify 2014 top earners whose highest-paying W-2 was issued by a private C-corporation. We identify them in five steps. First, we compile a list of the universe of 2014 businesses, including C-corporations, S-corporations, partnerships, and non-profits. Second, we define private C-corporations as all C-corporations whose EINs do not appear in Compustat. Third, we merge our universe of businesses to our top incomes data by the EIN on individuals' highest-paying W-2 and thereby classify 8.1% of top 1% individuals (by imputed national income) as being paid wages by a private C-corporation.

At this point in the procedure, a substantial share of individuals with a W-2 are "ghost payees": they were not matched to any business in step 3, either because they were government employees (and thus were correctly unmatched to a business) or because their non-government employer issued W-2s under a different EIN from the one under which it paid taxes (and thus were erroneously unmatched to a business). Similarly, many private C-corporations are "ghost payers": they deducted wages and salaries or officer compensation on their tax returns but matched to no W-2 in the universe of W-2s, suggesting that they issued W-2s under a different EIN from the one under which it paid taxes. There are thus

[70] Consider an example. Suppose that in 2014, Jane Doe had $100,000 in total wages and was an owner of the S-Corporation Acme Inc. Acme deducted officer compensation but was linked to no W-2s. Suppose that the nearest non-candidate owner in Jane's group had $100,002 in total wages, $50,001 of which came from the S-corporation. Then we would impute $50,000 of owner wages to Jane.

likely missing matches between private C-corporations and our top incomes data.

In our fourth step, we impute those missing matches by assuming that—within size bins—the match rate between ghost payers and ghost payees is the same as between directly observed private C-corporations and eligible top earners, in the third step above. Specifically, we divide top-earning individuals into three income bins based on imputed national income: those in the top 1% but with less imputed national income than \$1M, those with greater than \$1M but not in the top 0.1%, and those in the top 0.1%. We divide all private C-corporations into five firm size bins based on the sum of their deducted wages and salaries and officer compensation: \$0, (\$0,\$100K], (\$100K,\$1M], (\$1M,\$10M], and \$10M+. Within each income bin b, we compute the weighted number $matched_{bf}$ of individuals who matched to a private C-corporation by firm size bin f. We then impute private-C-corporation-payer classification to the weighted number $matched_b^{'}$ of ghost payees in each income bin b:

$$matched_b^{'} = \sum_f matched_{bf} \times \frac{NumGhostPayers_f}{NumNonghostPayers_f}, \tag{4}$$

where $NumGhostPayers_f$ is the number of private C-corporations in size bin f and $NumNonghostPayers_f$ is the number of all other private C-corporations in size bin f. We therefore classifiy a large number of ghost payees as having a private C-corporation payer to the extent that a large number of similar-earning individuals were matched directly to a private C-corporation payer and that a large number of private C-corporations were ghost payers. This imputation step classifies an additional 4.9% of top-1% individuals as having a private C-corporation payer.

In our fifth step, we conservatively classify *all* of an individual's wages as capital income if and only if she is classified as having a private C-corporation payer in step 3 or 4 above.

C Pass-Through Income in Imputed National Income

Pass-through income constitutes one-third (32.5%) of top 1% imputed national income (Figures 1C and 8B). PSZ's Online Appendix Section C.2 focuses on S-corporation income in discussing an earlier draft of our paper and indicates that S-corporation income is a small share of top imputed national income. This appendix uses PSZ's published appendix to reconcile these two facts and show that pass-through income is indeed large in top imputed national income.

Like the current version of our paper, the first version studied all pass-through income. However, for data reasons, the first version focused much of the empirical analysis on S-corporation income. PSZ plot the share of top 1% income over time earned in the form of S-corporation income, non-S-corporation labor income, and non-S-corporation capital income. Figure I.14A replicates Appendix Figure S.34 from PSZ using data from the supplementary spreadsheet.[71] PSZ conclude that S-corporation income is minor.

PSZ do not include partnership or other non-S-corporation pass-through income in their discussion, instead focusing only on S-corporation income. PSZ also divide non-S-corporation pass-through income into 65% labor income and 35% capital income. Including *all* components of pass-through income reveals the large and growing importance of pass-through income for top incomes for two reasons. First, because other components of top labor and capital income have been shrinking over time, the importance of partnerships is muted in PSZ's composite labor and capital income series. Second, fiscal partnership income accounts for 46% of pass-through business income at the top in imputed national income. Our paper's focus on private pass-through business income includes both S-corporations and partnerships.

Figure I.14B uses PSZ's supplementary spreadsheet to modify Figure I.14A by applying shading to the components of labor and capital income that reflect allocations from non-S-corporation pass-through income ("mixed income").[72] Figure I.14C applies the same shading to all pass-through income.

Including partnership and other mixed income makes clear the importance of pass-

[71] Sheet TB2f in `http://gabriel-zucman.eu/files/PSZ2017AppendixTablesII(Distrib).xlsx`.

[72] In defining mixed income, the supplementary spreadsheet does not separately break out sole proprietor's income and unreported non-corporate-business income from partnership income. This section therefore does not attempt to decompose mixed income further.

through income in imputed national income. Pass-through income has grown dramatically since the 1980s. Pass-through income was less than half the size of other capital income in the 1960s and rose to surpass other capital income briefly in the 2000s. In 2014, one-third of top 1% imputed national income is pass-through income, with the rest split nearly evenly between non-pass-through labor and non-pass-through capital income.

In imputed national income, pass-through income has been secularly rising since 1990, while retained earnings steadily declined from the 1960s and then recovered somewhat since 2000. C-corporation income was much more important for top incomes in the 1960s and 1970s, prior to the 1986 tax reform, than in recent decades. In 2014, pass-through income in imputed national income is much larger than C-corporation income, including imputed retained earnings.

D Imputed National Income Data Update

For their analysis of the composition of top 1% incomes (Online Appendix Section C.2 and Sheet TB2f), PSZ use actual aggregate S-corporation and C-corportion wealth estimates from the US Financial Accounts for the years prior to 2011. For 2011–2014, PSZ extrapolate top 1% S-corporation and C-corporation wealth: they start with the 2010 values and then grow them using the growth rate of aggregate household equity wealth. We update this series to reflect actual aggregate wealth estimates. This update does not affect an individual's total income; it alters the allocation of that income among sources. See Appendix F for the formulas we use to replicate estimates in PSZ with unextrapolated data.

Figure I.15 presents results of this update. The updated Financial Accounts wealth estimates increase aggregrate S-corporation wealth and reduce aggregate household C-corporation weath. Accordingly, imputed S-corporation income rises by approximately 21%, or $47B, and the sum of C-corporation dividends and retained earnings falls by this amount.

Figures I.16A-B show the effect of this update on relative contributions of S-corporation and C-corporation income to top 1% business income growth. The graph also includes partnership income (first two bars) and other non-S-corporation pass-through income (third bar) to study the evolution of all business income. Figure I.16A focuses on the period from 1990 to 2014 to study the full time series after TRA86 (including transition years). Figure I.16B focuses on the period from 2000 to 2014 (as emphasized by PSZ). For each scenario, we compute the contribution of business income to top 1% income growth (e.g., business income increased by 2.8% of national income from 1990 to 2014) and divide this amount into contributions from each source (e.g., S-corporation income increased by 1.1% of national income from 1990 to 2014, or 40% of the business income increase).

For the time period 2000–2014, the original PSZ series shows S-corporation income contributed 6% to business income growth. Using updated unextrapolated data increases this contribution to 19%. The update increases the total pass-through contribution from 25% to 38% of the growth in total business income over this time. The contribution of C-corporation income contracts symmetrically: in the original PSZ series, C-corporation income contributed 74% to total business income growth; in unextrapolated data, the contribution falls to 61%.

Going back to 1990, the updated series shows a relative contribution of 60% to 63% for pass-through income, up from 51% in the original PSZ series, and 37% to 40% for C-corporation income including retained earnings, down from 49%. Thus, pass-through income is a major contributor to business income growth in the updated data.

E Imputing Retained Earnings with Realized Capital Gains

The retained earnings of C-corporations is an important component of national income that does not appear in fiscal income. In creating the imputed national income series, PSZ impute retained earnings to individuals based on inferred C-corporation stock that is directly held.[73] Their approach infers aggregate C-corporation ownership using the sum of taxable dividends and 100% of realized capital gains, because C-corporation income can appear on individual tax returns in either form.

Dividends always reflect C-corporation income. This appendix documents that realized capital gains often do not and illustrates the implications for imputing top incomes. Specifically, because realized capital gains are much larger and more concentrated among top 1% earners than dividends, using 100% of realized capital gains to impute retained earnings may allocate too much retained earnings to top 1% earners.

Figure I.17A uses public aggregates from the IRS Statistics of Income for realized capital gains, broken down by asset class.[74] A large share of realized capital gains are not due to the sale of corporate stock. In recent years, the share of net gains attributed to stock sales and mutual funds, most of which is C-corporation stock, is approximately 25%. Another 25% includes directly owned non-C-corporate-stock asset sales, such as real estate and financial securities. The remaining 50% of gains are in the form of pass-through gains, which includes indirectly owned C-corporate stock but also includes indirect ownership of other assets and recharacterized labor income in the form of carried interest for hedge fund and private equity managers. If anything, the importance of C-corporation stock has fallen over time following the stock market boom in the late 1990s.

Hence, 25% to 75% of realized capital gains reflects the sale of C-corporate stock. Figure I.17B plots macroeconomic retained earnings, the household sector's share of macroeconomic retained earnings, and total fiscal realized capital gains over 1962–2014 (all in 2014 dollars).

[73] The share of C-corporation stock held by pensions and non-profits is imputed to the pension sector and allocated separately as pension income. When PSZ emphasize the importance of retained earnings for top 1% incomes, they refer to the directly held component and not the pension component.

[74] See `https://www.irs.gov/statistics/soi-tax-stats-sales-of-capital-assets-reported-on-individual-tax-` for the data.

The broad nature of realized capital gains can explain why total realized capital gains of \$732B in 2014 vastly exceeds the total household share of retained earnings (\$306B). In 2014, total realized capital gains even exceeds the overall macroeconomic flow of retained earnings (\$649B). Figure I.17B shows these facts are true in most years between 1962 and 2014. The gap between realized capital gains and the household share of retained earnings widened from the 1980s through the 2000s, suggesting over-allocation of retained earnings to top 1% earners may be increasing over time.

These patterns materially affect top retained earnings imputations in 2014. In the fiscal income inputs to PSZ's imputation, the top 1% receive 74% of the \$732B of realized capital gains but only 49% of the \$271B of C-corporation dividends. Thus, the top 1% share of allocated retained earnings in imputed national income is $67\%\left(=\frac{\$132B+\$539B}{\$271B+\$732B}\right)$ when using PSZ's 100% assumption. If we instead use 25% of realized capital gains combined with C-corporation dividends when allocating C-corporation retained earnings, the top 1% share of allocated retained earnings is $59\%\left(=\frac{\$132B+0.25\cdot\$539B}{\$271B+0.25\cdot\$732B}\right)$. Hence, imputed national income may allocate too much retained earnings to top 1% earners and not enough to lower earners.

F Imputing Retained Earnings under Alternative Assumptions

This appendix studies the relative importance of pass-through and C-corporation income under different assumptions for imputing C-corporation retained earnings. Section F.1 explains our successful replication of the imputed national income estimates in PSZ. Section F.2 studies the robustness of results to the weight placed on realized capital gains when imputing retained earnings. Section F.3 quantifies the level of top 1% retained earnings in 2014 under alternative scenarios. Section F.4 quantifies the growth of top 1% retained earnings since 1990 and 2000 under alternative scenarios and compares that growth to other components of business income.

F.1 Replicating the INI Retained Earnings Imputation

Overview of calculation. The imputed national income (INI) approach in PSZ uses fiscal income data to build allocation factors and apply these factors to produce a "top down" imputation of all components of national income, which by construction sum to total national income. For equity income, this procedure allocates to different people the aggregate flow of S-corporation income, C-corporation dividends, C-corporation retained earnings, and corporate taxes, which equals \$2.15T in aggregate in 2014. The final result is a pretax division of this aggregate flow between S-corporation income, C-corporation dividends, and C-corporation retained earnings. This section replicates PSZ's INI estimates, carefully following the computations in their analysis spreadsheets and replication code.[75]

Imputing retained earnings in 2014. The first step is to compute the share of this \$2.15T flow that accrues to the top 1%, which equals 34%. This allocation share equals the sum of estimated top 1% S-corporation and C-corporation wealth divided by macro equity wealth in the household, non-profit, and pension sectors. The top 1% S- and C-corporation wealth estimates capitalize fiscal income following the method of Saez and Zucman (2016).

[75]The final numbers appear in Sheet TB2f, Columns B through M, in `http://gabriel-zucman.eu/files/PSZ2017AppendixTablesII(Distrib).xlsx`. Note that we convert shares of income to dollars to make comparison of alternative scenarios more straightforward.

In the case of S-corporation wealth, the procedure first allocates macro S-corporation wealth ($2.8T) in proportion to the top 1% share of fiscal S-corporation income (=$229B/$407B=56%). In the case of C-corporation wealth, the procedure first allocates macro C-corporation wealth owned by households ($11T) in proportion to an individual's share of taxable dividends and realized capital gains (=($132B+$539B)/($271B+$732B)=67%). These calculations yield $8.9T of top 1% S-plus C-corporation wealth, or 34% of total macro equity wealth ($26.2T). The top 1% flow of equity income is $733B (= $2.15T×.34).

The second step divides the top 1% flow of equity income ($733B) into proportional contributions from C-corporation retained earnings, C-corporation dividends, and S-corporation income. As above, each source of equity income uses wealth estimates based on fiscal income to apportion macroeconomic flows.

C-corporation retained earnings are defined as macroeconomic retained earnings ($649B) multiplied by top 1% estimated C-corporation wealth ($7.4T) divided by macro C-corporation wealth ($23.4T), yielding $205B. Similar steps yield $177B for C-corporation dividends and $231B for S-corporation dividends. Combining these components yields a retained earnings share of $205B/($205B+$177B+$231B), equal to 33%. The final estimate for retained earnings in the top 1% percent is the product of $733B (the result of the first step) and 33% (the result of the second step), which equals $245B.

General formulas and inputs for top 1% imputed retained earnings. This subsection describes in more detail the imputed national income mapping from raw inputs to imputed retained earnings, in order to clarify how alternative assumptions affect the procedure. This mapping combines data from three sources: fiscal income data, macroeconomic income data from NIPA, and macroeconomic wealth data from the US Financial Accounts.

The mapping begins with a top-level number of macroeconomic income from equity to allocate between S-corporations and C-corporations. The formula for S-corp dividends is the product of an allocation factor and total top 1% income from equity (the formulas for C dividends and retained earnings are analogous):

$$\text{top 1\% S-corp dividends} = \text{S income allocation factor} \times \underbrace{\text{Total top 1\% income from equity}}_{=\text{(top 1\% equity wealth)}\times\text{(Aggregate equity yield)}} \tag{5}$$

The S-corporation income allocation factor is the proportional contribution of S-corporation income to top 1% pretax equity income. Total top 1% income from equity equals an estimate of top 1% equity wealth multiplied by an aggregate equity yield, which uses only publicly available macro statistics. Following Saez and Zucman (2016), top 1% wealth is a capitalized wealth estimate, derived by multiplying a flow of fiscal income by a capitalization factor combining fiscal income and macroeconomic wealth statistics from the US Financial Accounts.

Several inputs are required to compute top 1% equity wealth and the aggregate equity yield. We first substitute data series from fiscal income data and macroeconomic data into equation (5). We then rearrange this formula to isolate factors derived from tax data and those from macroeconomic data:

$$\begin{aligned}
&= \text{S income allocation factor} \\
&\quad \times \left[(\mathbf{top\ 1\%\ S\ divs}) \times \left(\frac{\textit{total S wealth}}{\mathbf{total\ S\ divs}} \right) + (\mathbf{top\ 1\%\ C\ divs + top\ 1\%\ cap\ gains}) \times \left(\frac{\textit{total C household wealth}}{\mathbf{total\ C\ divs + total\ cap\ gains}} \right) \right] \\
&\quad \times \left[\frac{(\textit{total C,S divs + retained earnings + taxes}) \times \left(\frac{\textit{household equity wealth FoF}}{\textit{household equity wealth FoF+pension equity wealth FoF}} \right)}{\textit{total C,S household wealth}} \right] \qquad (6) \\
&= \text{S income allocation factor} \\
&\quad \times \left[\left(\frac{\mathbf{top\ 1\%\ S\ divs}}{\mathbf{total\ S\ divs}} \right) \times (\textit{total S wealth}) + \left(\frac{\mathbf{top\ 1\%\ C\ divs + top\ 1\%\ cap\ gains}}{\mathbf{total\ C\ divs + total\ cap\ gains}} \right) \times (\textit{total C household wealth}) \right] \\
&\quad \times \left(\frac{1}{\textit{household equity wealth FoF + pension equity wealth FoF}} \right) \times (\textit{total C,S divs + retained earnings + taxes}), \qquad (7)
\end{aligned}$$

where bold is used to denote tax data and italics denote NIPA and US Financial Accounts data. When neither bold nor italic are used, the item combines both tax and NIPA/Financial Accounts data.

Total top 1% equity equals the sum of top 1% S-corporation wealth and top 1% C-corporation wealth. Top 1% S-corporation wealth equals top 1% S-corporation fiscal income

times total Financial Accounts S-corporation wealth divided by total S-corporation fiscal income. Similarly, top 1% C-corporation wealth equals the sum of top 1% C-corporation fiscal dividends and top 1% realized capital gains times total C-corporation wealth held by households divided by the sum of total C-corporation fiscal dividends and total realized capital gains. The aggregate equity yield equals the macroeconomic flow of dividends plus retained earnings from C-corporations plus corporate tax payments from NIPA divided by total macroeconomic equity wealth owned by households, non-profits, and pensions.

The S-corporation income allocation factor equals $a/(a + b + c)$, where a is the S-corporation allocation component, b is the C-corporation dividends allocation component, and c is the C-corporation retained earnings component. These allocation components are similar to the overall formula for S-corporation and C-corporation income, except they allocate a pre-tax macroeconomic income flow across the income distribution. Each allocation component is defined as an estimate of top 1% wealth in either S-corporation or C-corporation form multiplied by a macroeconomic yield on total S-corporation or C-corporation wealth. In the case of S-corporations, because all wealth is held by households, the formula simplifies to allocating macroeconomic S-corporation dividends (which may differ slightly from fiscal income S-corporation dividends due to a different sampling period) in proportion to the top 1% share of fiscal income S-corporation dividends. In the case of C-corporations, because a substantial share of C-corporation wealth is held outside the household sector, there is a third term that reduces the amount of C-corporation income to the share held directly by households.

The formula for the S-corporation allocation component is:

$$
\begin{aligned}
a &= \text{top 1\% S wealth} \times \left(\frac{\textit{total S divs}}{\textit{total S wealth}} \right) \\
&= \mathbf{top\ 1\%\ S\ divs} \times \left(\frac{\textit{total S wealth}}{\mathbf{total\ S\ divs}} \right) \times \left(\frac{\textit{total S divs}}{\textit{total S wealth}} \right) \\
&= \frac{\mathbf{top\ 1\%\ S\ divs}}{\mathbf{total\ S\ divs}} \times \textit{total S divs}
\end{aligned}
$$

The formula for the C-corporation allocation component is:

$$
\begin{aligned}
b &= \text{top 1\% C wealth} \times \left(\frac{\textit{total C divs}}{\textit{total C wealth}} \right) \\
&= (\textbf{top 1\% C divs} + \textbf{top 1\% cap gains}) \times \left(\frac{\textit{total C household wealth}}{\textbf{total C divs} + \textbf{total cap gains}} \right) \times \left(\frac{\textit{total C divs}}{\textit{total C wealth}} \right) \\
&= \left(\frac{\textbf{top 1\% C divs} + \textbf{top 1\% cap gains}}{\textbf{total C divs} + \textbf{total cap gains}} \right) \times \left(\frac{\textit{total C household wealth}}{\textit{total C household wealth} + \textit{total C pension wealth}} \right) \times \textit{total C divs}
\end{aligned}
$$

The formula for C retained earnings from the allocation component is:

$$
\begin{aligned}
c &= \text{top 1\% C wealth} \times \left(\frac{\textit{retained earnings}}{\textit{total C wealth}} \right) \\
&= \left(\frac{\textbf{top 1\% C divs} + \textbf{top 1\% cap gains}}{\textbf{total C divs} + \textbf{total cap gains}} \right) \\
&\quad \times \left(\frac{\textit{total C household wealth}}{\textit{total C household wealth} + \textit{total C pension wealth}} \right) \times \textit{retained earnings}
\end{aligned}
$$

Figure I.18 implements these formulas and compares the replication of the final imputed income estimates to those in PSZ's appendix spreadsheet, converted to dollars to aid comparison of alternative scenarios. The replication closely matches the imputed national income estimates in PSZ.[76]

F.2 Imputing Retained Earnings with Different Weights on Realized Capital Gains

Figures I.19A-C plot the equity-income-component series under alternative methods for using realized capital gains to allocate C-corporation ownership shares. The graphs compare a dividends-only method to scenarios that use dividends plus 25%, 50%, or 100% of realized capital gains. We make these adjustments for wealth estimates used in both the allocation and total equity income components of the imputed national income formulas above. For comparison purposes, we also plot a Fiscal Income + RE + Tax scenario, which uses fiscal income data for S-corporation dividends, C-corporation dividends, and partnership income; allocates C-corporation retained earnings in proportion to the household share of

[76] Slight differences appear in the graph; there are minor discrepancies in the underlying raw micro and macro files we were given by PSZ. Note this replication seeks to match PSZ's appendix spreadsheet estimates, including estimates from 2011–2014 based on extrapolated wealth data. Below, we present series with unextrapolated wealth inputs.

C-corporation dividends; and allocates corporate tax in proportion to these pre-tax figures. See Online Appendix E for additional details.

The figures display a wide range in top 1% C-corporation dividends and retained earnings under alternative scenarios. Top 1% S-corporation income is largely unchanged, though the Fiscal Income + RE + Tax scenario shows greater volatility during the recent recession. In 2014, top 1% C-corporation dividends vary from $145B in the dividends only scenario to $182B when 25% of realized capital gains are used to $212B when 100% of realized capital gains are used. For retained earnings, the dividends only scenario yields $167B versus $210B when 25% of realized capital gains are used versus $245B when 100% of realized capital gains are used. The Fiscal Income + RE + Tax scenario yields $150B for top 1% C-corporation dividends and $170B for top 1% retained earnings.

F.3 Quantifying Top 1% Retained Earnings and Pass-through Income in 2014

Figures I.20A-B explore the relative importance of the components of top 1% business income in 2014 under a range of assumptions for imputing retained earnings. The **PSZ (2018)** series presents the imputed national income estimates from PSZ's paper as published, including S-corporation income ($229B), C-corporation dividends ($234B), and C-corporation retained earnings ($270B). Partnership income ($174B) equals fiscal partnership income (without adding a tax imputation) using INI ranks and household definitions to identify the top 1% percent.[77] The **PSZ Updated** series updates the INI series in PSZ (2018) to reflect unextrapolated aggregate wealth estimates. When combined with fiscal partnership income, top 1% pass-through income in this series ($450B) roughly equals C-corporation dividends plus retained earnings ($457B). See Online Appendix D for additional details.

The next series (**Fiscal Income + RE + Tax**) presents a "bottom up" approach that reports raw fiscal income for S-corporation dividends, partnership income, and C-corporation dividends. For C-corporation retained earnings, we allocate a share of macroeconomic retained earnings in proportion to fiscal C-corporation dividends only. We then allocate cor-

[77] Using fiscal partnership income here is conservative relative to imputed mixed income, which is considerably larger.

porate tax to each component in proportion to these pre-tax figures. This series retains the ranking and household definitions in INI. The next series (**PS (2003) Ranks**) applies the Fiscal Income + RE + Tax method but uses the Piketty and Saez (2003) method to sort households using fiscal income excluding capital gains and define households as tax units, thereby determining which units are considered top 1%.

The remaining series apply the extrapolation update and modify the method for imputing components of equity income. The **Divs Only (A+W)** ("A" for Allocation, "W" for Wealth) series uses fiscal C-corporation dividends (and not realized capital gains) to compute C-corporation dividend and C-corporation retained earnings allocation factors (in step two above) and to compute top 1% equity income (in step one above)—i.e., it only uses the ownership composition of fiscal C-corporation dividends to estimate top 1% C-corporation wealth. The **Divs + 0.25 CapG (A+W)** and **Divs + 0.5 CapG (A+W)** use the sum of dividends and 25% or 50% of realized capital gains to compute allocation factors and top 1% equity income.

The **Divs Only** series uses fiscal C-corporation dividends only when computing the allocation factors, but leaves top 1% equity income unchanged. The **Add Pships** series introduces partnership income as a fourth allocation component and adds this income to total equity income to be allocated, thus treating partnership income as a type of business income to be allocated similarly to S-corporation and C-corporation income. The **Divs Only, Pships** series uses both the Divs Only method for allocation and the Add Pships method to include partnership income. Finally, the **Divs Only (A+W), Pships** ("A" for Allocation, "W" for Wealth) series applies the Divs Only, Pships method and further uses the Divs Only wealth estimates to compute top 1% equity income.

The analysis delivers three findings. First, across scenarios, pass-through income is quantitatively important for top 1% incomes and usually larger than C-corporation income including retained earnings. Estimates of top 1% C-corporation income are sensitive to imputation assumptions.

Second, using only dividends to allocate retained earnings delivers estimates for top 1% C-corporation dividends closer to observed taxable dividends.[78] C-corporation dividends

[78]If one were to shrink top dividends and inflate top retained earnings, then one would be assuming a

in the PSZ Updated series are $212B, which exceeds by 46% the $145B in the Divs Only (A+W) series and by 41% the $150B in the Fiscal Income + RE + Tax series. Corresponding estimates of top 1% retained earnings range between $135B and $215B. The estimate from the Fiscal Income + RE + Tax series is $170B. Refinements that incorporate partnership income reduce the relative contribution and possible bias from estimated top 1% C-corporation wealth in the calculation of total equity income.

Third, ranking effects are relatively modest. Comparing the PS (2003) series to the Fiscal Income + RE + Tax series, C-corporation dividends and imputed retained earnings fall 19% and 14%, S-corporation income falls 24% from $306B to $233B, and partnership income falls 14% from $229B to $198B.

F.4 Quantifying the Growth of Retained Earnings

Following the alternative imputation approaches described in the prior section, Figures I.21A-E illustrate the range of implied relative contributions to top 1% income growth from pass-through and C-corporation income.

Figures I.21A, I.21B, and I.21C respectively present the time series from 1990 to 2014 of S-corporation income, C-corporation dividends, and C-corporation retained earnings. Figures I.21D and I.21E quantify the relative contributions from S-corporation income, partnerships, and C-corporation income to overall business income growth, following the same approach as in Figures I.16A and I.16B.

The data support PSZ's finding on the large role in recent years of C-corporation income growth. C-corporation income accounts for 61% in the PSZ Updated series, 49% in the Fiscal Income + RE + Tax scenario, and always at least 44%. Retained earnings account for more than two-thirds of C-corporation income growth since 2000.

In the time series, the year 2000 appears to be a local minimum for C-corporation income, likely driven by business cycle fluctuations. Starting in other nearby years yields smaller relative growth contributions for C-corporation income. Going back to 1990, pass-through income growth exceeds C-corporation growth across scenarios. In the Fiscal Income + RE

different dividend payout ratio among top-owned C-corporation equity than bottom-owned C-corporation equity.

+ Tax scenario, pass-through income accounts for 67% of the growth since 1990 and 51% of the growth since 2000. S-corporation and partnership growth have provided approximately equal contributions to this growth.

G Other Capital Income in Imputed National Income

PSZ identify the rise of retained earnings since 2000 as the key discrepancy between a fiscal-income-based analysis and an imputed-national-income-based analysis. They write the "macro flow of retained earnings amounts to 5.1% of national income (on average over 2010–2014)," and that this flow contributes 1.2 points to the overall 1.9 point increase in the top 1% share in the PSZ series. For this reason, the prior appendices focus on this component of capital income.

PSZ also write about missing tax-exempt capital income more broadly, noting that observed ordinary capital income misses "two-thirds of economic capital income." In imputed national income, many of the largest components of national income not included in fiscal income are allocated roughly in proportion to fiscal income, including public goods spending, the government deficit, certain taxes, and pension benefits. Allocating these components alters the level of income but not its distribution.

The other components of capital income PSZ mention—imputed housing rents, capital income paid to pension funds, dividends and interest retained in trusts, and corporate taxes—are less important than retained earnings, as shown in the analysis of the composition of top incomes in fiscal income and imputed national income in Figure 1 of our paper:

- *Imputed housing rents.* While a large portion of unobserved capital income, imputed housing rents are broadly held among the top 50% of the population.

- *Capital income (interest and dividends) paid to pension funds.* In fiscal income, defined contribution pensions show up when beneficiaries take distributions. These flows are therefore captured by fiscal income. In imputed national income, pension benefits are allocated in proportion to contributions, proxied by the distribution of taxable wage income. As wage income is more broadly distributed than taxable capital income, this approach has a small effect on the top 1% income composition (as noted in PSZ, footnote 52, p.589, and discussion on p.577, Section IV.A).

- *Dividends and interest retained in trusts.* We have not conducted a full reconciliation for how this income is distributed in imputed national income. At least some of the

income flows through to tax returns and therefore appears in fiscal income. Of the components responsible for top 1% income growth in imputed national income, this item does not appear as a central driver.

- *Corporate tax.* Corporate tax receipts have been falling over time and thus cannot account for the growth in top 1% incomes observed in imputed national income. The retained earnings allocations in the prior sections account for corporate tax distributed across the pass-through and C-corporation sector, consistent with imputed national income estimates in PSZ.

When combined, these components very modestly contribute to top 1% income growth over time and remain smaller than either C-corporation or pass-through income. The key excluded component driving the difference between fiscal income and imputed national income is the allocation of C-corporation retained earnings.

Two additional comments regarding these series deserve mention. First, there is a large gap between pass-through income in imputed national income and in fiscal income, despite the fact that in principle all of this income should appear on tax returns. We believe this gap owes primarily to the allocation of underreported income included in proprietors' income in the national accounts. Auten and Splinter (2017) identify this factor as the most important difference between their estimate of the top 1% share and imputed national income in PSZ. While large, this component did not grow disproportionately over the 1990–2014 period, so focusing on the fiscal partnership income series does not affect our main conclusions (see Figures I.16A-B).

Second, the largest component of non-business capital income that differs from fiscal income and contributes to top 1% growth is interest income. We have not conducted a full reconciliation for this series. With imputed national income ranks, the taxable interest series is substantially lower than the imputed national income series and fell as a share of national income in recent decades. Further evidence of how interest income not present on tax returns is distributed would be valuable.

H Supplemental Analyses

H.1 Heterogeneous Profitability is Not Risk

Does high profitability at top-owned firms reflects payment for higher undiversifiable risk? For example, if top-owned firms have a higher probability of failure, owners could be compensated for that risk by higher profitability in years of survival. The blue circles (left axis) in Figure I.13 plots the share of year-2001 firms in the main sample that had exited the sample by 2014 (which typically indicates failure) versus 2001 owner personal income rank, weighting by the firm's 2001 number of workers. Rather than experiencing higher exit rates than average, top-owned firms experienced lower exit rates than average. This finding suggests that top-owned firms exhibit higher profitability and lower risk.

Whereas the exit rate measure proxies for risk along the extensive margin of firm exit, we employ a second measure that proxies for risk: a version of the Sharpe ratio, computed within each personal income bin. The Sharpe ratio—defined as an asset's mean return divided by the standard deviation of its returns—is commonly used in finance to assess whether an asset's return compensates for its risk. A high Sharpe ratio indicates returns in excess of what one would expect given the risk. In our context, higher Sharpe ratios among top-owned firms would indicate that top-owned firms' high profitability more than sufficiently compensates their owners for their risk. For each year 2011–2014 in the main sample, we compute each personal income bin's Sharpe ratio as the ratio of employment-weighted mean profitability to the employment-weighted standard deviation of profitability across owner-firm observations. We then average those within-bin Sharpe ratios evenly across years and plot the means in the green triangles (right axis) of Figure I.13. Top income bins have higher standard deviations of profitability, indicating somewhat higher risk. However, profitability is so much higher in top income bins that we find higher Sharpe ratios among top-owned firms. This finding suggests that higher risk does not explain higher profitability among top-owned firms.

H.2 The Human-Capital-Rich Finding Is Robust

Figure 7 used our preferred estimate of 75% for the human capital share of pass-through income. Seventy-five percent is the average of the six estimates—two estimates for each of three income groups—presented in Table 4. Online Appendix Figure I.7 repeats Figure 7 when using the minimum estimate from Table 4 for each income group. Specifically, in Online Appendix Figure I.7, the top 1% bars classify 59.6% of pass-through income as labor income, the million-dollar-earner bars classify 81.6%, and the top 0.1% bars classify 71.7%. In each of the six permutations plotted in Online Appendix Figure I.7, most top earners are human-capital rich.

As discussed in Section 3.3 and by PSZ, the same tax considerations that apparently lead human capital returns among pass-through owners to be characterized as profits can work in reverse at private C-corporations. The wages of private C-corporation owners may therefore contain non-human-capital returns, leading us to classify some top earners as human-capital rich when they are in fact financial-capital rich.[79] Online Appendix Figure I.10 therefore repeats Figure 7 under the conservative assumption that *all* of an individual's wages are capital income and not labor income, if her highest-paying W-2 was issued by a private C-corporation. We did so by merging the universe of Employer Identification Numbers (EINs) from private C-corporation tax filings to the EIN on the highest-paying W-2 of each top earner with a W-2, accounting for the fact that not every private C-corporation can be matched to its W-2s. See Online Appendix B for details. In each of the six permutations plotted in Online Appendix Figure I.10, we continue to find that a majority of top earners are human-capital rich.

H.3 Pass-through Growth Not Just a Reporting Phenomenon

The rising top pass-through income documented in Section 5.1 partly reflects relabeling of business income, as businesses reorganized from C-corporation to pass-through form and entrants increasingly chose pass-through form following the Tax Reform Act of 1986. We now quantify how much of the rise in top pass-through income is in fact a real economic

[79] Owners of public firms are too numerous to plausibly each receive a W-2 from the firm in order to avoid taxes.

phenomenon.

Figure I.11A uses public SOI aggregate statistics from 1980–2012 to plot the pass-through (S+P) share of three measures of total (C+S+P) corporate and partnership activity: the total number of firms, total profits, and total sales. Figures I.11B-D focus on the period 2001–2014 during which our linked firm-owner data are available. The pass-through share of total business sales—which rose from approximately 10% in the mid-1980s to 20% in 1990 to 35% in recent years—indicates that some share of rising top pass-through income is an artifact of changes in the organizational form through which business income is reported. Figure I.11B shows the rapid increase from 2001 to 2014 in the number of pass-throughs is due mostly to firms that are not owned by top earners.

Figure I.11C decomposes the level of pass-through profits between 2001 and 2014 into actual pass-through profits and the share attributed to organizational form changes. To correct for the effect of differential net entry into the pass-through sector, the decomposition assumes the level of pass-through sales remains a constant share of total business sales (including S-corporations, C-corporations, and partnerships) throughout the time period. The top bars represent the share of pass-through profits due to pass-through firms having a higher share of total business sales relative to 2001. Figure I.11D applies the same transformation to decompose the growth in top 0.1% pass-through profits.

Figure I.11C shows that in 2014, the share of profit levels due to organizational form changes was approximately 26%, while 74% of pass-through profits remain under the constant share assumption. In terms of growth, Figure I.11D shows that actual top profits tripled between 2001 and 2014 in real terms, while counterfactual profits rose roughly 240%. Thus, most of the growth in top profits remains after adjusting for corporate form reorganization.[80]

H.4 Appropriate Correction for Firm Reorganizations

An earlier draft of this paper reported −60.7% as the preferred estimate of the profit impact of top 1% owner deaths at S-corporations (Table 4A Column 2 of Smith, Yagan, Zidar and

[80]We consider an alternative approach to measuring the role of corporate form switching using the population of businesses that switch from C-corporation to S-corporation form between 2001 and 2014. We find that 70% of the growth in S-corporation profits is due to firms that did not switch from C-corporation form during this time.

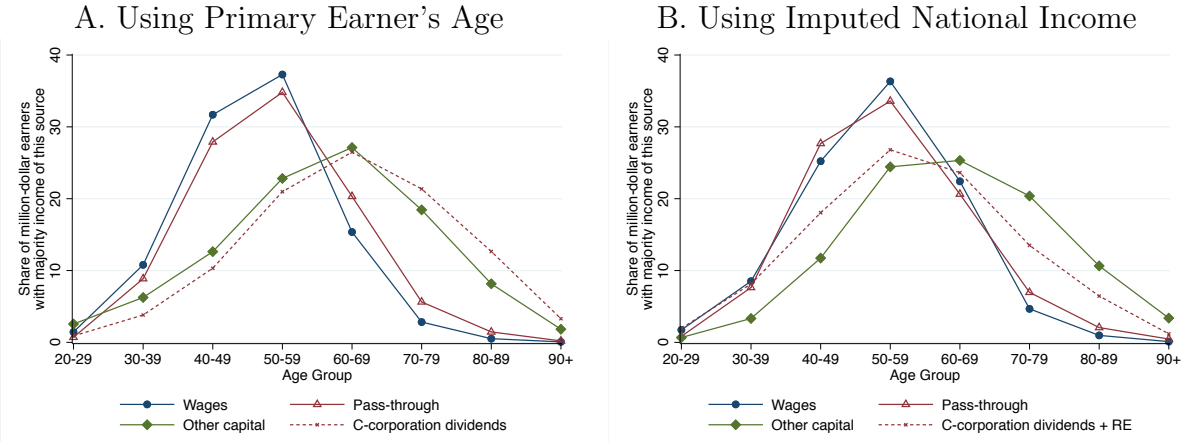
Zwick 2017). The current version reports −72.9% (Table 4A Column 8) at pass-throughs (S-corporations and partnerships). Most of the discrepancy derives from an inappropriate handling of firm reorganizations (i.e., firm exits that are not shutdowns) in the earlier draft, rather than sample differences. A back-of-the-envelope correction to the earlier draft's estimate nearly yields the current version's −72.9% estimate.

The earlier draft found that 28.6% of firm exits were reorganizations. Thus when computing the preferred impact of an owner death on firm survival, that draft multiplied the naive estimate of −41.0% by .714, yielding −29.3% (Table 4A Column 1 of Smith, Yagan, Zidar and Zwick 2017). Multiplying by .714 was a sensible correction for the extensive margin impact, since only 71.4% of the naive extensive-margin impact was genuine. However, the earlier draft applied the same correction to the Column 2 analysis of profits, which was inappropriate. Column 2 of that table analyzed profits at all firms, regardless of whether they exited and even though 100% of the profit impact at surviving firms was genuine. An appropriate back-of-the-envelope correction would therefore have multiplied *only* the extensive-margin component of the profit impact by .714, not the full impact. Combining estimates from Columns 1-3 from that table, that correction would have yielded: $.714 \times (-12307+5090)/24015/.602 = -70.9\%$.

The current version appropriately handles firm reorganizations in a simpler and more straightforward way: we replace firm profit at each reorganized firm with the last observed profit for that firm following Chetty and Saez (2005). We then run regressions on the replaced data, with no need for post-regression multiplication of the surviving share of firms. See Section 3.1 for more detail.

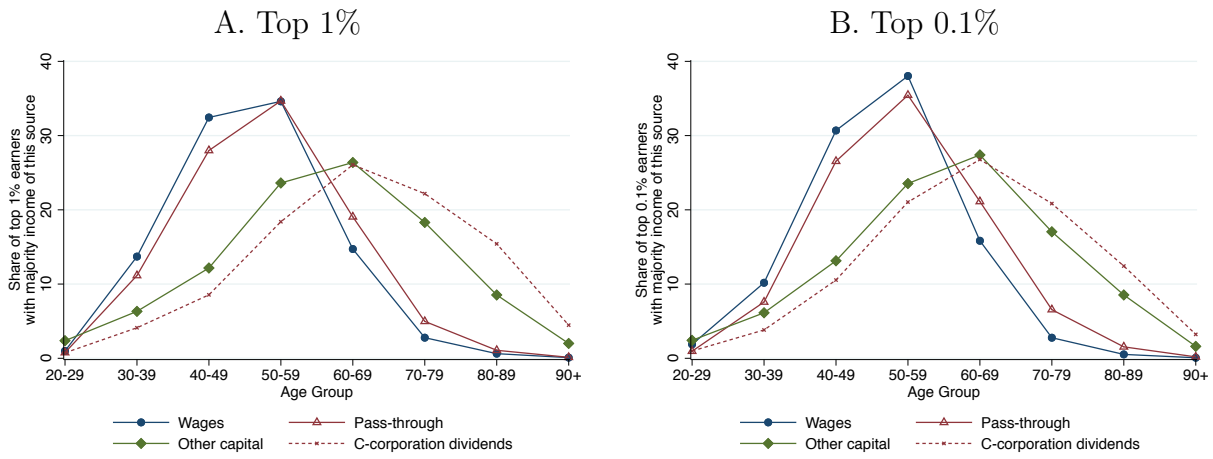
I Appendix Figures

Figure I.1: Working-Age Pass-through Owners Prevail at the Top of the Income Distribution



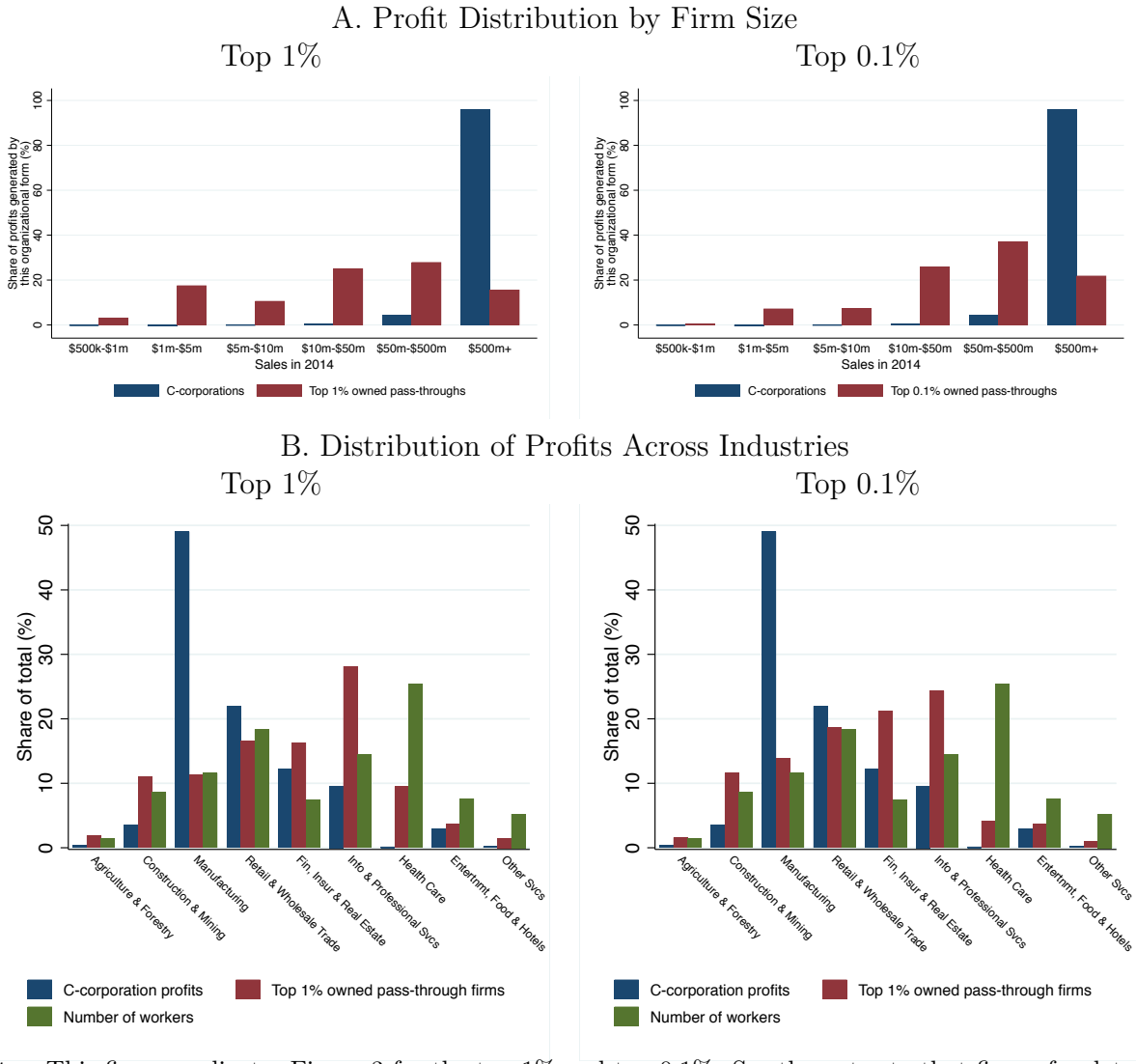
Notes: Panel A replicates Figure 2B when we use the age of the primary tax filer. See the notes to that figure for details. Panel B replicates Figure 2B among million-dollar earners in imputed national income at the individual level.

Figure I.2: Top 1% and Top 0.1% Pass-through Owners are Working Age



Notes: This graph replicates Figure 2B among the top 1% and among the top 0.1%. See the notes to that figure for details.

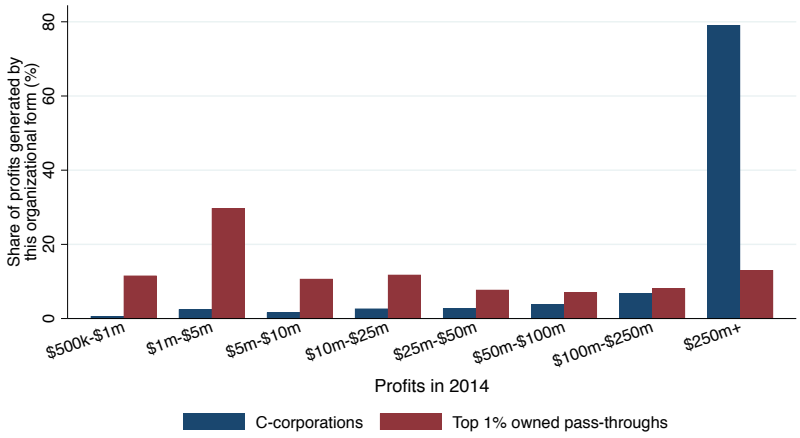
Figure I.3: Profit Distribution of Top-owned Firms by Firm Size and Industry



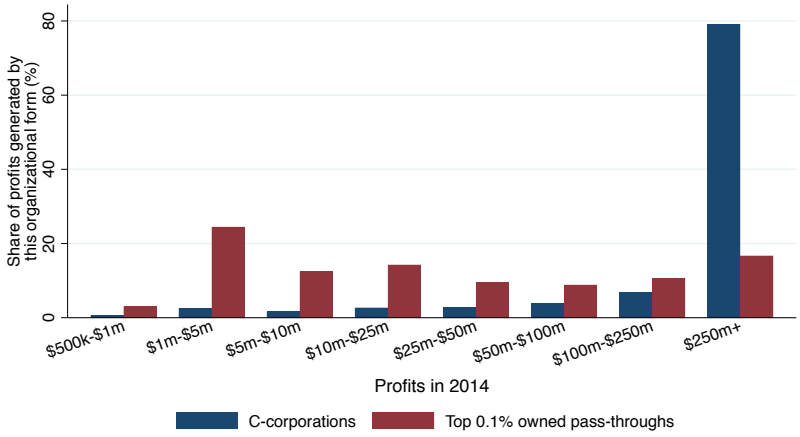
Notes: This figure replicates Figure 3 for the top 1% and top 0.1%. See the notes to that figure for details.

Figure I.4: Profit Distribution of Top-owned Firms by Profit Bin (2014)

A. Top 1%

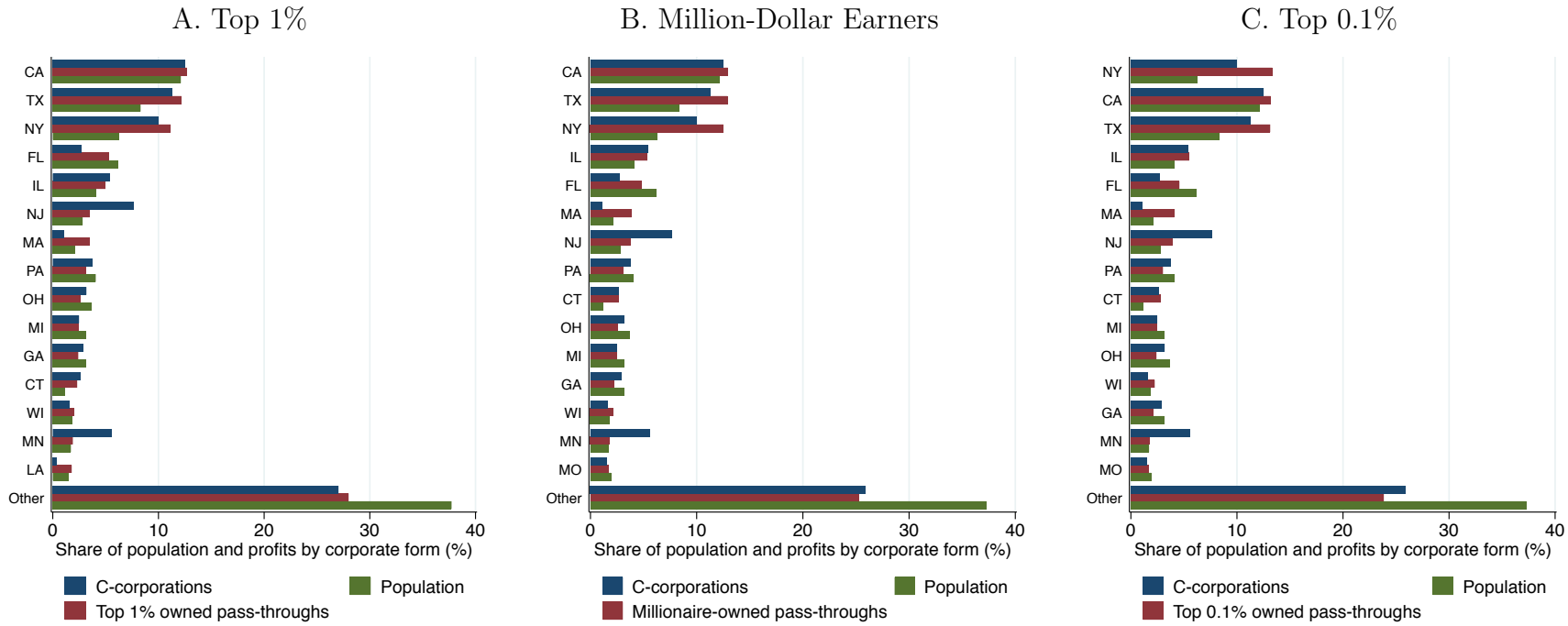


B. Top 0.1%



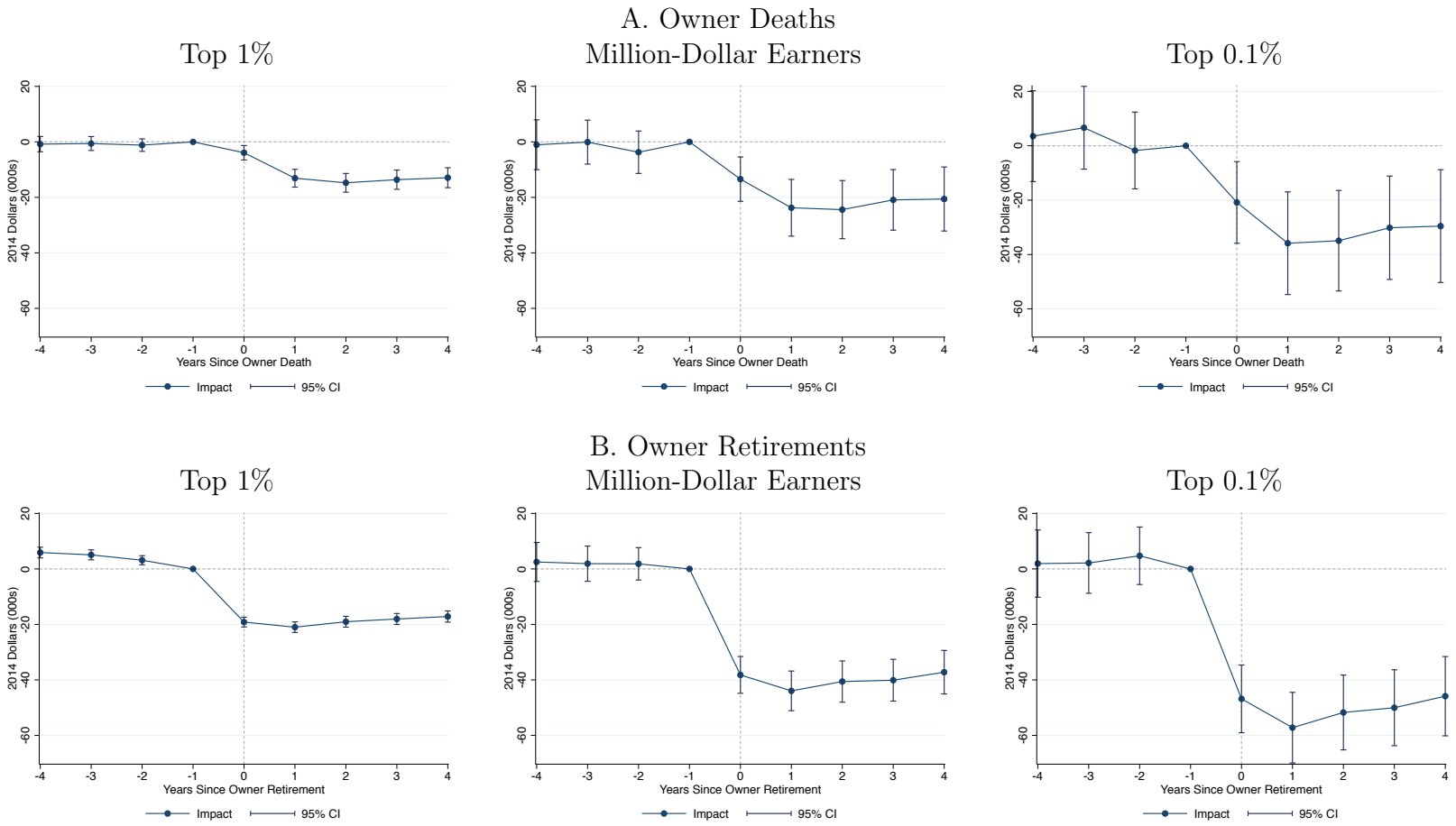
Notes: This figure plots the distribution of profits earned by C-corporations and top-owned pass-through firms in 2014, by total profits and corporate form. The cumulative share of top 1% profits earned by firms with less than $10M in profits is 52.1%. The cumulative share of top 1% profits earned by firms with less than $50M in profits is 71.6%.

Figure I.5: Spatial Allocation of Top-Owned Firms



Notes: This figure uses our 2014 linked-firm-owner data and the SOI sample of C-corporations to show that top-owned pass-through profits are widely distributed across states, and roughly proportional to 2014 state population. State refers to the state listed on the business income tax return, typically the state of the firm headquarters. Owners are indexed by their fiscal income. The "other" category comprises all states not explicitly listed.

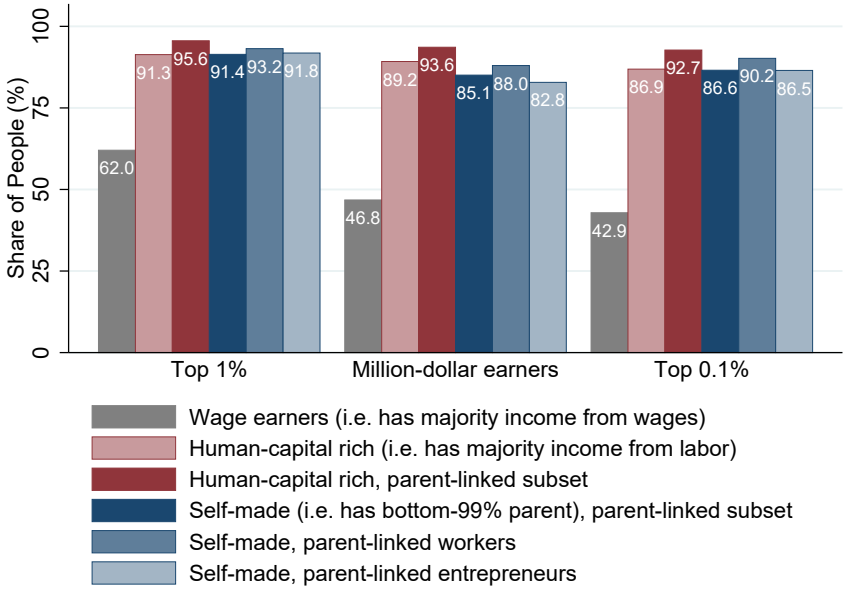
Figure I.6: Profit Impacts of Owner Deaths and Retirements, Additional Top Groups



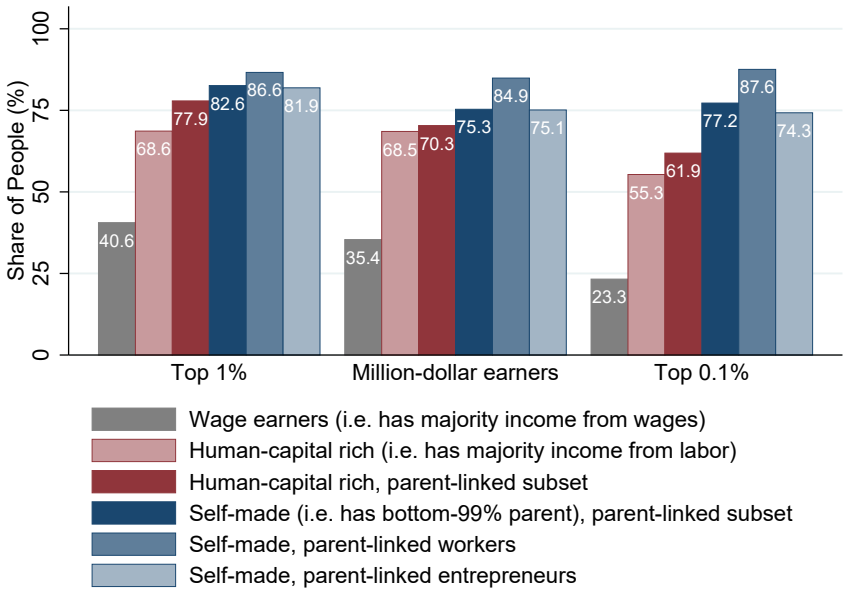
Notes: The middle panels of this figure reproduce the two graphs of Figure 5. See the notes to that figure for details. The left and right panels of this figure repeat the middle panels for owners in the top-1% of the fiscal income distribution and for owners in the top-0.1% of the income distribution, respectively.

Figure I.7: Are Top Earners Human-Capital Rich? Conservative Labor Share

A. Human-Capital Rich and Self-Made Shares of Top Earners (FI)



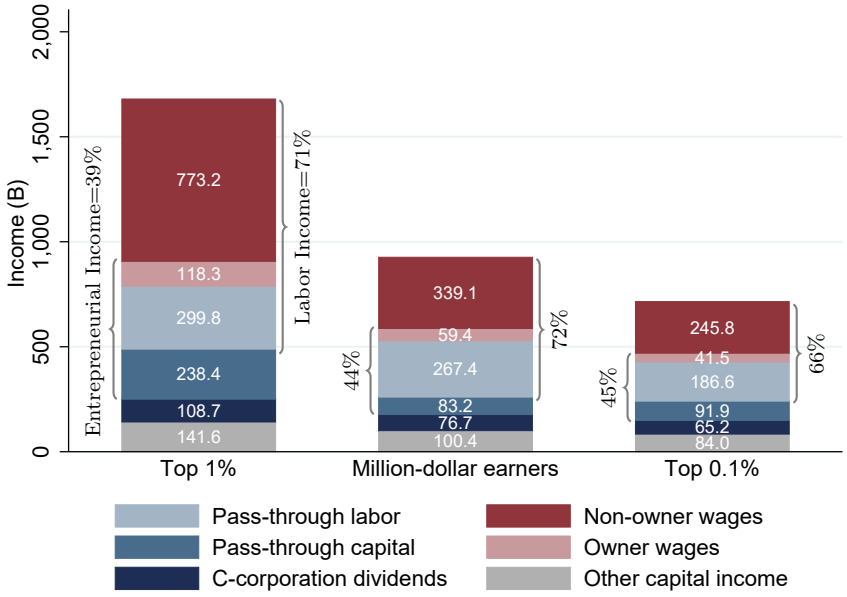
B. Human-Capital Rich and Self-Made Shares of Top Earners (INI)



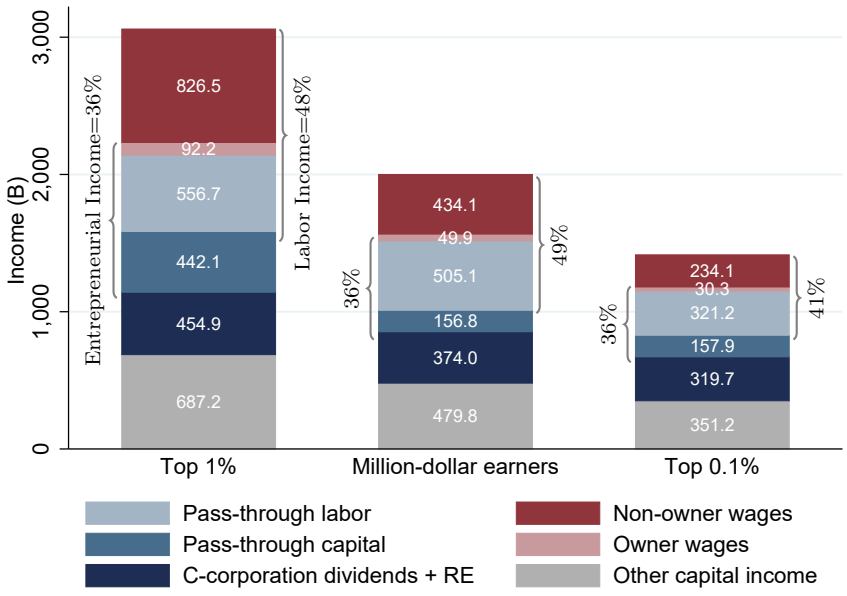
Notes: This figure replicates Figure 7 except that it does not classify 75% of pass-through income as labor income. Instead, the top 1% bars classify 59.6% of pass-through income as labor income, the million-dollar-earner bars classify 81.6%, and the top 0.1% bars classify 71.7%. See Section H.2 and the notes to Figure 7 for details.

Figure I.8: How Do Million-Dollar Earners Earn Their Income? Conservative Labor Share

A. Top Labor and Capital Income (FI)



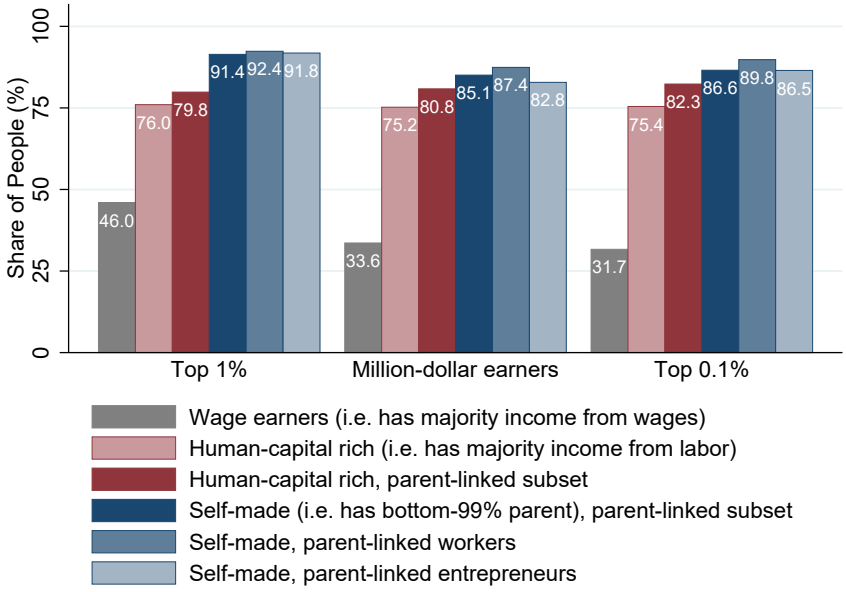
B. Top Labor and Capital Income (INI)



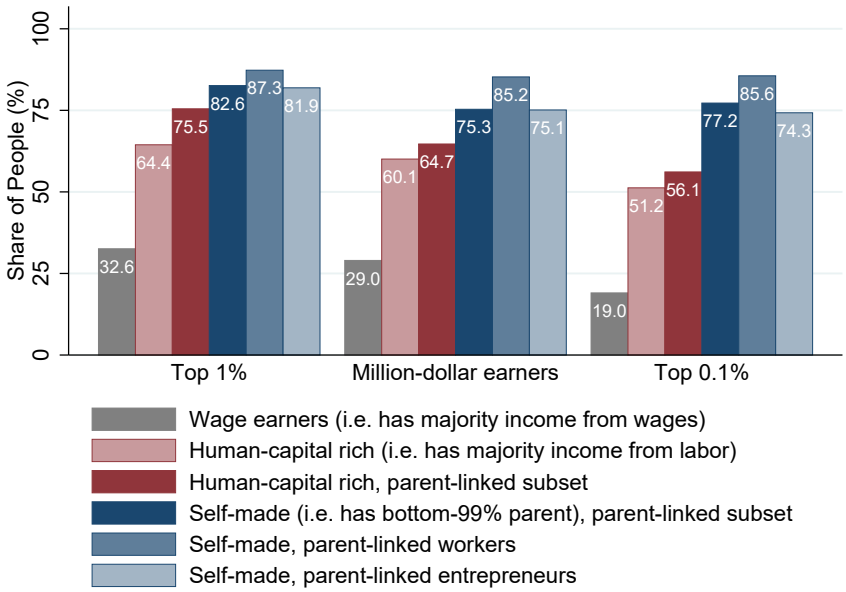
Notes: This figure replicates Figure 8 except that it does not classify 75% of pass-through income as labor income. Instead, the top 1% bars classify 59.6% of pass-through income as labor income, the million-dollar-earner bars classify 81.6%, and the top 0.1% bars classify 71.7%. See Section H.2 and the notes to Figure 8 for details.

Figure I.9: Are Top Earners Human-Capital Rich? Reclassified C-Corp Wages

A. Human-Capital Rich and Self-Made Shares of Top Earners (FI)



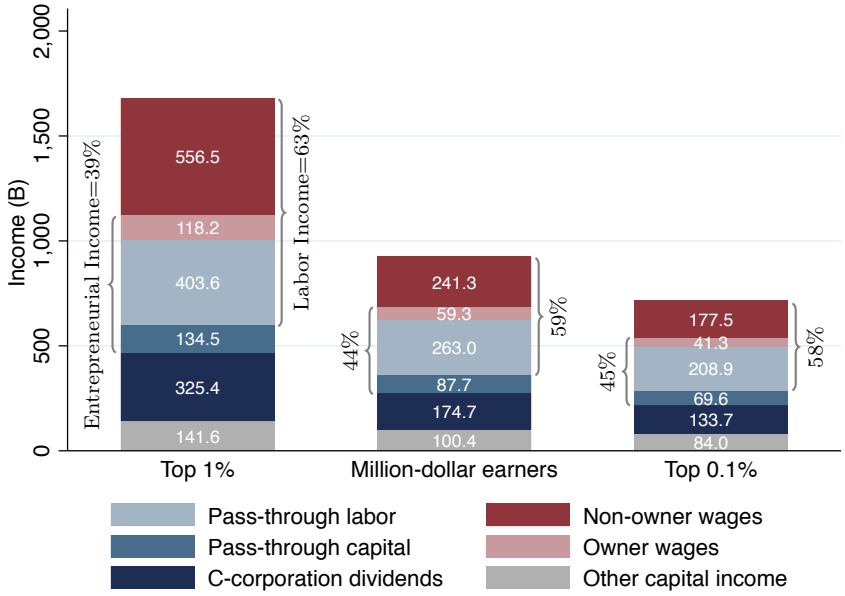
B. Human-Capital Rich and Self-Made Shares of Top Earners (INI)



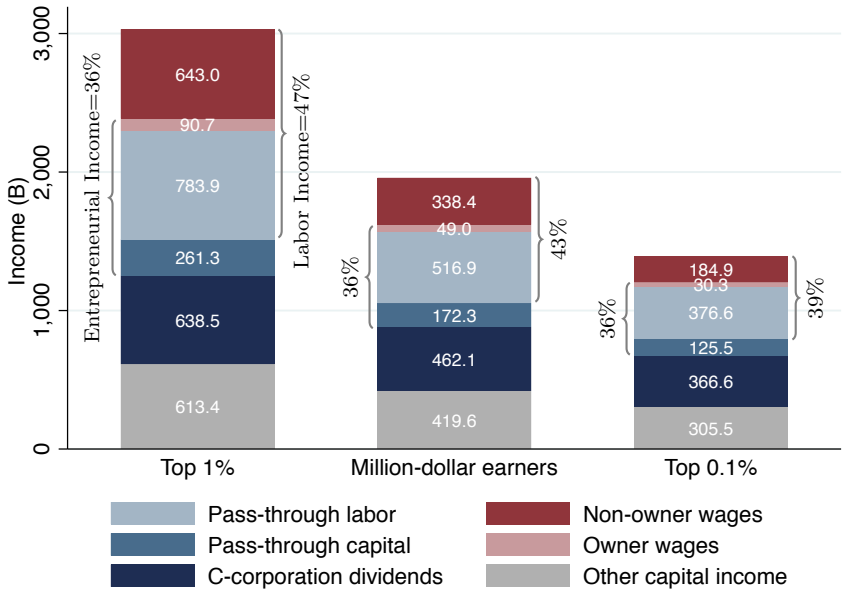
Notes: This figure replicates Figure 7 except it classifies as capital income all wages of individuals whose highest-W2-payer was a private C-corporation. In the case of married tax units, we classify as capital income all wages of the tax unit if either spouse's highest-W2-payer was a private C-corporation. See Section H.2 and the notes to Figure 7 for details.

Figure I.10: How Do Million-Dollar Earners Earn Their Income? Reclassified C-Corp Wages

A. Top Labor and Capital Income (FI)

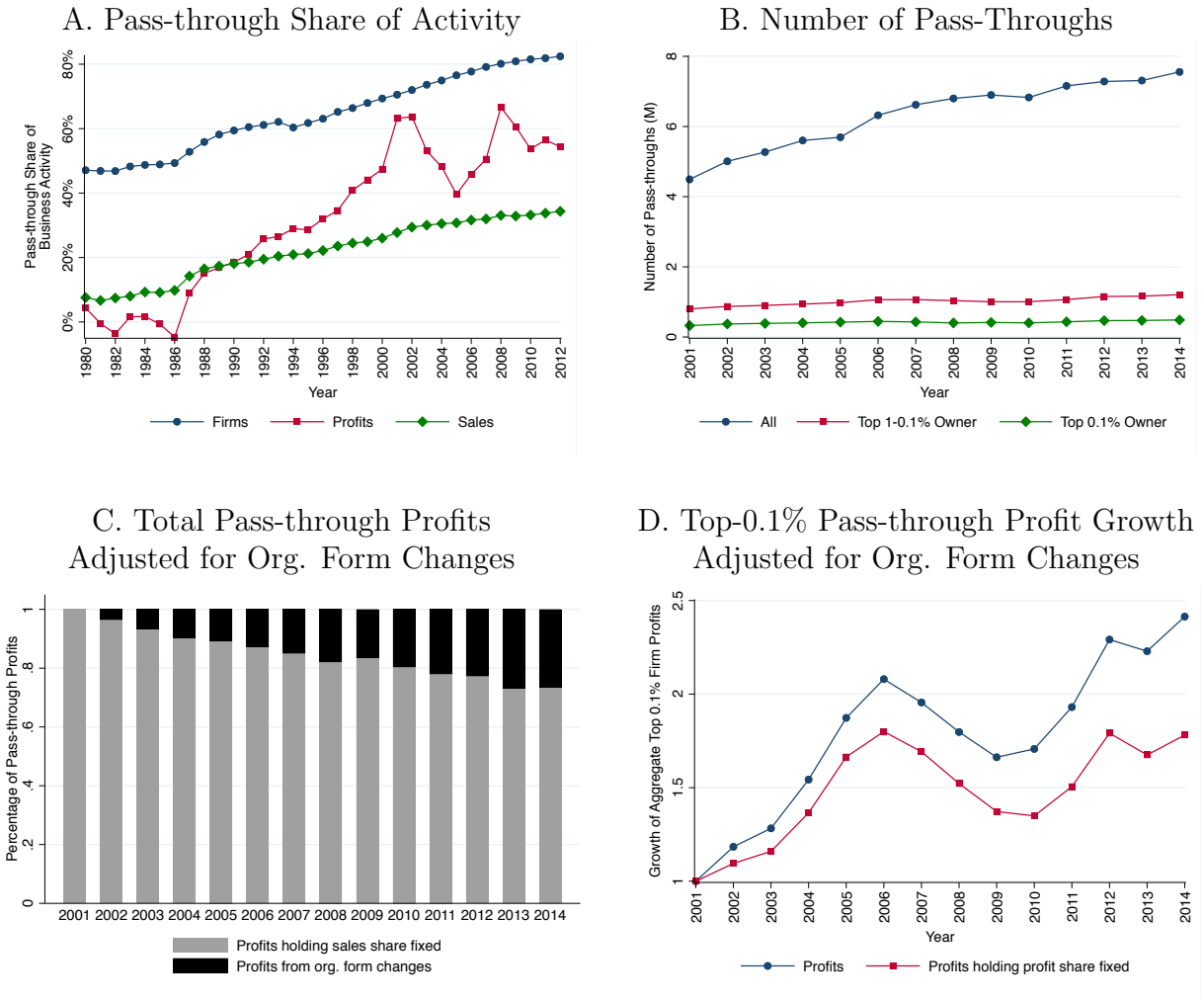


B. Top Labor and Capital Income (INI)



Notes: This figure replicates Figure 8 except it classifies as capital income all wages of individuals whose highest-W2-payer was a private C-corporation. In the case of married tax units, we classify as capital income all wages of the tax unit if either spouse's highest-W2-payer was a private C-corporation. See Section H.2 and the notes to Figure 7 for details.

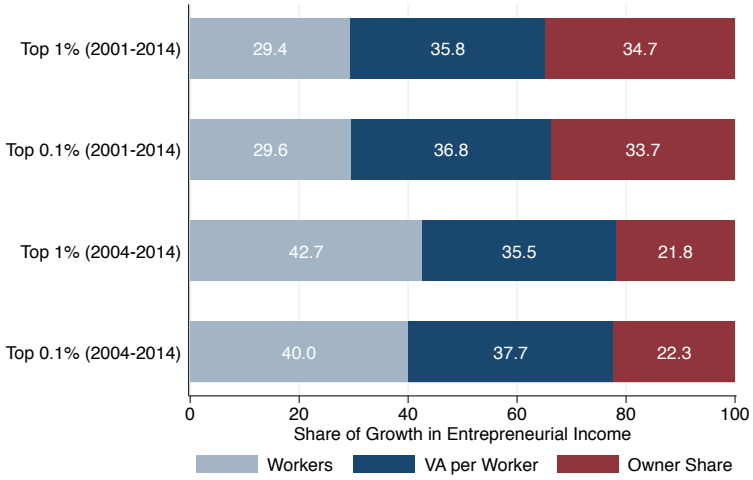
Figure I.11: Growth in Pass-through Profits Accounting for Organizational Form Changes



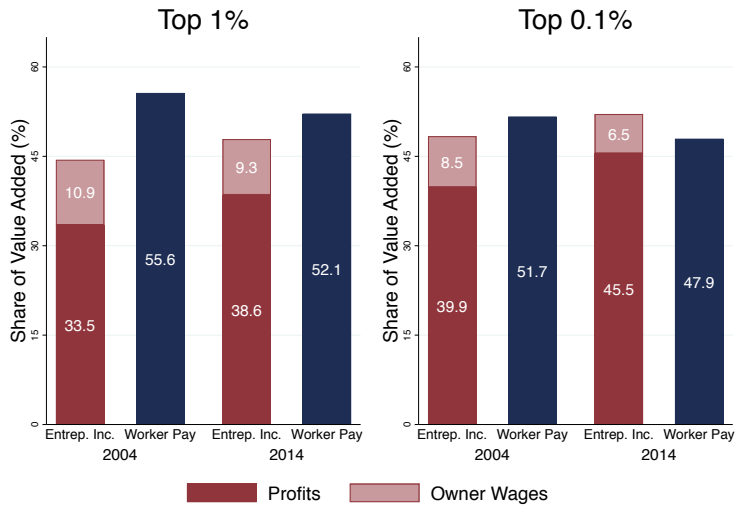
Notes: Panel A uses the SOI C-corporate, S-corporate, and Partnership study files to show the pass-through (S-corporation plus partnership) shares of total business activity since 1980 (measured as the sum of C-corporations, S-corporations, and partnerships). Panel B uses our linked-firm-owner data to show the number of pass-throughs by owner income group since 2001, which is the period for which the US Treasury tax files enable us to link firms and owners. Panel C uses our linked-firm-owner data along with the SOI files to decompose the level of pass-through profits between 2001 and 2014 into actual pass-through profits and the share attributed to organizational form changes. The decomposition assumes the level of pass-through sales is a constant share of total business (i.e., S-corporation plus C-corporation plus partnership) sales. The top bars represent the share of pass-through profits that are attributed to pass-throughs having a higher share of total business sales relative to 2001. Panel D uses our linked-firm-owner data along with the SOI files to apply the same transformation to decompose the growth in pass-through profits among those with top 0.1% owners. The first series shows how actual pass-through profits increased since 2001. The second series shows a counterfactual series, which assumes that pass-through sales are a constant share of total business sector activity equal to the initial psss-through share in 2001.

Figure I.12: Robustness of Value Added Decomposition

A. Decomposing Entrepreneurial Income Growth (Without Adjustment for Org. Form Changes)

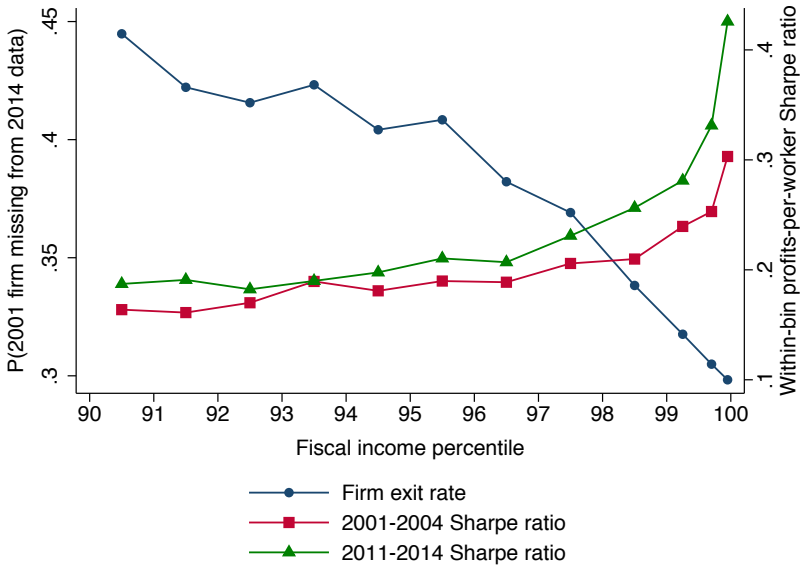


B. Falling Wages and Rising Entrepreneurial Income Since 2004



Notes: Panel A replicates Figure 10C without adjusting for organizational form changes. Not accounting for changes in organizational form overstates the role of growth in scale in explaining the rise in entrepreneurial income in our analysis sample. Panel B replicates Figure 10D using 2004 as the baseline year. This figure suggests that our findings are robust to our baseline year of choice.

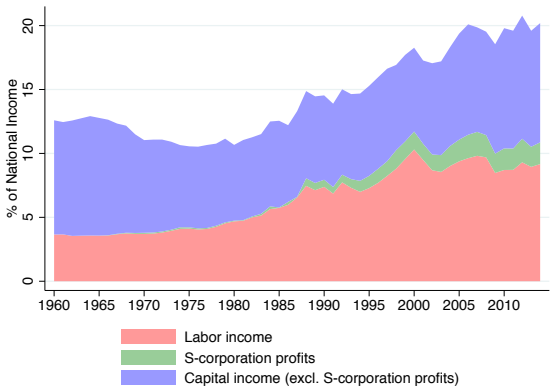
Figure I.13: Risk Decreases with Owner Income Rank



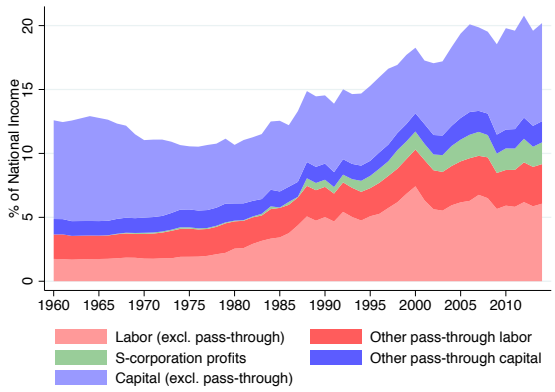
Notes: This figure plots measures of risk in the linked-firm-owner data by owner fiscal income percentile. The circles plot the share of 2001 pass-throughs within each fiscal income bin that had exited the sample by 2014, weighting by the firm's 2001 number of employees. The squares and triangles plot a measure of the mean Sharpe ratio across firms. Our Sharpe ratio is defined as the average profits per worker at firms owned by individuals within the fiscal income bin divided by the standard deviation of profits per worker at those firms, weighting firms by their number of workers and then averaging ratios across the listed years.

Figure I.14: Pass-Through Income in Top 1% Imputed National Income (PSZ, 2018)

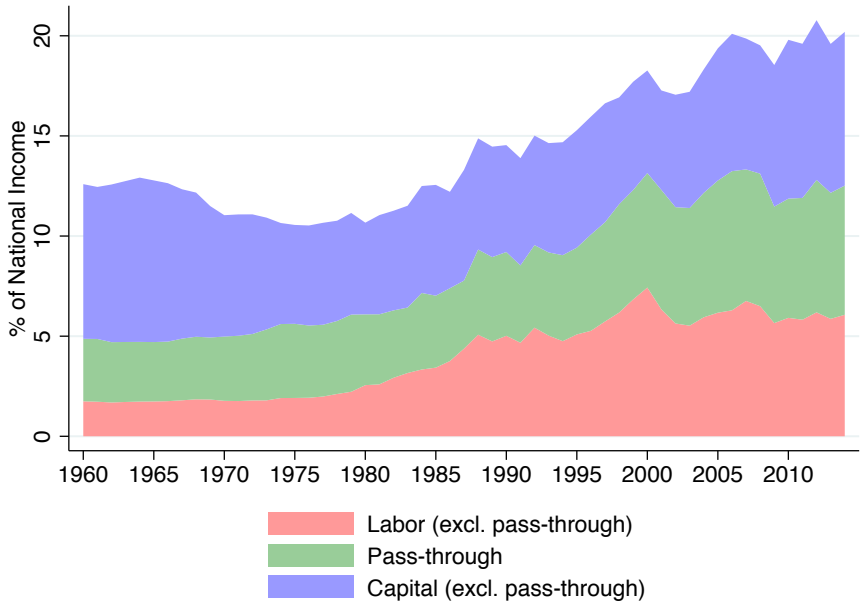
A. PSZ Appendix Figure S.34



B. Isolating mixed income

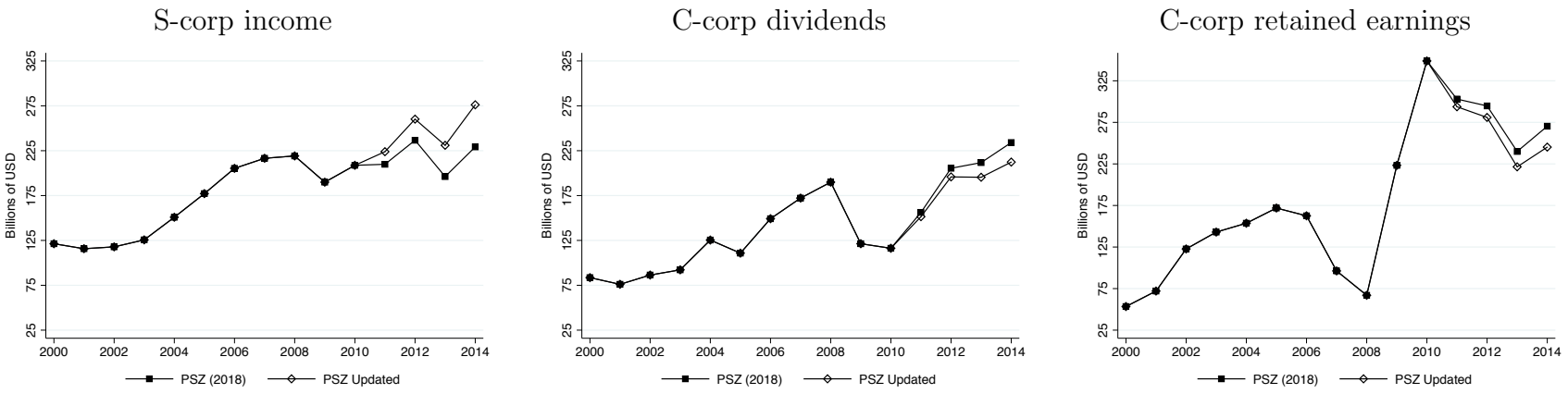


C. Pass-through income



Notes: This figure plots components of top income from imputed national income. Panel A replicates Appendix Figure S.34 from Piketty, Saez and Zucman (2018). Panel B modifies Panel A by applying shading to the components of labor and capital income that reflect allocations from mixed income. Panel C applies the same shading to S-corporation profits and the labor and capital components of PSZ. See Appendix C for further discussion.

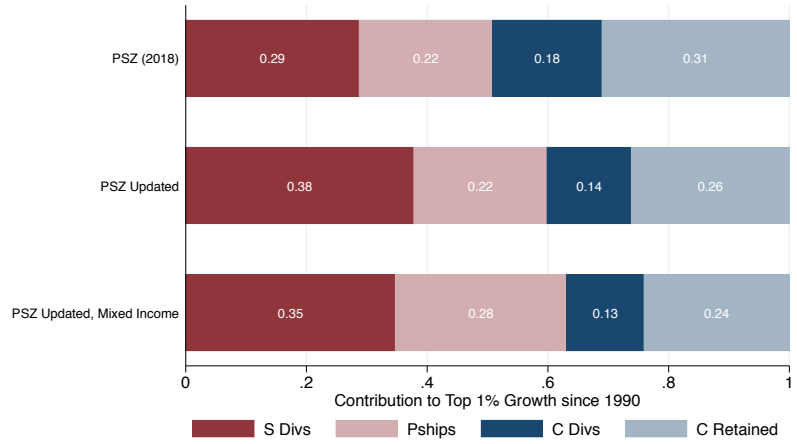
Figure I.15: Effect of Updating Financial Accounts Wealth on Imputed Equity Income



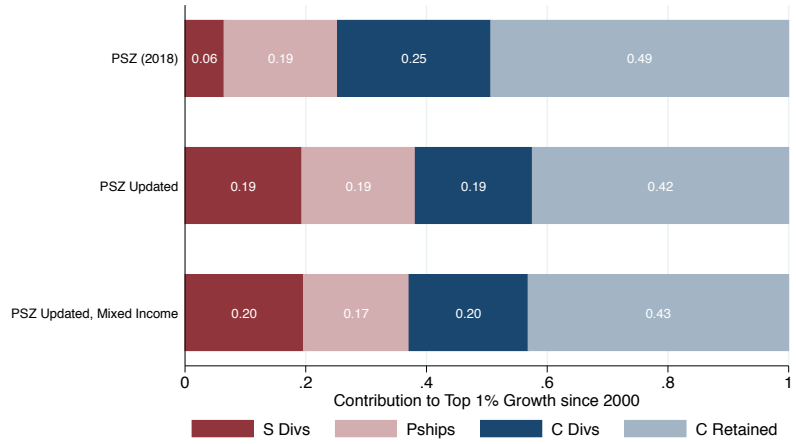
Notes: This figure shows the effect of updating the equity income components in imputed national income to reflect actual aggregate wealth estimates for 2011–2014. See Appendix D for more detail.

Figure I.16: Effect of Updating Financial Accounts Wealth on the Composition of Business Income Growth

A. Contributions to business income growth (1990–2014)



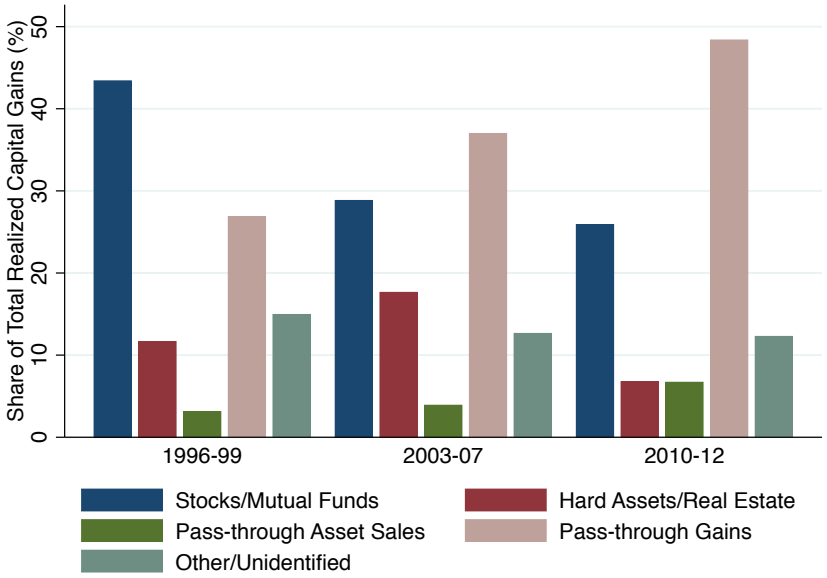
B. Contributions to business income growth (2000–2014)



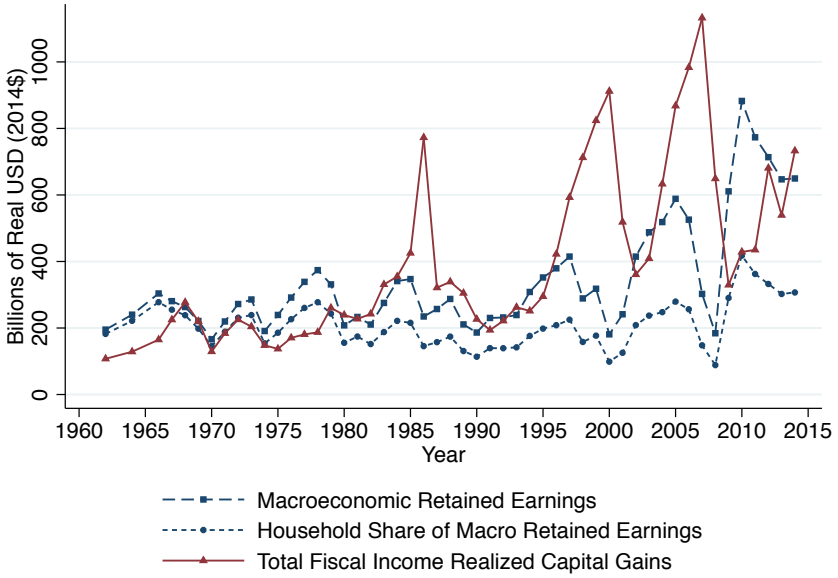
Notes: This figure shows the effect of updating the equity income components in imputed national income to reflect actual aggregate wealth estimates for 2011–2014. Panels A and B quantify the relative contributions from S-corporation income, C-corporation income, and partnerships to overall business income growth over the periods 1990–2014 and 2000–2014, respectively. "PSZ Updated, Mixed Income" defines partnership income as total labor and capital mixed income, instead of fiscal partnership income. For each scenario, we compute the contribution of business income to top income growth (e.g., business income increased by 2.8% of national income from 1990 to 2014) and divide this amount into contributions from each source (e.g., S-corporation income increased by 1.1% of national income from 1990 to 2014, or 40% of the business income increase). See Appendix D for more detail.

Figure I.17: Realized Capital Gains, C-Corporation Stock, and Retained Earnings

A. Realized Capital Gains Composition

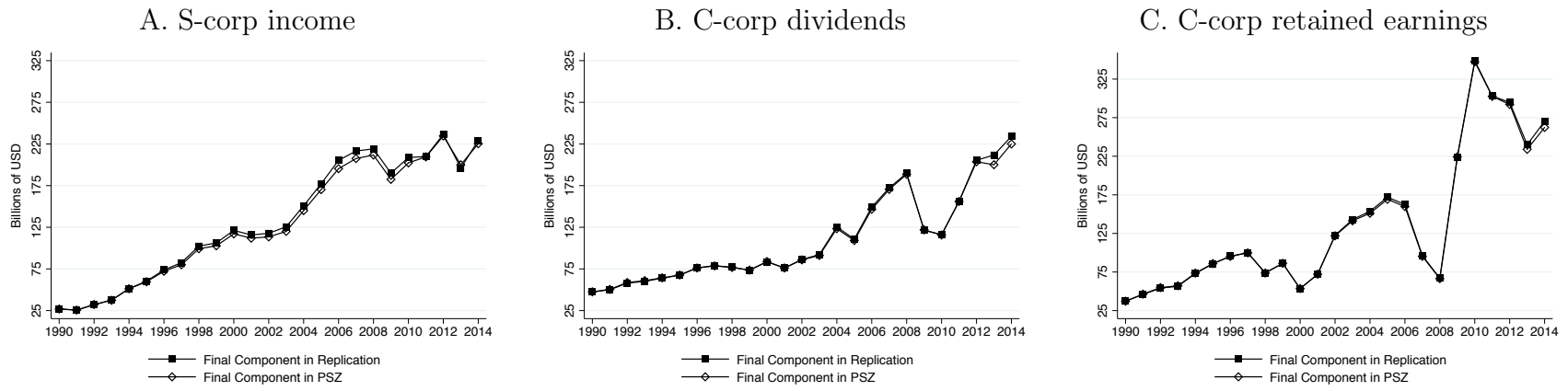


B. Realized Capital Gains vs. Retained Earnings



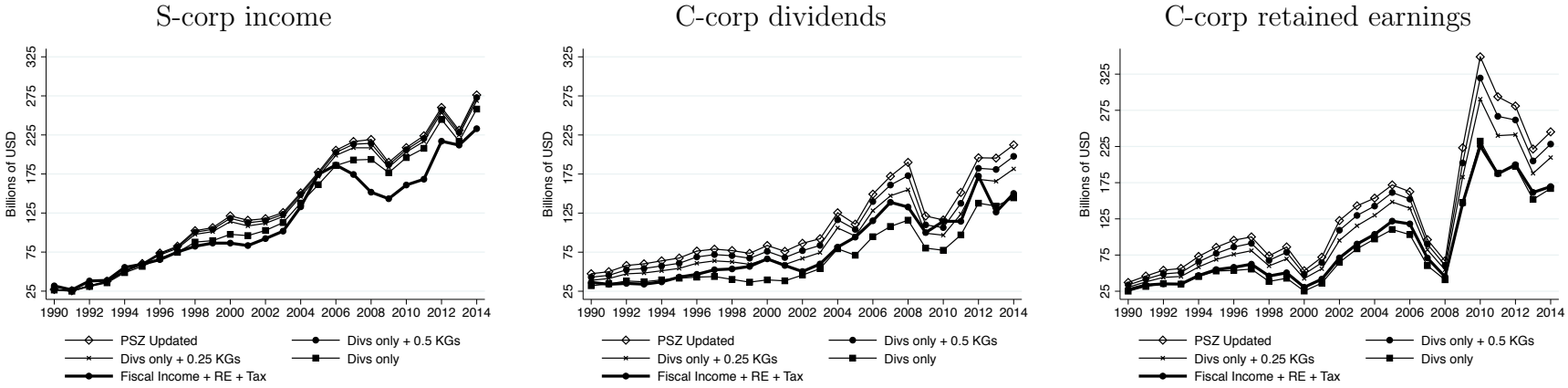
Notes: Panel A plots the share of total realized capital gains accrued to stocks/mutual funds, hard assets, pass-through asset sales, pass-through gains, and other assets in 1996–1999, 2003–2007, and 2010–2012. Hard assets includes net gains/losses for depreciable business personal property, depreciable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

Figure I.18: Replication of Imputed National Income Equity Income Components



Notes: This figure implements the formulas in Appendix F.1 and compares the replication of the final imputed income estimates to those in PSZ's appendix spreadsheet, converted to dollars to aid comparison of alternative scenarios.

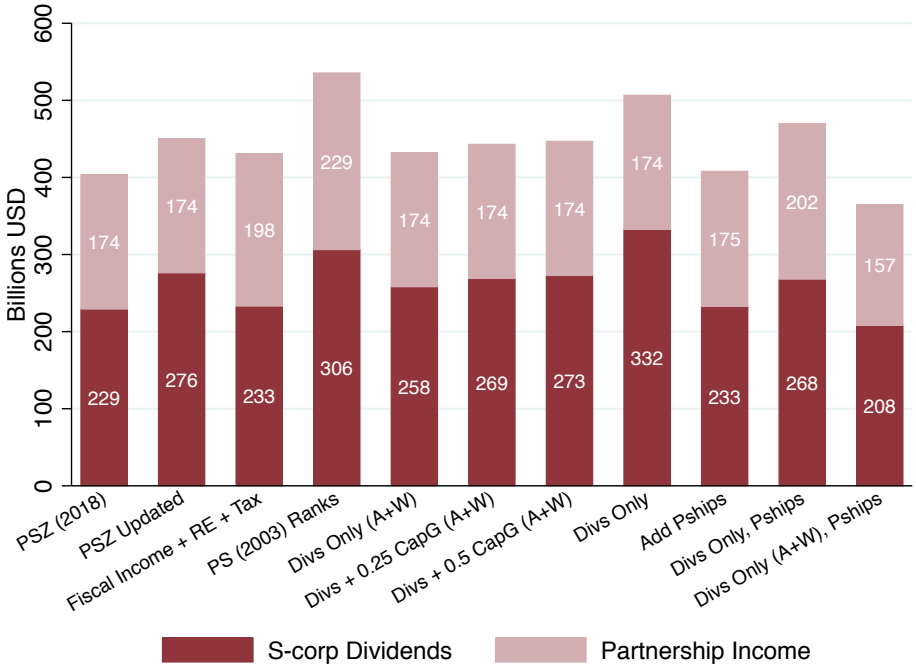
Figure I.19: Effect of Alternative Capital Gains Assumptions on Imputed Equity Income



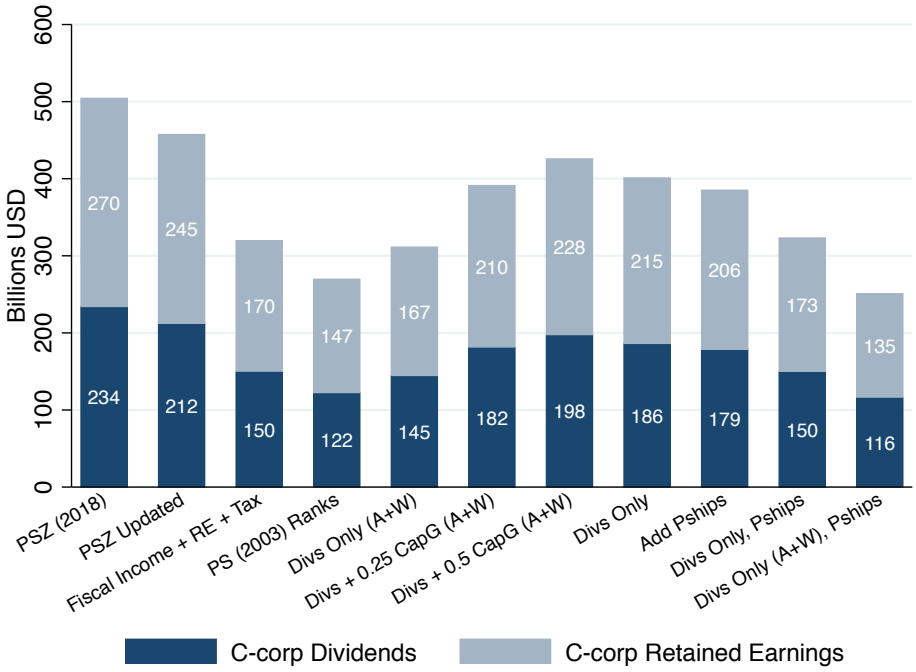
Notes: This figure graphs S-corporation income, C-corporation dividends and retained earnings under alternative assumptions for using realized capital gains to impute equity income. These alternative assumptions reflect the possibility some realized capital gains are not due to the sale of C-corporation stock and thus should not be used to estimate the ownership of C-corporation stock. **PSZ Updated** updates the original PSZ series to reflect actual aggregate wealth estimates. **Divs only**, **Divs only + 0.25 KGs** and **Divs only + 0.5 KGs** respectively graph a dividends-only method, and scenarios that use dividends plus 25% or 50% of realized capital gains. We make these adjustments for wealth estimates used in both the allocation and total equity income components of the imputed national income (INI) formulas. **Fiscal Income + RE + Tax** uses INI ranks and household definitions to identify the top 1 percent, then uses fiscal income data for S-corporation dividends, partnership income, and C-corporation dividends. For C-corporation retained earnings, this scenario allocates a share of macroeconomic retained earnings in proportion to C-corporation dividends only. It then allocates corporate tax to each component in proportion to these pre-tax figures. See Appendix F.2 for discussion.

Figure I.20: Top 1% Business Income Sources under Alternative Imputation Assumptions

A. Pass-through income

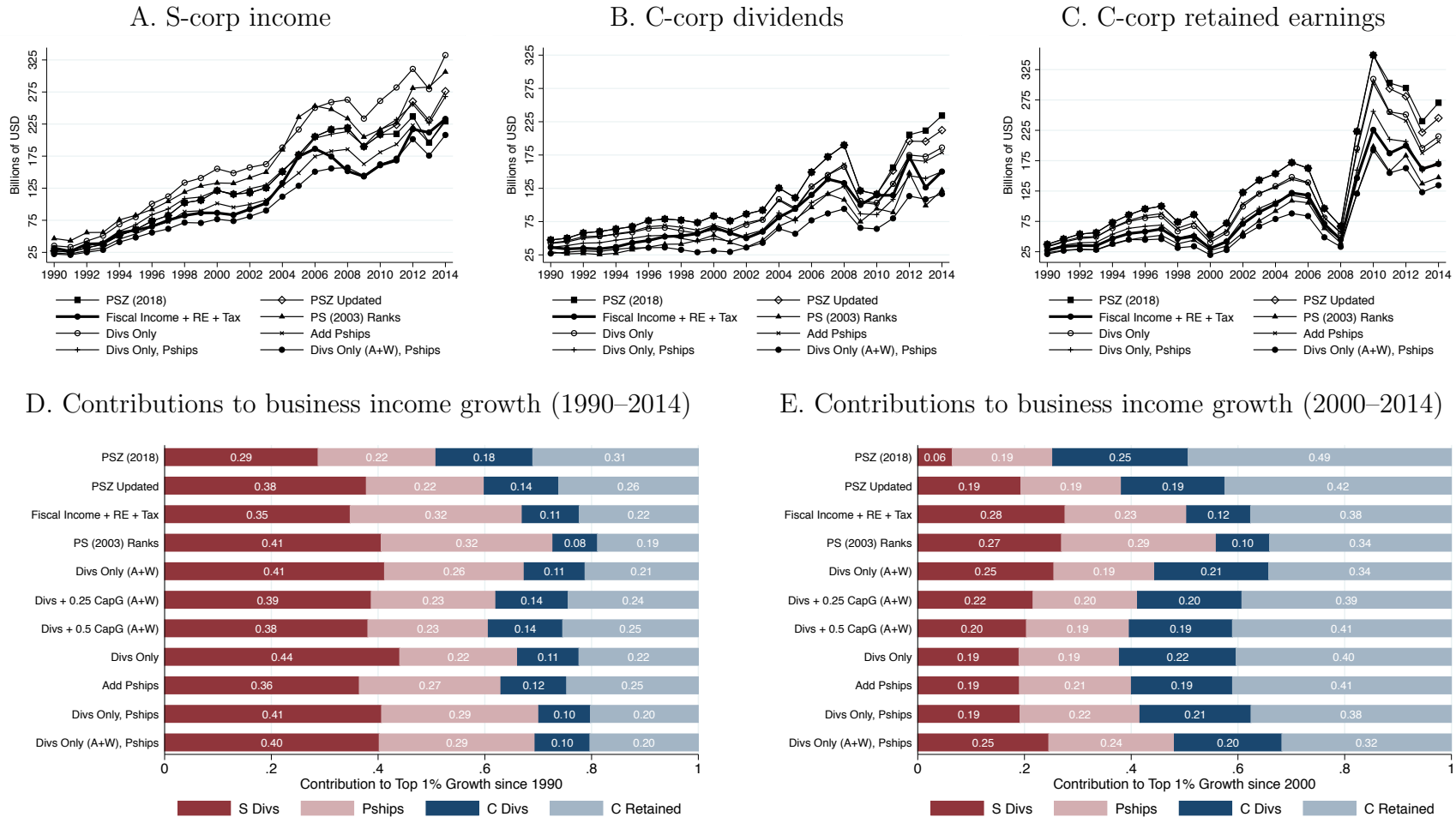


B. C-corporation income



Notes to Figure I.20: This figure plots business income sources in 2014 under alternative assumptions for imputing national income. We consider the following scenarios: 1. **PSZ (2018)**. Original imputed national income (INI) numbers from PSZ. 2. **PSZ Updated**. For the years from 2011 through 2014, PSZ extrapolate top 1 S-corporation and C-corporation wealth: they start with the 2010 values and then grow them using the growth rate of aggregate household equity wealth. This scenario updates the INI series from PSZ to reflect actual aggregate wealth estimates. 3. **Fiscal Income + RE + Tax**. Use imputed national income ranks and household defintions from PSZ to identify the top 1%. Then use fiscal income data for S-corporation dividends, partnership income, and C-corporation dividends. For C-corporation retained earnings, allocate a share of macroeconomic retained earnings in proportion to C-corporation dividends. Then allocate corporate tax to each component in proportion to these pre-tax figures. 4. **PS (2003) Ranks**. Use the Raw Data + Tax method for fiscal income data for top 1 percent households identified using the Piketty and Saez (2003) method of sorting households by fiscal income excluding capital gains. 5. **Divs Only (A+W)** ("A" for Allocation, "W" for Wealth). Use only fiscal C-corporation dividends (not capital gains) to compute C-corporation dividend and C-corporation retained earnings allocation factors and in the computation of top 1% equity income. 6. **Divs Only + 0.25 CapG (A+W)**. Use fiscal C-corporation dividends plus 25% of realized capital gains to compute C-corporation dividend and C-corporation retained earnings allocation factors and in the computation of top 1 equity income. 7. **Divs Only + 0.5 CapG (A+W)**. As above, but uses fiscal C-corporation dividends plus 50% of realized capital gains. 8. **Divs Only**. Use fiscal C-corporation dividends only to compute C-corporation dividend and C-corporation retained earnings allocation factors, but leave top 1% equity income unchanged. 9. **Add Pships**. Add fiscal partnership income as a fourth allocation component and to top 1% equity income. 10. **Divs Only, Pships**. Use both the Divs Only method for allocation and the Add Pships method to include partnership income. 11. **Divs Only (A+W), Pships**. Use the Divs Only method for both allocation and the computation of top 1% equity income and the Add Pships method to include partnership income. Scenarios 5–11 all apply the extrapolation fix in scenario 2. Scenarios 1, 2, and 5–8 use raw partnership income without a corporate tax imputation. Appendix F.3 provides additional discussion of this analysis.

Figure I.21: Top 1% Business Income Growth under Alternative Imputation Assumptions



Notes: This figure plots the growth of business income sources under alternative assumptions for imputing national income. For detail on these assumptions, see the note to Figure I.20 and the discussion in Section F.3. Panels A–C plot the time series of S-corporation income, C-corporation dividends, and C-corporation retained earnings from 1990 to 2014. Panels D and E quantify the relative contributions from S-corporation income, C-corporation income, and partnerships to overall business income growth over the periods 1990–2014 and 2000–2014, respectively. For each imputation scenario, we compute the contribution of business income to top income growth (e.g., business income increased by 2.8% of national income from 1990 to 2014) and divide this amount into contributions from each source (e.g., S-corporation income increased by 1.1% of national income from 1990 to 2014, or 40% of the business income increase). See Appendix F.4 for discussion.

J Appendix Tables

Table J.1: Summary Statistics on S-Corporations and Their Owners

A. Firm Summary Statistics

	A. All Firms				B. Firms with Top 1-0.1% Owner				C. Firms with Top 0.1% Owner			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Sales	1,824	21	264	2,639	4,267	56	1,256	9,937	22,520	61	3,581	49,917
Profits	93	-27	14	183	234	-26	125	691	1,597	-80	283	3,681
Profit margin	0.05	-0.19	0.05	0.40	0.11	-0.03	0.08	0.43	0.12	-0.02	0.08	0.45
Assets	919	0	54	922	1,878	12	311	3,742	14,163	40	1,427	22,068
Employees	13.9	0.0	2.0	25.3	32.8	0.0	7.0	70.6	103.0	0.0	10.6	190.5
Employees | Employees > 0	20.4	1.0	5.0	37.1	43.0	1.2	12.8	89.4	150.8	2.3	34.9	267.4
Entrepreneurial income	147	-14	38	311	400	-9	294	.	.	-47	467	.
Number of owners	1.6	1.0	1.0	2.4	2.2	1.0	1.2	4.0	3.4	1.0	2.0	6.1
Sales per worker	195.1	22.7	88.3	362.2	323.5	31.3	139.8	647.0	865.2	29.4	190.9	1,241.0
Profits per worker	18.4	-5.5	4.2	47.6	39.7	-2.0	10.6	111.7	139.9	-4.8	11.8	186.9
Profits per worker, employees-weighted	5.5	-1.7	1.0	16.0	6.3	-0.4	1.5	17.6	12.3	-0.0	2.7	28.4
Profits per owner	57.3	-18.9	10.6	132.9	153.7	-14.3	74.0	465.0	827.4	-37.8	127.5	2,071.0
Entrep. income per owner	92.2	-10.3	28.1	219.6	249.5	-4.8	180.0	652.4	959.3	-22.1	206.8	2,426.0
Entrep. income per worker	36.1	-1.2	13.5	85.0	72.8	0.4	25.3	208.8	190.6	-1.7	20.1	302.4
Entrep. income / profit	1.69	0.31	1	4.08	2.05	0.93	1.14	4.24	1.57	0.77	1	2.25
Entrep. income / sales	0.13	-0.19	0.13	0.61	0.20	-0.05	0.17	0.70	0.16	-0.12	0.11	0.79
Number of firm-years	43,898,440				4,933,977				1,367,487			

B. Owner Summary Statistics

	A. All Owners				B. Top 1-0.1% Owners				C. Top 0.1% Owners			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Income	213	15	98	423	646	391	560	1,076	4,511	1,549	2,391	7,486
Age	50.0	34.7	49.8	66.3	52.1	38.8	51.5	66.9	54.9	40.9	54.4	70.9
Number of firms owned	1.1	1.0	1.0	1.7	1.3	1.0	1.0	2.0	1.8	1.0	1.0	3.1
Wage income	71	0	31	157	205	0	148	489	743	0	249	1,749
S-corporation income	60.04	-15.78	8.85	132.37	198.26	-4.34	127.40	548.25	1536	-4.70	749.34	3358
Entrepreneurial income	100	-8	27	229	322	0	285	760	.	0	.	.
S-corp income / entrep. income	0.68	0.03	1	1	0.72	0.12	0.86	1	0.82	0.34	1	1
Wage income / income	0.64	0	0.29	0.95	0.33	0	0.25	0.82	0.21	0	0.09	0.70
Entrep. income / income	0.73	-0.08	0.39	1.01	0.50	0	0.51	1	0.48	0	0.49	0.98
Business income / income	0.22	-0.17	0.16	0.84	0.38	0	0.40	0.82	0.53	0	0.64	0.92
Only earns passive income	0.08	0	0	0	0.07	0	0	0	0.05	0	0	0
Number of owner-years	61,764,812				5,966,540				1,103,585			

Notes: This table replicates Table 1, restricting to S-corporation observations only. Dollar values are in thousands of 2014 dollars. The main sample comprises firm-owner-year observations with positive sales and non-zero profits. Panel A pools distinct firm-year observations. Panel B pools distinct owner-year observations. All statistics are unweighted, unless otherwise specified.

Table J.2: Summary Statistics on Partnerships and Their Owners

A. Firm Summary Statistics

	A. All Firms				B. Firms with Top 1-0.1% Owner				C. Firms with Top 0.1% Owner			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Sales	1,767	4	136	2,040	2,434	5	366	4,895	11,233	8	634	14,468
Profits	-152	-45	6	240	244	-74	24	796	1,609	-244	40	2,608
Profit margin	0.06	-0.77	0.05	0.80	0.13	-0.56	0.10	0.91	0.15	-0.52	0.11	0.93
Employees	10.2	0.0	0.0	17.9	17.5	0.0	0.0	38.4	38.5	0.0	0.0	74.0
Employees | Employees > 0	30.3	1.3	7.7	58.4	44.4	2.0	13.6	92.9	112.9	2.8	28.6	208.1
Entrepreneurial income	135	-35	6	217	212	-54	22	712	.	-161	28	.
Number of owners	4.4	1.0	2.0	4.0	4.0	1.0	2.0	7.1	27.8	1.0	3.0	21.2
Sales per worker	202.2	12.5	72.0	370.0	277.0	16.5	109.6	523.8	504.0	15.1	98.5	781.2
Profits per worker	2.5	-11.7	2.1	60.4	38.7	-11.3	5.8	117.8	77.5	-34.9	2.7	157.6
Profits per worker, employees-weighted	-22.1	-3.8	0.7	30.7	9.2	-2.4	1.1	32.3	24.6	-2.6	2.1	79.5
Profits per owner	-275.5	-20.6	2.6	106.5	87.6	-26.7	8.5	324.4	362.1	-61.2	8.5	798.9
Entrep. income per owner	34.9	-16.1	2.8	95.3	70.0	-19.6	7.6	292.7	229.0	-40.1	5.8	587.6
Entrep. income per worker	20.6	-8.5	3.1	61.7	39.0	-7.5	6.7	116.9	68.1	-21.8	2.5	145.4
Entrep. income / profit	0.95	0.50	1	1	0.93	0.41	1	1	0.82	0.23	0.99	1
Entrep. income / sales	0.06	-0.82	0.06	0.81	0.14	-0.67	0.10	0.94	0.13	-0.82	0.09	0.95
Number of firm-years	15,035,028				2,445,622				1,097,116			

B. Owner Summary Statistics

	A. All Owners				B. Top 1-0.1% Owners				C. Top 0.1% Owners			
	Mean	p10	p50	p90	Mean	p10	p50	p90	Mean	p10	p50	p90
Income	263	10	97	548	664	396	581	1,102	4,845	1,569	2,466	8,247
Age	52.6	33.6	52.3	73.6	52.7	39.1	52.0	68.0	54.0	40.4	53.3	69.9
Number of firms owned	1.4	1.0	1.0	2.0	1.7	1.0	1.0	3.0	2.6	1.0	1.4	5.5
Wage income	83	0	1	177	201	0	71	587	1,102	0	178	2,745
Partnership income	39.98	-8.16	0.34	76.69	132.41	-6.81	7.50	508.35	658.49	-22.16	11.02	1962
Entrepreneurial income	43	-8	0	87	138	-6	8	522	670	-22	12	.
Pship income / entrep. income	0.98	1	1	1	0.98	1	1	1	0.99	1	1	1
Wage income / income	0.63	0	0	0.95	0.31	0	0.12	0.93	0.26	0	0.06	0.94
Entrep. income / income	3.85	-0.08	0.01	0.79	0.21	-0.01	0.01	0.90	0.18	-0.01	0	0.87
Business income / income	0.22	-0.09	0.02	0.97	0.36	-0.01	0.25	0.97	0.42	-0.01	0.45	0.96
Only earns passive income	0.16	0	0	1	0.14	0	0	1	0.09	0	0	0.30
Number of owner-years	46,810,812				5,826,709				1,225,439			

Notes: This table replicates Table 1, restricting to partnership observations only. Dollar values are in thousands of 2014 dollars. The main sample comprises firm-owner-year observations with positive sales and non-zero profits. Panel A pools distinct firm-year observations. Panel B pools distinct owner-year observations. All statistics are unweighted, unless otherwise specified.

Table J.3: Firm and Owner Counts by Industry for S-Corporations and Partnerships

	Top 0.1% Owners					Top 1-0.1% Owners			
Industry (NAICS)	S Firms	S Owners	P Firms	P Owners	Industry (NAICS)	S Firms	S Owners	P Firms	P Owners
Lessors of real estate (5311)	12573	18150	115664	200328	Offices of physicians (6211)	41975	63386	7463	36957
Activities related to real estate (5313)	10911	14973	47793	92785	Lessors of real estate (5311)	33466	56383	277828	684343
Automobile dealers (4411)	5236	7927	1418	2287	Activities related to real estate (5313)	25314	39844	96502	258321
Offices of physicians (6211)	4711	5817	1333	2440	Other professional/technical svc (5419)	22841	32287	13018	32316
Restaurants (7225)	4471	6133	5978	10986	Offices of dentists (6212)	18413	21199	2120	3737
Other professional/technical svc (5419)	4291	5672	4443	8179	Restaurants (7225)	16300	26823	10520	29476
Other financial investment actvty (5239)	4030	6215	61477	349033	Legal svc (5411)	13240	16808	8987	52849
Management/technncl consulting svc (5416)	2785	3684	3114	5657	Management/technncl consulting svc (5416)	11746	16754	8525	22143
Indie artists, writers, performers (7115)	1992	2251	787	1235	Offices of other health practitioners (6213)	9978	13583	3186	10286
Other specialty trade cntrctr (2389)	1968	2688	663	952	Insurance agencies/brokerages (5242)	9753	14568	3172	7382
Legal svc (5411)	1929	2241	1615	9871	Other specialty trade cntrctr (2389)	9737	14483	2265	3936
Insurance agencies/brokerages (5242)	1832	2434	951	1531	Computer sys design/related svc (5415)	9607	14422	4502	10605
Computer sys design/related svc (5415)	1760	2444	1431	2403	Other financial investment actvty (5239)	9022	15163	60593	578995
Misc. durable goods merch whlsl (4239)	1697	2402	849	1318	Architectural/engineering svc (5413)	7516	11811	1900	3851
Residential building constr (2361)	1566	2231	2840	4467	Other personal svc (8129)	6599	9188	5269	10472
Traveler acmdtn (7211)	1552	2602	4227	7848	Offices of real estate agents/brokers (5312)	6397	8230	2797	5595
Other personal svc (8129)	1483	1873	1592	2521	Residential building constr (2361)	6256	8736	6390	12037
Oil/gas extraction (2111)	1394	2045	7003	43202	Building equipment cntrctr (2382)	5601	8697	745	1395
Other miscellaneous mfg. (3399)	1341	1999	777	1376	Misc. durable goods merch whlsl (4239)	5389	8584	2198	4452
Nonresidential building constr (2362)	1210	1813	709	1134	Accounting/bookkeeping svc (5412)	4968	7101	2953	14982
Other fabricated metal prod mfg. (3329)	1171	1821	212	379	Health/personal care stores (4461)	4758	7120	1560	3780
Nondepository credit intrmd (5222)	1163	1667	1743	3700	Automobile dealers (4411)	4504	9005	1278	2759
Health/personal care stores (4461)	1110	1509	490	805	Nonresidential building constr (2362)	4371	7178	2022	4129
Offices of other health practitioners (6213)	1088	1294	721	1166	Traveler acmdtn (7211)	4207	8964	6645	22047
Architectural/engineering svc (5413)	1085	1581	435	743	Indie artists, writers, performers (7115)	4162	4886	1517	3131
Building equipment cntrctr (2382)	1076	1509	209	287	Other miscellaneous store retailers (4539)	3968	5910	1734	2985
Misc. nondrbl gds merch whlsl (4249)	1040	1567	563	981	Advertising, pr,/related svc (5418)	3922	5529	2162	4488
Machinery/equipment rental and leasing (5324)	1031	1453	2092	3834	Other miscellaneous mfg. (3399)	3569	6448	1705	4830
Other amusement/recreation indies (7139)	1007	1363	2285	4306	Auto repair/mntnce (8111)	3544	4937	1363	2507
Other miscellaneous store retailers (4539)	991	1363	609	891	Gasoline stations (4471)	3439	4889	886	1561

Notes: This table presents counts of the number of firms and owners by 4-digit industry, ranked by the level of S-corporation profits for firms owned by the top 0.1% and the top 1-0.1% respectively. The first column shows the number of S-corporations in 2014. The second column shows the number of S-corporation owners in 2014. The third and fourth columns show the same statistics, but for partnerships. We exclude firms in the residual category NAICS 5511 (Management of Companies and Enterprises), as in Section 2.1.

Table J.4: Industry-Level Correlates of Top Pass-through and C-corporation Profits

Panel A. Top 1-0.1% Profits by Corporate Form

	Pass-through	C-corp	Pass-through	C-corp	Pass-through	C-corp	Pass-through	C-corp
Skill Share of Workers	0.57	0.22	0.67	0.33	0.67	0.33	0.50	0.33
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.11)	(0.08)
Average Wages	0.35	0.27	0.43	0.25	0.43	0.25	0.26	0.29
	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.08)
Officer Share of Wages	0.60	-0.21	0.75	-0.19	0.75	-0.19	0.80	-0.03
	(0.05)	(0.06)	(0.04)	(0.07)	(0.04)	(0.07)	(0.06)	(0.09)
Share Using a Computer	0.36	0.33	0.41	0.39	0.41	0.39	0.20	0.60
	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.11)	(0.09)
Capital per Worker	-0.20	0.76	-0.26	0.78	-0.26	0.78	-0.20	0.79
	(0.06)	(0.04)	(0.06)	(0.04)	(0.07)	(0.05)	(0.06)	(0.05)
R&D	-0.08	0.08	-0.16	0.17	-0.16	0.17	-0.11	0.00
	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Concentration	-0.21	0.17	-0.27	0.05	-0.27	0.05	-0.24	0.02
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.06)	(0.07)
Weight by Sales	Yes	Yes						
Weight by Profits			Yes	Yes	Yes	Yes	Yes	Yes
Size >100M					Yes	Yes	Yes	Yes
Control for 1-D NAICS							Yes	Yes

Panel B. Top 0.1% Profits by Corporate Form

	Pass-through	C-corp	Pass-through	C-corp	Pass-through	C-corp	Pass-through	C-corp
Skill Share of Workers	0.27	0.22	0.41	0.33	0.41	0.33	0.35	0.33
	(0.04)	(0.07)	(0.05)	(0.07)	(0.05)	(0.08)	(0.08)	(0.08)
Average Wages	0.68	0.27	0.66	0.25	0.66	0.25	0.55	0.29
	(0.05)	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)	(0.08)
Officer Share of Wages	0.43	-0.21	0.58	-0.19	0.58	-0.19	0.59	-0.03
	(0.06)	(0.06)	(0.05)	(0.07)	(0.06)	(0.07)	(0.07)	(0.09)
Share Using a Computer	0.50	0.33	0.54	0.39	0.54	0.39	0.37	0.60
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.10)	(0.09)
Capital per Worker	0.02	0.76	0.05	0.78	0.05	0.78	0.08	0.79
	(0.06)	(0.04)	(0.07)	(0.04)	(0.07)	(0.05)	(0.06)	(0.05)
R&D	-0.07	0.08	-0.14	0.17	-0.14	0.17	-0.11	0.00
	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Concentration	-0.09	0.17	-0.10	0.05	-0.09	0.05	-0.08	0.02
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.06)	(0.07)
Weight by Sales	Yes	Yes						
Weight by Profits			Yes	Yes	Yes	Yes	Yes	Yes
Size >100M					Yes	Yes	Yes	Yes
Control for 1-D NAICS							Yes	Yes

Notes: This table presents correlations among top owned firms. Panel A shows correlations for top-1-0.1%-owned pass-through businesses and all C-corporations. Panel B shows correlations for top-0.1%-owned pass-through businesses and C-corporations. The industry-level correlates are the following: **Total profits** are the 2000-2014 average level of profits in 2014 dollars. **Top profits** are total profits among firms with top 1-0.1% and top 0.1% owners. **Skill share** is the 2000-2014 average share of workers in a 4-digit industry who have at least some college in the CPS. **Average wages** is the 2014 top pass-through and C-corporation wages divided by the number of employees at top-owned firms and total C-corporation employees, respectively. Aggregate employee counts and payroll for C-corporations are taken from the County Business Patterns produced by the Census Bureau. **Officer share** is the share of labor compensation (the sum of salaries and wages paid to employees, employee benefit programs such as health insurance, and contributions to pension and profit-sharing plans) that accrues to officers. Specifically, on Form 1120 and 1120S it is line 7 divided by the sum of lines 7, 8, 17, and 18. We use the S-corporation officer share for partnerships, as Form 1065 does not divide officer compensation and labor compensation. **Share using a computer** is the share of 2000–2014 average share of workers who use a computer as part of their role, following Autor, Levy and Murnane (2003). **Capital per worker** is total book value of depreciable assets less accumulated depreciation divided by aggregate W-2 payees. Capital is measured as the average for all S-corporations and C-corporations respectively in the IRS SOI corporate sample between 2000 and 2014, weighted to represent the population. Aggregate W-2 payees is measured directly for the population of S-corporations. **R&D** is the industry's average share of total R&D expenditure in Compustat between 2000 and 2014. **Concentration** is the sum of the sales shares of the four largest S and C corporations relative to total S + C industry sales, averaged over the years 2000-2014. Weight by Sales denotes that total sales by corporate form are used to weigh the correlation regression. Weight by Profits denotes that total profits by corporate form are used to weigh the correlation regression. Size > 100M restricts the sample to industries with at least $100M in total profits, with the restriction applied separately for each corporate form.

Table J.5: Construction of the Owner Deaths Analysis Sample

Step	Sample Size at End of Step
Distinct firms 2005-2010	9,489,180
Restrict to firms with one owner death 2005-2010	349,039
Restrict to dying owners in the top 1%	64,589
Restrict to dying owners under age 65	18,933
Restrict to firms with $t-1$ sales >\$100K and positive sales in $[t-4, t-1]$	4,676
Restrict to firms with at least one pre-period worker	3,273
Restrict to firms with dying owner's ownership share $\geq 20\%$	2,496
Match to at least one counterfactual firm	2,436

Notes: This table lists the sample sizes at each of eight steps in the construction of the top-1% owner deaths analysis sample, detailed in Section 3.1. The analysis sample of million-dollar-earner deaths is a subset of the top-1% sample. The sample construction begins with all distinct pass-throughs in the 2005-2010 subset of our linked-firm-owner data. The second step restricts to "owner-death" firms: those with one firm-owner-year observation in our main sample 2001-2014 in which the owner died in the year of or immediately following the observation, as well as to firms in which that one firm-owner-year observation lies in a year $t \in 2005-2010$. The third step restricts to firms with dying owners in the top 1% of the $t-1$ U.S. fiscal income distribution. The fourth step restricts to dying owners aged under 65 on December 31 of year t. The fifth step further restricts to firms with at least \$100,000 in sales in 2014 dollars in $t-1$ and positive sales in all years $[t-4, t-1]$. The sixth step restricts to firms with positive employment in some year $[t-4, t-1]$. The seventh step restricts to firms in which the dying owner had an ownership share of at least 20%. The eighth step restricts attention to owner-death firms with at least one match to a "counterfactual" firm that met the same $[t-4, t-1]$ firm requirements, match the owner-death firm on organizational form (S-corporation or partnership), three-digit industry, and $t-1$ sales decile, and have a year-t owner who matches the dying owner on $t-1$ income bin and five-year age bin.

Table J.6: Construction of the Inferred Owner Retirement Analysis Sample

Step	Sample Size at End of Step
Distinct firms 2005-2010	9,489,180
Restrict to firms with an inferred retirement	191,656
Restrict to firms with top 1% owner in $t-1$	21,616
Restrict to firms with $t-1$ sales >\$100K and positive sales in $[t-4, t-1]$	18,115
Restrict to firms with at least one pre-period worker	18,115
Restrict to firms with working owner's ownership share $\geq 20\%$	16,827
Match to at least one counterfactual firm	16,548

Notes: This table lists the sample sizes at each of eight steps in the construction of the top-1% owner retirements analysis sample, detailed in Section 3.2. The analysis sample of million-dollar-earner retirements is a subset of the top-1% sample. The sample construction begins with all distinct pass-throughs in the 2005-2010 subset of our linked-firm-owner data. The second step restricts to "owner-retirement" firms: those with at least one owner receiving a W-2 $[t-4, t-1]$ and no owner receiving a W-2 $[t, t+1]$ while still have positive sales, with t in $[2005, 2010]$. The third step restricts to firms with retiring owners in the top 1% of the $t-1$ U.S. fiscal income distribution. The fourth step further restricts to firms with at least \$100,000 in sales in 2014 dollars in $t-1$ and positive sales in all years $[t-4, t-1]$. The fifth step restricts to firms with positive employment in some year $[t-4, t-1]$. The sixth step restricts to firms in which the dying owner had an ownership share of at least 20%. The seventh step restricts attention to owner-retirement firms with at least one match to a "counterfactual" firm that met the same $[t-4, t-1]$ firm requirements, match the owner-retirement firm on organizational form (S-corporation or partnership), three-digit industry, and $t-1$ sales decile, and have a highest-earning year-t owner in the same $t-1$ income bin as the highest-earning year-t owner who received a W-2 in the retirement firm and also in the same five-year age bin. There is no age restriction in the owner retirements sample. The restriction on pre-period workers does not reduce the sample size by construction.

Table J.7: Impact of Owner Death on Firm Outcomes

	Profits per pre-period worker ($/worker) (1)	Firm survival (pp) (2)	Profits per pre-period worker ($/worker) (3)	(4)	(5)	(6)	(7)
A. Top 1% Owner Death							
Impact	-12,920	-0.182	-7,001	-9,667	-15,572	3,011	-12,087
	(1,831)	(0.009)	(2,108)	(2,373)	(2,702)	(2,112)	(1,961)
Surviving firms only			X				
Minority owner				X			
Majority owner					X		
Death before 65	X	X	X	X	X		X
Death after 75						X	
S-corporations only							X
Observations	2,609,973	2,609,973	958,158	910,899	1,699,074	114,021	2,358,207
Owner deaths	2,436	2,436	1,305	1,094	1,342	1,601	2,093
R^2	0.004	0.064	0.001	0.001	0.006	0.000	0.003
Mean of counterfactual firms	27,258	0.889	28,290	26,162	28,151	14,911	25,287
Dying owners ownership %	65.0%	65.0%	56.7%	39.7%	85.7%	58.5%	67.9%
Preferred percentage impact	-72.9%	-31.6%	-43.7%	-93.1%	-64.6%	34.5%	-70.4%
B. Top 0.1% Owner Death							
Impact	-29,543	-0.205	-16,625	-11,761	-43,206	8,506	-32,584
	(10,582)	(0.023)	(12,916)	(11,698)	(16,382)	(5,662)	(12,597)
Surviving firms only			X				
Minority owner				X			
Majority owner					X		
Death before 65	X	X	X	X	X		X
Death after 75						X	
S-corporations only							X
Observations	194,787	194,787	84,717	72,990	121,797	41,661	180,153
Owner deaths	435	435	213	189	246	496	378
R^2	0.005	0.071	0.001	0.001	0.010	0.001	0.005
Mean of counterfactual firms	48,221	0.878	53,194	41,948	53,040	19,273	50,955
Dying owners ownership %	66.4%	66.4%	58.9%	40.1%	86.6%	60.2%	68.7%
Preferred percentage impact	-92.3%	-35.1%	-53.1%	-69.9%	-94.1%	73.4%	-93.1%

Notes: This table repeats Table 4A for the (fiscal-income) top 1% and top 0.1%. See the notes to that table for details.

Table J.8: Impact of Inferred Owner Retirements on Firm Outcomes

	Profits per pre-period worker ($/worker) (1)	Firm survival (pp) (2)	Profits per pre-period worker ($/worker) (3)	(4)	(5)	(6)
A. Inferred Top 1% Owner Retirement						
Impact	-17,150	-0.283	-9,280	-11,799	-19,088	-17,806
	(1,027)	(0.004)	(1,329)	(1,849)	(1,228)	(1,052)
Surviving firms only			X			
Minority owner				X		
Majority owner					X	
S-corporations only						X
Observations	1,432,179	1,432,179	693,306	371,043	1,061,136	1,361,682
Owner retirements	16,548	16,548	9,150	4,400	12,148	15,485
R^2	0.005	0.122	0.002	0.003	0.006	0.006
Mean of counterfactual firms	37,780	0.930	40,878	33,808	39,219	38,498
Retiring owners ownership %	76.2%	76.2%	76.5%	41.0%	88.9%	77.6%
Preferred percentage impact	-59.6%	-40.0%	-29.7%	-85.2%	-54.7%	-59.6%
B. Inferred Top 0.1% Owner Retirement						
Impact	-45,861	-0.265	-24,104	-37,020	-49,112	-48,288
	(7,286)	(0.009)	(8,845)	(13,993)	(8,535)	(7,334)
Surviving firms only			X			
Minority owner				X		
Majority owner					X	
S-corporations only						X
Observations	255,897	255,897	122,715	65,682	190,215	246,024
Owner retirements	3,176	3,176	1,763	854	2,322	2,988
R^2	0.003	0.106	0.002	0.002	0.004	0.004
Mean of counterfactual firms	84,573	0.921	95,282	74,282	88,359	84,478
Retiring owners ownership %	75.6%	75.6%	76.5%	40.2%	88.6%	76.8%
Preferred percentage impact	-71.7%	-38.0%	-33.0%	-123.9%	-62.7%	-74.5%

Notes: This table repeats Table 4B for the (fiscal-income) top 1% and top 0.1%. See the notes to that table for details.

Table J.9: Dollar-Weighted Impact of Owner Deaths and Retirements on Firm Profits

			Pre-period profit weighted		
	Equal weight	log pre-profits weight	Full Sample	<50M in pre-period profits	<10M in pre-period profits
	(1)	(2)	(3)	(4)	(5)
A. Owner Deaths					
Impact	-12,920.0	-18,247.3	-35,421.1	-31,033.8	-22,033.3
	(1,831.2)	(2,198.0)	(8,166.8)	(7,338.7)	(4,930.7)
Mean of counterfactual firms	27,068.4	33,465.5	64,188.2	62,418.5	50,092.9
Dying owners ownership %	65.0%	64.8%	57.4%	57.1%	60.1%
Percentage impact in sample	-73.4%	-84.2%	-96.1%	-87.1%	-73.2%
Scenarios to bound effects for large firms					
Low impact (% impact = 0)				-62.4%	-38.1%
Medium impact (% impact = .5)				-76.6%	-62.1%
High impact (% impact = 1)				-90.8%	-86.1%
B. Owner Retirements					
Impact	-17,150.3	-26,525.9	-83,798.2	-74,484.4	-52,499.9
	(1,027.0)	(1,288.2)	(11,761.0)	(9,467.5)	(4,124.1)
Mean of counterfactual firms	36,642.6	50,120.7	102,842.2	96,658.6	86,082.5
Retiring owners ownership %	76.2%	75.9%	69.3%	69.3%	70.2%
Percentage impact in sample	-61.5%	-69.8%	-117.7%	-111.1%	-86.9%
Scenarios to bound effects for large firms					
Low impact (% impact = 0)				-79.6%	-45.2%
Medium impact (% impact = .5)				-93.8%	-69.2%
High impact (% impact = 1)				-108.0%	-93.2%

Notes: This table estimates the effects of owner deaths and retirements under alternative weighting specifications. Panel A and B use the owner death and retirement samples, repectively. Column 1 replicates the equal-weighted result from Column 8 of Table 4. Column 2 weighs all owner death pairs in our analysis sample by the log of their mean pre-period profits (i.e., mean profits from $t-4$ to $t-1$). Column 3 uses the level of mean pre-period profits as weights. Columns 4 and 5 also dollar-weight using pre-period profits, but restrict the sample to firms with average pre-period profit below \$50M and \$10M, respectively. The mean of counterfactual firms is the pre-period profit weighted mean four years after owner death, scaled by the ratio of average pre-period profits of the counterfactual firm to average pre-period profits of firms whose owner died. The ownership share of dying owners is measured in the year before owner death and is also the pre-period profit weighted mean.

Table J.10: CEO and Entrepreneurial Income, Own Firm Size, and Reference Firm Size

	ln (Total compensation)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Top 1000			Top 500		
Panel A. Gabaix and Landier (2008)							
ln(Firm size)	0.21***	.37***	.37***	.26***	.38***	.32***	.23***
	(0.01)	(0.02)	(0.02)	(0.06)	(0.04)	(0.04)	(0.07)
ln(Firm size of #250)		.72***	.66***	.78***	.73***	.73***	.84***
		(0.053)	(0.054)	(0.052)	(0.084)	(0.085)	(0.080)
Observations	9,777	7,936	7,936	7,936	4,156	4,156	4,156
R^2	.439	.23	.29	.6	.2	.29	.63
Year fixed effects	✓						
Industry fixed effects	✓		✓			✓	
Firm fixed effects				✓			✓
Panel B. Estimates in Smith, Yagan, Zidar and Zwick (2018) sample							
ln(Firm size)	0.80***	0.78***	0.79***	0.82***	0.62***	0.72***	0.78***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.04)
ln(Firm size of #250)		0.27***	0.30***	0.23***	0.42***	0.34***	0.31***
		(0.05)	(0.04)	(0.04)	(0.08)	(0.06)	(0.05)
Observations	13,445	13,445	13,445	13,445	6,654	6,654	6,654
R^2	0.558	0.124	0.477	0.875	0.091	0.468	0.872
Year fixed effects	✓						
Industry fixed effects	✓		✓			✓	
Firm fixed effects				✓			✓

Notes: This table replicates Table I and Table II in Gabaix and Landier (2008) using the full population of S-corporations and partnerships. Panel A reproduces the results from Gabaix and Landier (2008) for the sake of comparability. We regress the log of entrepreneurial income (i.e., pass-through income plus wages from their firm) in year t on the log of the firm size in year $t-1$, and the log of the 250th firm size in year $t-1$. Gabaix and Landier use a different measure of firm size. Their baseline measure of firm size uses total market value (debt plus equity), which we present in Columns 2-7, but their Table I shows similar results using sales as a measure of firm size. Since we cannot measure total market value for pass-throughs, we measure firm size using total sales across all specifications. Firm size information is defined in year $t-1$. Following Gabaix and Landier, we select each year the top $n \in \{500, 1000\}$ largest firms. All nominal quantities are converted into 2014 dollars. Industries are defined at the 4-digit NAICS level. Section 1 describes our data. Robust standard errors reported in parentheses ($^{***}p < 0.01, ^{**}p < 0.05, ^{**}p < 0.1$).

Table J.11: Entrepreneurial Income, Own Firm Size, and Reference Firm Size

	ln (Total compensation)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Top 1000			Top 500		
Panel A. S-corporations in Smith, Yagan, Zidar and Zwick (2018) sample							
ln(Firm size)	0.88***	0.83***	0.87***	0.95***	0.81***	0.87***	0.86***
ln(Firm size of #250)		0.32***	0.29***	0.21***	0.38***	0.25***	0.26***
		(0.05)	(0.04)	(0.04)	(0.07)	(0.06)	(0.06)
Observations	13,859	13,859	13,859	13,859	6,892	6,892	6,892
R^2	0.490	0.157	0.396	0.833	0.147	0.422	0.848
Year fixed effects	✓						
Industry fixed effects	✓		✓			✓	
Firm fixed effects				✓			✓
Panel B. Partnerships in Smith, Yagan, Zidar and Zwick (2018) sample							
ln(Firm size)	0.77***	0.91***	0.76***	0.88***	0.72***	0.67***	0.75***
ln(Firm size of #250)		-0.05	0.26***	0.11***	-0.00	0.37***	0.20***
		(0.05)	(0.04)	(0.03)	(0.07)	(0.05)	(0.04)
Observations	12,395	12,395	12,395	12,395	6,233	6,233	6,233
R^2	0.655	0.168	0.585	0.900	0.103	0.573	0.899
Year fixed effects	✓						
Industry fixed effects	✓		✓			✓	
Firm fixed effects				✓			✓

Notes: This table replicates Table J.10 for the full population of S-corporations and partnerships separately. See the notes of Table J.10 for details.

Table J.12: Changes in Entrepreneurial Income and Reference Firm Size

	Gabaix and Landier (2008)	Smith, Yagan, Zidar, and Zwick (2018)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		S-corporations				Partnerships			
		Top 1000		Top 500		Top 1000		Top 500	
D.ln(Firm size)	1.14***								
	(0.28)								
D.5 ln(Firm size of #250)		1.04***		1.23***		0.81***		0.83***	
		(0.08)		(0.13)		(0.11)		(0.15)	
D.10 ln(Firm size of #250)			0.16		-0.18		0.20		-0.19
			(0.21)		(0.29)		(0.26)		(0.30)
Observations	34	6,283	2,367	3,087	1,169	4,388	1,460	2,377	837
R^2	.29	0.031	0.000	0.040	0.000	0.011	0.000	0.011	0.000

Notes: This table estimates the effect of lagged firm size changes on log entrepreneurial income for the full population of S-corporations and partnerships. Column 1 reproduces analogous results for log CEO pay, which are estimated in Table IIII of Gabaix and Landier (2008). Gabaix and Landier use a different measure of firm size. Their baseline measure of firm size uses total market value (debt plus equity), which we present in Column 1, but their Table 1 shows similar results using sales as a measure of firm size. Since we cannot measure total market value for pass-throughs, we measure firm size using total sales across all specifications. Firm size information is defined in year $t-1$. Following Gabaix and Landier, we select each year the top $n \in \{500, 1000\}$ largest S-corporations and partnerships. D.5 and D.10 denote five- and ten-year lags, respectively. Section 1 describes our data. Robust standard errors reported in parentheses ($^{***}p < 0.01, ^{**}p < 0.05, ^{**}p < 0.1$).