Reply to Piketty, Saez, and Zucman (2024): Income Inequality in the United States

Gerald Auten
Office of Tax Analysis, U.S. Treasury

David Splinter
Joint Committee on Taxation

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Abstract

National income inequality estimates using tax data must allocate missing income. Starting with estimates from Auten and Splinter (2024, AS), a comment by Piketty, Saez, and Zucman (2024, PSZ) replaces certain AS allocations of missing income with PSZ allocations. This reply shows that these PSZ adjustments fail to address AS arguments, use problematic back-of-the-envelope estimates, and depend on inappropriate distributions of income reported on tax returns. AS allocations use more appropriate data to allocate each missing income source. For example, the AS approach is more consistent with actual partnership depreciation distributions and with underreported income distributions found in special audit studies.

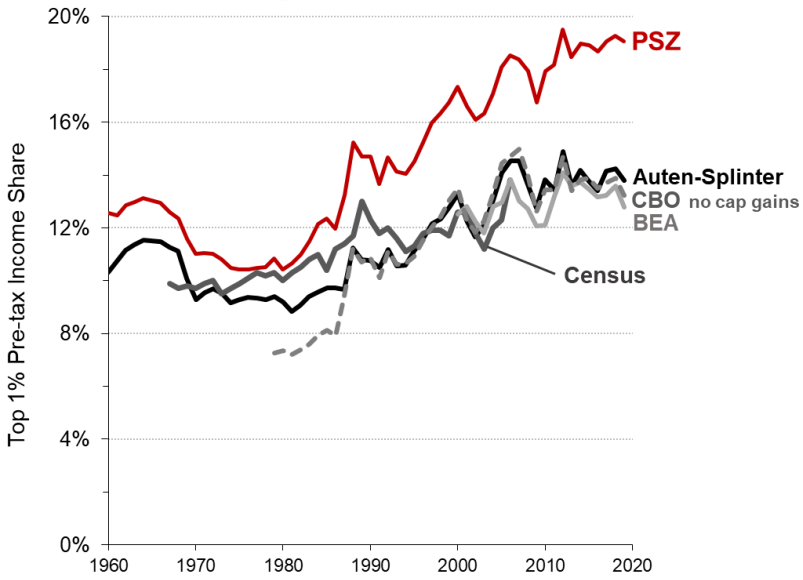
Keywords: Income inequality, wealth inequality, tax data, income underreporting, tax audits
JEL: D3, E01, H2, H5, J3

Auten: This research was conducted while the author is an employee at the U.S. Department of the Treasury. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author and do not necessarily reflect the views or official positions of the U.S. Department of the Treasury. *Splinter*: This paper embodies work undertaken for the staff of the Joint Committee on Taxation, but as members of both parties and both houses of Congress comprise the Joint Committee on Taxation, this work should not be construed to represent the position of any member of the Committee.

Estimating the distribution of national income with tax data requires allocating income missing from individual income tax returns. Researchers have used different approaches to allocate this income. This note replies to Piketty, Saez, and Zucman (2024, PSZ), a comment on Auten and Splinter (2024a, AS). PSZ's comment essentially replaces AS allocations of missing income with PSZ allocations. These PSZ allocations, however, use inappropriate methods to distribute income not on tax returns. The AS paper already discusses these differences and explains that the AS approaches better align with the existing literature and use more appropriate data. In contrast, the PSZ comment ignores relevant data, ignores relevant prior research, ignores AS reasons and prior replies, and uses problematic assumed distributions and calculations. This reply discusses these limitations.

Given these issues with the PSZ methodology and adjustments, it is unsurprising that other estimates are much closer to the AS estimates. The PSZ estimates are outliers, as seen in Figure 1. These comparisons illustrate that AS and other researchers come to similar conclusions, whether using other data or the same tax data. Moreover, this implies other papers disagree with the PSZ assertion that missing income is distributed like reported income on tax returns. Instead, the widespread finding for recent decades is that missing income is more equally distributed than tax-reported incomes. This results from missing income increasingly taking the form of imputed housing rents, employer-paid taxes and insurance, and retirement income—which are more equally distributed than tax-reported income with respect to the top 1% (see AS Figure B16). Like AS, most other studies also show a smaller jump in top shares immediately following the Tax Reform of 1986, when top incomes shifted from sources missing from tax returns to those reported on tax returns.

Figure 1: Pre-tax top 1% income shares: PSZ is an outlier



Notes: All estimates exclude realized capital gains. *Sources:* Piketty, Saez, and Zucman (2018, PSZ, with corrections for a pension rollover error and other updates, accessed from Zucman's website on March 14, 2023); Auten and Splinter (2024a); Bureau of Economic Analysis (2024, BEA); Congressional Budget Office (2022, CBO) with capital gains removed using ratios from Piketty and Saez (2003 and updates) as described in the appendix; and Burkhauser et al. (2012, Census) that corrects for 1993 survey changes and top-coding.

The large difference between PSZ and other estimates primarily results from their allocating missing income by inappropriate measures of income reported on tax returns. Their approach over-weights reported incomes from certain sources. It also under-weights the unique characteristics of each missing income source, which can often be inferred from data. That is, we disagree with the PSZ assertion that allocating missing income by reported income is "distributionally neutral." Instead, scaling up reported incomes is a poor choice among many possible distributions.[1] For example, PSZ allocate underreported business income using only reported business income, reallocating underreported income that should go to returns with negative total income to the top of the distribution. This PSZ approach increases top 1% shares—even though the audit studies used to add this missing income to national accounts show detected underreporting decreases top 1% shares (Gorman, McGuire, and Splinter 2024; Guyton et al. 2021). For partnership excess depreciation, PSZ's use of inappropriate reported-income distributions results in an overstated effect by an order of magnitude, as we show below with new linkages of partnerships to owner tax returns. AS (online appendix p. 18) has already explained that this PSZ allocation is incorrect because excess depreciation "pushes these tax units down in the reported income distribution."

The PSZ adjustments exactly or nearly match AS estimates of differences with Piketty, Saez, and Zucman (2018, PSZ18).[2] PSZ essentially took the largest differences estimated by AS, asserted they were "assumed to reduce inequality," ignored AS's reasons for their approaches over the PSZ approaches, and then reversed these estimates. However, each of these adjustments require convincing reasons, data, and calculations—but none of the PSZ proposed adjustments meet these criteria.

This reply discusses all eight of PSZ's proposed adjustments, each of which is problematic. PSZ rely on back-of-the-envelope calculations and inappropriate reported-income measures to allocate income not on tax returns. For most adjustments, PSZ fail to mention or address the reasons presented by AS for each allocation. A comment should instead clearly explain the reasons presented by the original paper, challenge those explanations (not ignore them), and present more convincing methods or data. The PSZ adjustments fail to meet this standard.

Section I responds to PSZ's adjustments for excess depreciation and underreported income. Section II responds to five other adjustments to the distributions of corporate

[1] For example, PSZ's approach acknowledges that it would be inappropriate to scale up *taxable* interest to allocate *tax-exempt* interest. This is because tax-exempt interest should be more concentrated among high-income returns with the largest tax benefit. But this general point is ignored by PSZ for underreported income and accelerated ("excess") depreciation, which are less concentrated among high-income returns than the reported incomes used by PSZ.

[2] PSZ adjustments are retained earnings 0.4 pp (0.4 pp in AS), sales taxes 0.5 pp (0.5 pp in AS), government consumption 0.8 pp (0.7 pp in AS), government deficits 0.2 pp (0.4 pp in AS), and income gaps (e.g., excess depreciation, S-corps, and underreporting) 1.9 pp (1.6 pp in AS). The PSZ adjustment for pensions is 0.3 pp, the residual from AS's 1.2 pp after PSZ pension rollover corrections. AS estimates are for 1979–2014 and PSZ estimates for 1979–2019.

retained earnings, pension plan accrued income, sales taxes, government consumption, and government deficits. Section III discusses why AS capital income estimates are consistent with wealth inequality patterns. To provide additional context, section IV reviews prior AS replies to other PSZ comments.

I. Excess depreciation and underreported income

This section discusses shortcomings of the three PSZ adjustments to AS estimates for excess depreciation and underreported income. AS allocate national account capital consumption adjustments, referred to here as *excess depreciation*, by expensing and depreciation reported on tax returns and underreported income by special audit studies. PSZ make three adjustments: (1) allocate proprietor excess depreciation by reported partnership losses and then positive partnership income, (2) allocate prototype S corporation excess depreciation amounts by reported positive S corporation income, and (3) allocate audit-based underreporting by reported income—mostly reported positive business income. We discuss significant issues with each of these adjustments. Using more appropriate data, such as partnerships and S corporations linked to the tax returns of owners, these adjustments have minor effects on AS estimates.

1. Partnership excess depreciation

Excess depreciation results from faster depreciation in tax data than in the national income accounts. This can be due to faster tax depreciation tables, bonus depreciation, and expensing, which allows immediate deduction of the full cost of investments. Depreciation is deducted from gross income to give net income. Therefore, holding constant other factors, businesses with more excess depreciation will have lower reported net incomes. AS (online appendix p. 21) explained that "when allocating by expensing, capital consumption adjustments tend to go lower in the distribution than net business income." Accounting for these effects indicates that PSZ overstate the effect of partnership excess depreciation on top 1% income shares by an order of magnitude.

This reply extends the analysis by Love (2021) by tracing a large share of partnership depreciation to the ultimate owners using population data. This responds to a suggestion by PSZ.[3] The partnership depreciation distribution was not previously available and relies on new estimates presented in this reply. When partnership depreciation is traced to owners this results in a much lower top share than PSZ assumed. Relative to the PSZ allocation by reported losses and income, the linked partnership depreciation estimates suggest half as much excess depreciation goes to the top 1% and a top share increase that is one-fifth the PSZ adjustment or less.

[3] PSZ (p. 5) wrote, "Ideally, partnership excess depreciation should be allocated to the ultimate individual owners of the corresponding partnerships. In practice, it is not possible to fully trace the ultimate ownership of partnerships…"

To estimate the top share of partnership excess depreciation, we start with the 39% of partnership depreciation estimated to flow through to the top 1% of resident tax returns. This estimate is based on allocating partnership entity-level depreciation on Form 1065 line 16c (as bonus depreciation is not available) to domestic individual tax returns in proportion to partner ownership shares reported on Forms K-1.[4] As discussed below, this estimated partnership depreciation top share is identical to that for S corporation depreciation. This estimate is adjusted in two ways. First, to account for grouping by individuals rather than tax returns and related re-ranking, it is lowered by 10%. Second, because excess depreciation tends to lower one's income more than economic depreciation, we apply a 15% "excess depreciation" re-ranking adjustment. In 2019, this approach shows that about 29% of partnership excess depreciation went to the top one percent, which we call the *linked partnership excess depreciation distribution*.[5] Applying this linked partnership distribution to other excess depreciation implies a top 1% share increase relative to the AS baseline of only 0.2 pp.

Partnership excess depreciation effect on AS top 1% share, 2019 ($billions)

(29%	–	16%)	•	($380	–	$70)	÷	$18,273	= 0.2 pp
partn. deprec.		reported deprec.		excess dep.		bonus		nat. income	

This back-of-the-envelope approach, however, ignores re-ranking effects. To account for re-ranking effects, we allocate partnership depreciation to tax microdata by adjusted gross income (AGI) groups.[6] Our approach matches the top share of estimated partnership excess depreciation both before and after re-ranking. That is, the top 1% (of tax returns) by reported income has 33% of this depreciation and when adding seven-tenths of this depreciation to reported income to account for re-ranking from excess depreciation, the top group has 59% of partnership depreciation. This is nearly identical to the estimate from linked partnership-individual data of 60% after re-ranking. Thus, our allocation method closely matches the empirical data both before and after likely re-ranking effects.[7]

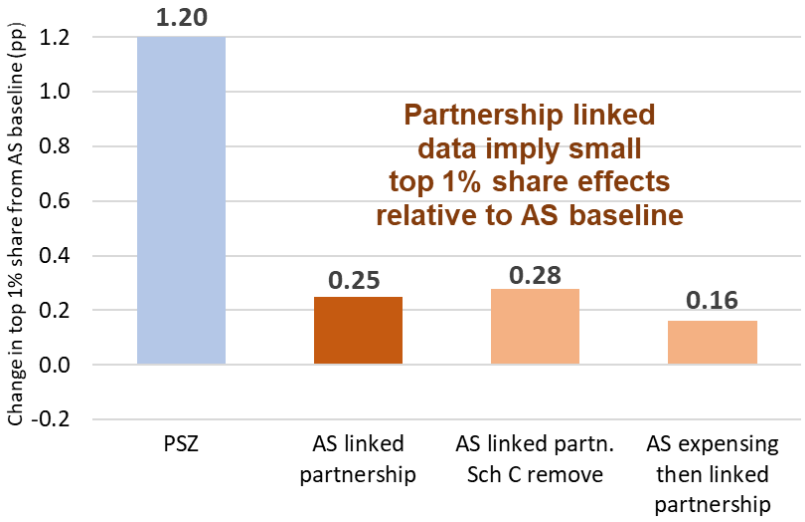
[4] This accounts for Form 1065 line 16c partnership depreciation in the population of partnership returns. Our approach matches to individual tax returns over half of depreciation that could be potentially matched, i.e., after removing C corporation owners and entities besides individuals and other partnerships. This accounts for one-third of this partnership depreciation and considers ten tiers of partnerships with data from Love (2021). Some unlinked amounts are from non-profits and foreign ownership, but about half of unlinked amounts are from C corporations, which have a similar top share as the linked partnership amounts. To account for data errors, total partner shares on all K-1s for each partnership are adjusted to sum to one. PSZ's back-of-the-envelope calculation does not account for flows to corporate, non-profit, or foreign entities, and instead is based only on partnership income reported on individual tax returns: [(65% reported partnership share – 11% assumed reported expensing/depr. share) • $411 excess depr.] ÷ $18,300 nat. income = 1.2 pp PSZ adjustment.

[5] 39% partn. depreciation to top 1% by fiscal income among tax returns • (100% – 10% indivs./re-ranking adj. – 15% excess deprec. re-ranking effect) = 29% partnership excess depreciation to top 1%.

[6] The microdata distribution of partnership excess depreciation from partnership-partner links is as follows: 25%, 8%, 13%, 6%, 15%, 33% to the negative, bottom 50%, P50–90, P90–95, P95–99, and top 1% of tax returns ranked by fiscal income (after applying the excess depreciation re-ranking adjustment but not the 10% adjustment). Amounts are allocated proportionally to the absolute value of partnership net income within each income group.

[7] The test for re-ranking from excess partnership depreciation results from adding 70% of partnership depreciation to AGI based on a suggestion by Gabriel Zucman.

Figure 2: Top 1% share changes relative to AS from partnership excess depreciation, 2019 (pp)



Notes: Besides PSZ, estimates use tax microdata and include re-ranking Changes are relative to AS after underreporting multiplier and proprietor adjustments changes (Auten and Splinter 2025). *Sources*: PSZ and authors' calculations with tax data.

Figure 2 shows similar results when using microdata that accounts for re-ranking effects. The linked partnership excess depreciation distribution applied to microdata results in increasing the top 1% income share by 0.25 pp, one-fifth the PSZ adjustment. This finding is robust to alternative allocations. Shifting $41 billion of excess depreciation from Sch. C sole proprietors to partners, as suggested by PSZ, increases the top share by only 0.28 pp. Allocating by reported expensing and then the linked partnership distribution, the effect is only 0.16 pp. This last approach leverages the most direct data about excess depreciation, using micro-level reported expensing as well as the linked partnership excess depreciation distribution.

The excess depreciation discussed here reflects the BEA's estimates of the difference between tax and economic depreciation, i.e., capital consumption adjustments. When the tax code begins allowing more excess depreciation, as in 2018, this shifts tax depreciation forward in time relative to economic depreciation—but these are temporary effects. The PSZ (p. 1) claim that the increase in excess depreciation means that "about half of partnership income is legally exempt from tax" ignores the temporary aspect of excess depreciation. Furthermore, as tax-based excess depreciation phases out, this could even result in substantial negative adjustments because prior-year investments will have little tax depreciation but large economic depreciation. Corporate excess depreciation (discussed next) has already seen a sign reversal, between 2019 and 2022 these went from $94 billion to –$219 billion, i.e., from adding to removing corporate income from tax-reported incomes.

2. S corporation excess depreciation

The official national income and product accounts do not break out corporate excess depreciation into S and C corporation components. Therefore, AS allocated total corporate income gaps (i.e., excess depreciation and retained earnings) by C corporation ownership

shares.[8] Corporate investment is disproportionately by C corporations, suggesting this AS allocation was a reasonable approach. In 2011, for example, C corporation depreciation was seven times larger than S corporation depreciation.[9]

PSZ point to prototype estimates in (BEA 2024) to motivate a second adjustment to the AS estimates. PSZ, however, do not mention the issues already raised by AS about the earlier version of these prototype estimates. First, the original prototype estimates in Krakower et al. (2021) were limited to six years, but the AS study spans six decades. AS (online appendix p. 21) explained that "these prototype estimates are only for 2012 through 2017 and therefore cannot be used for our full analysis at this time." Second, AS already estimated the possible effects of this adjustment and found a smaller effect than the PSZ back-of-the-envelope estimates. Third, the BEA estimates changed since the AS paper was accepted for publication. Finally, these prototype estimates have not been officially adopted for use in national income and product accounts data.

PSZ's back-of-the-envelope calculation makes two errors. First, it allocates more total excess depreciation than shown in the prototype estimates (one-third more in 2019 even when including intellectual property adjustments). Second, it assumes all this excess depreciation should be distributed like reported positive S corporation income, allocating 56% to the top 1% in 2019. This overstates the effect on top income shares because, as discussed above, excess depreciation tends to lower reported incomes. Relative to the PSZ reported income allocation, linked entity-level S corporation and individual returns suggest only half as much S corporation excess depreciation goes to the top 1% and a small change to AS top shares. In fact, the top share of S corporation linked depreciation is identical to that for partnership depreciation, which provides additional support for the partnership estimates.

To estimate the top share of S corporation excess depreciation, we start with an estimated 39% of depreciation going to the top 1% of resident tax returns. This is estimated using a ten percent random sample of the population of S corporations and allocates S corporation entity-level depreciation (and small amounts of depletion) on Form 4562 to individual tax returns in proportion to ownership shares reported on Forms K-1.[10] For a back-of-the-envelope approach, the top share is adjusted as in the prior section. First, to account for grouping by individuals rather than tax returns and related re-ranking, it is lowered by 10%. Second, because expensing and excess depreciation tends to lower one's income more than depreciation, we apply a 15% excess depreciation re-ranking adjustment. This results in 29% of S corporation excess depreciation going to the top 1% of individuals in 2019 with the *linked S corporation excess depreciation distribution*.[11]

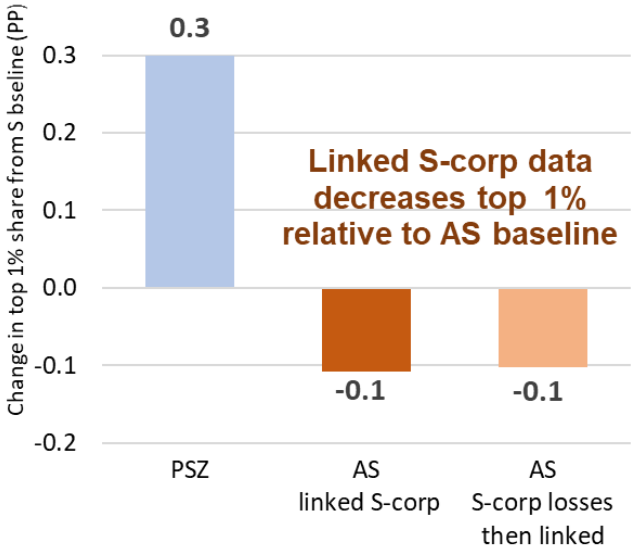
[8] This is after underreporting is allocated to S corporations; adding about $50 billion in recent years, which is consistent with estimates from the 2003/2004 S corporation underreporting study (Johns 2009).

[9] See p. 17 and p. 129 of the IRS corporate income tax returns study: www.irs.gov/pub/irs-soi/11colineitemestimates.pdf.

[10] This accounts for 84% of this S corporation depreciation and depletion. Some unlinked amounts are from data issues with owner shares, even after total shares on all K-1s for each S corporation are adjusted to sum to one.

[11] 39% S-corp. depreciation to top 1% of returns by fiscal income • (100% – 10% indivs./re-ranking adj. – 15% excess depr. re-ranking effect) = 29% S-corp excess depreciation to top 1%.

Figure 3: Change in top 1% share relative to AS from excess S corp. depreciation, 2019



Notes: AS shares are after the allocation. Changes are relative to AS after underreporting multiplier and proprietor adjustments changes (Auten and Splinter 2025). *Sources*: Authors' calculations using tax data.

Incorporating this S corporation excess depreciation distribution into the PSZ back-of-the-envelope calculation shows that relative to the AS baseline, the top 1% income share has a negligible change. This is because the estimated 29% linked S corporation share is similar to the AS baseline C corporation share.[12] Applying S corporation excess depreciation to the microdata results in a 0.1 pp decrease to the AS baseline top 1% income share (Figure 3). We also consider the possibility that excess depreciation causes more S corporation losses on individual tax returns. Allocating S corporation excess depreciation by the $86 billion of S corporation losses (over half of excess depreciation) and then by the S corporation excess depreciation distribution, the top 1% income share also decreases by 0.1 pp.[13] Thus, following the PSZ suggestion to allocate corporate excess depreciation to S corporation owners would have little effect on the AS baseline top shares.

3. Underreported income and special audit studies

Nearly $800 billion dollars in underreported income is added to tax-reported income for national accounts in 2019. These amounts are mostly based on IRS special audit studies and the distributional information from those studies should be used to allocate this income.[14] PSZ argue that audit study data should be ignored and that their approach of scaling up reported incomes by income type is "neutral." AS already addressed the many problems with that allocation, but PSZ ignored that discussion. Here, we review the reasons for the AS approach and the issues with the PSZ allocation by positive reported income.

[12] In contrast, the PSZ back-of-the-envelope calculation is: (56% S-corp reported top share – 28% C-corp top share) • $177 S-corp excess depreciation ÷ $18,281 nat. income = +0.27 pp.

[13] PSZ first allocate partnership excess depreciation by partnership losses, but for S corporations they ignore losses.

[14] National accounts only explicitly use audit study estimates for non-farm proprietor misreporting. AS show that gaps between national account and tax-reported totals are similar to audit study underreporting for wages and other sources.

To allocate underreported income, or underreporting, AS use the distributions from IRS special audit studies. These audit studies consist of stratified random samples of tax returns such that totals are representative of all tax returns, while also sampling high-income returns at higher rates. These data include *detected* underreporting based on auditor income adjustments. In recent years, this detected underreporting lowers top 1% fiscal income shares by 0.4 pp to 0.5 pp (Gorman, McGuire, and Splinter 2024; Guyton et al. 2021). To account for detected underreporting in the tax return sample data, AS use detailed estimates from various special audit studies since 1988 from Auten and Langetieg (2020). This approach approximates other estimates using the audit data (see AS Figure B5).

To account for *undetected* underreporting, the amount of *detected* underreporting in the audit studies is approximately tripled. These undetected amounts are based on detection controlled estimation (DCE) that, among similar returns, brings smaller auditor income adjustments up to those of the largest auditor adjustments. While DCE gives total undetected amounts, the prior method of distributing it with four simple multipliers was problematic. DeBacker et al. (2020 p. 1106) explained that because the simple multipliers were "applied to all auditors regardless of skill level, the biggest amounts of undetected misreporting will be attributed to the audits with the largest amounts of detected misreporting. This runs counter to the intended application of the adjustments and can exaggerate the true variation in misreporting." That is, simple multipliers exaggerate income inequality.[15]

Simple multipliers deviate from the underlying motivation for DCE because they increase detected underreporting by the same proportions regardless of the auditor. This overstates corrected incomes for those with the auditor with the largest income adjustment, for whom little or no additional underreporting should be added according to DCE. To address this limitation, the AS allocation of undetected underreporting is based on distributionally consistent gradient multipliers that depend on the ratio of detected under-reporting to reported income. Tax returns with higher ratios of *detected* underreporting to reported income likely had auditors with larger adjustments and therefore the AS method assigns them smaller *undetected* underreporting multipliers. Similarly, tax returns with lower ratios of detected underreporting likely had auditors with smaller adjustments and therefore have larger undetected underreporting multipliers. AS call these gradient multipliers "distributionally consistent" because they fit the theoretical mechanism of the underlying DCE methodology that tries to bring all auditor results up to the auditor with the largest adjustments, see Auten and Splinter (2021; 2024b).

We discuss four limitations of the PSZ adjustment: (1) incomplete discussion of prior audit study estimates, (2) allocation by reported income that ignores the audit studies, especially returns with negative reported total income, (3) PSZ adjustment calculation issues, and (4) no discussion of relevant AS comments.

[15] Others expressed similar concerns: DeBacker et al. (2020), Johns and Slemrod (2010); Hemel, Holtzblatt, and Rosenthal (2022); and Government Accountability Office (2024). IRS no longer uses these simple multipliers.

PSZ mention that estimates by Johns and Slemrod (2010, JS) found higher shares than AS of total underreporting in the top 1% of filers. But PSZ fail to mention that the JS estimates had biased allocations of undetected DCE-based underreporting because they used four simple multipliers—a major point in AS. Additionally, PSZ say AS "discard" the simple multiplier method but fail to mention that the IRS also discarded that method over a decade ago because of its many problems.

PSZ also fail to mention that the PSZ18 method allocates about 44% of underreporting to the top 1%, far greater than the already excessive 27% estimated by JS.[16] The AS estimate is 19% using audit study data and distributionally consistent gradient multipliers for undetected underreporting.[17] That is, AS provide a detailed explanation of why their top share of underreporting was 8 pp lower than JS, but PSZ provide no reason why their top share was 17 pp higher. It is also helpful to consider effects on top 1% income shares when adding underreporting. Even the biased JS estimates show no effect on top 1% shares, but the PSZ18 approach significantly increases top 1% percent shares.[18] These differences imply audit-study distributions are essential for empirically based underreporting distributions. In contrast, the PSZ method ignores all information from the audit studies.

The PSZ allocation is not "distributionally neutral" as claimed because it ignores negative incomes. About 40% of detected business underreporting is from returns with negative reported total income (Figure 3D in Auten and Langetieg 2020).[19] This is why detected underreporting increases negative income shares by 0.4 pp (Gorman, McGuire, and Splinter 2024). Instead, the PSZ18 method allocates underreporting in proportion to positive reported income. The PSZ18 approach essentially reallocates overstated business losses to the top of the reported income distribution. In contrast, the AS approach accounts for the distributional consequences of adding underreporting to returns with reported losses. AS underreporting allocations use two negative reported income groups, for large losses over $50,000 and for smaller losses. For each group, the audit study data include the share of returns with underreporting, the average ratio of underreported to reported income, and the dispersion of those amounts from Auten and Langetieg (2020).

[16] AS previously explained, the PSZ18 approach allocates about 50% of underreported business income to the top 1%. Using the PSZ spreadsheet, we estimate it was 48% in 2019, and when including wages: ($293 • 67% S-corp top share + $553 • 65% partn. top share + $483 • 17% sole prop. top share + $159 • 11% wages top share) ÷ $1,488 underrep. = 44%.

[17] PSZ (p. 9) claims that "AS do not publish their distribution of underreported income, but through communications with them we were able to obtain it." In fact, AS provided these for 2001 and 2010 (AS Figure B5) and added estimates for all years to the public spreadsheet in March 2024. We stated the intent to post these estimates to PSZ beforehand.

[18] PSZ18's own back-of-the-envelope estimate suggests their underreporting allocation approach increases their recent top 1% income shares by about 1.2 percentage points (PSZ18 online appendix p. 35).

[19] Business underreporting accounts for nearly all underreporting and accounting for it has large impacts on tax returns with negative reported adjusted gross income (AGI). Detected underreporting offsets all losses among over one-third of tax returns with negative reported AGI (Government Accountability Office 2024).

The PSZ spreadsheet back-of-the-envelope calculation reveals three issues.[20] First, it allocates underreporting by positive reported income and ignores the audit-based underreporting distribution. Second, it uses a misleadingly low AS top undetected underreporting share (see Auten and Splinter 2024b). Third, it overstates the amount of "undetected" underreporting. DCE's tripling of detected underreporting means about two-thirds of underreporting is undetected. Only about $500 billion in undetected underreporting are in national income in 2019, but the PSZ calculation assumes it is more than $800 billion That is, PSZ include detected underreporting, but their distribution for that detected underreporting is inconsistent with the audit studies, which show *decreases* in recent top 1% shares of 0.4 pp to 0.5 pp. These issues imply no change to the AS estimates because it already accounts for the audit-based underreporting distribution.

Additionally, PSZ assert that S corporation or other high-income underreporting is missing from these audit studies even after including DCE-based undetected underreporting.[21] First, this is not relevant for national income targeting because if the audit studies miss any sources then they are not part of national income. Second, recent audits do not support this missing high-income underreporting assertion: the IRS started auditing about twice as many tax returns with over $10 million but concluded that this higher audit-rate will "no longer be followed because these audits were unproductive having high no-change rates." (Treasury Inspector General for Tax Administration 2024 p. 2). When large partnerships are audited, this results in an overall decrease in income—that is, operational audits suggest large partnerships tend to *over*report income.[22] Third, a special IRS analysis concluded that the audit studies likely capture sufficient passthrough business income, as explained by AS (supplementary appendix p. 5):

> Based on a special audit study of S corporations, the IRS (2008, p. 14) concluded that the underreported income amounts we use (i.e., after scaling up to account for undetected underreporting) from the standard audit data "likely account for more misreporting of S-Corporation income than was detected in the S-Corporation study. Based on these findings, no additional adjustment is presently recommended to the Schedule E partnership and S-Corporation tax gap estimate…"

[20] For 2019: [(35% reported top 1% share – 11% audit-based top 1% share) • $810 billion underreporting] ÷ $18,300 billion nat. inc. = 1.1 pp. PSZ deduct this from a 0.6 pp adjustment in 1979 to give their Table 1 result of 0.4 pp. The details of this PSZ calculation are not explained in the comment but only observed in the PSZ spreadsheet.

[21] PSZ also suggest audit study underreporting distributions should be ignored in favor of differences between survey and tax return income distributions, but Splinter (2023b) already explained why that is inappropriate.

[22] "When field audits of large partnerships resulted in changes to the return, from tax year 2010 to 2018, the average audit adjustment to income was negative $264,000." (Government Accountability Office 2023 p. 30)

II. Other PSZ adjustments

1. Corporate retained earnings

The US has no registry of stock ownership that links C corporation stock ownership to individuals, which would allow allocations of corporate retained earnings to individuals. This means alternative indicators of corporate ownership must be used to allocate corporate retained earnings.

AS allocates retained earnings by fixed proportions of dividends and realized capital gains observed on individual income tax returns. PSZ18 (p. 568) allocated retained earnings by imputed corporate ownership, which they explain "in effect, blows up dividends and capital gains observed in tax data." This results in different relative shares, re-ranking, and calendar-year effects. First, the relative share of capital gains is often larger in the PSZ18 method than the fixed 25% capital gains in the AS method. This is why AS included a sensitivity test using capital gains shares of 0% and 50%. Neither of these alter the 1979–2019 change in top 1% shares (AS Table 5 sensitivity checks).[23] Second, individual re-ranking can be excessive due to lumpy capital gains realizations. This is because individuals often realize in one year capital gains that were accrued over many years, moving them far up the capital gains inclusive income distribution. This results in allocating too much corporate ownership to the top of the distribution. Limiting this re-ranking issue is one reason for the 25% proportion of capital gains in AS. Third, the PSZ18 approach can be sensitive to long-term or short-term changes in capital gains realizations resulting from tax policy changes, such as the spike in capital gains realizations in 1986 just before a tax increase (Auten, Splinter, and Nelson 2016). The AS fixed proportion method helps controls for these calendar-year issue.

2. Pension plan accrued income

PSZ overstate the impact of underfunded pension plans on top incomes in the AS study. We discuss two issues with this PSZ adjustment. First, the PSZ back-of-the-envelope calculation in their spreadsheet uses a top 1% share of pension wealth that is too large. The calculation uses 10.3%, but the PSZ comment says it should be 8.3%. PSZ (p. 35) write, "After subtracting unfunded pensions, the top 1% by income owns…8.3% in 2019."

Second, PSZ provide no evidence or citation supporting their asserted increase in top retirement wealth shares. We are not aware of the Federal Reserve Distributional Financial Accounts splitting out funded pension distributions. In contrast, AS used IRS information returns (Forms 1099-R) linked to individuals for Individual Retirement Account wealth and benchmarked their overall retirement wealth distributions on publicly available estimates from the Federal Reserve's Distributional Financial Accounts. Using this Federal Reserve data, the PSZ downward adjustment of 2 pp implies removing $6.5 trillion of

[23] PSZ (p. 37) incorrectly claim that the 2019 version of AS allocated half of retained earnings by dividends. All versions of AS allocating retained earnings used a three-quarters allocation by dividends. Tax data suggest dividends should be favored (Joint Committee on Taxation 2013) and other estimates "strongly support placing substantially more weight on dividends when capitalizing flows to estimate C-corporation wealth" (Smith, Zidar, and Zwick 2023 p. 549).

defined benefit pension underfunding from the bottom 99%.[24] However, Federal Reserve data show only $4.2 trillion of state and local pension underfunding in 2019. Adjusting for this and allocating some underfunding to the top 1% (proportionally half as much as for lower income groups), results in an effect that is only one-fifth the PSZ adjustment, a negligible amount.[25]

3. Sales taxes

National income is a pre-tax income definition and therefore includes corporate taxes, employer-paid payroll taxes, and sales taxes.[26] Standard allocations of these taxes, which are missing from fiscal income, are based on tax incidence.[27] Therefore, AS follows the standard assumption that consumers bear the incidence of sales taxes and allocates them by disposable income less savings. Disposable income is defined as corrected fiscal income plus cash transfers (from Social Security and unemployment benefits) less income, property, and payroll taxes—which approximates annual cash flows available to spend on consumption goods.

However, PSZ (p. 13) say one should ignore tax incidence when allocating sales taxes and instead "scale incomes up uniformly." This explanation is inconsistent with standard approaches. It also differs from the explanation in PSZ18 (p. 570): "we assume that sales and excise taxes are paid proportionally to factor income minus saving…so that they are borne by consumers." Note that by deducting savings, PSZ18 tried to target consumption.

But this PSZ18 sales tax allocation is not regressive enough because it "ignores transfers, retirement income, and taxes," as already noted by AS (online appendix p. 34). That is, PSZ18 understated the regressivity of sales taxes by ignoring low-income cash transfers and assuming high-income people make purchases with amounts already paid as income taxes. The PSZ uniform scaling by factor income is even less regressive than PSZ18 because it fails to remove savings, which are small or negative among low-income groups.

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[24] [$1.7T top 1% pens. wealth ÷ ($27.2T DFA pens. wealth – $6.5T PSZ underfund.)] – ($1.7T top 1% pens. wealth ÷ ($27.2T DFA pens. Wealth) = 8.3%. And 8.3% – 6.3% = 2.0 pp. Assets from Census Survey of Pensions and liabilities from national accounts via www.federalreserve.gov/releases/z1/dataviz/pension/funding_ratio/table/ (accessed Sept. 3, 2024). In a Congressional Budget Office study, Karamcheva and Perez-Zetune (2023 p. 27) reported that, "99 percent of unfunded liabilities were in state and local and in federal DB plans."

[25] The AS calculation for 2019: [(7.1% PSZ funded pension top 1% share – 6.3% AS top 1% pension share) • $1,340 billion] ÷ $18,300 billion national income = 0.06 pp. The PSZ calculation for 2019: [(10.3% PSZ pension wealth top 1% share – 6.3% AS/Fed. Reserve top 1% share) • $1,340 billion] ÷ $18,300 billion national income = 0.29 pp.

[26] PSZ create confusion by redefining national income by removing about $900 billion of sales taxes. PSZ (p. 3) write: "Unless otherwise noted, in this comment by national income we mean factor-price national income, i.e., national income excluding sales taxes (net of subsidies). In 2019, market-price national income was $18.3 trillion and factor-price national income was $17.4 trillion."

[27] PSZ18 (p. 562) expressed this similarly: "Who exactly earns the fraction of national income paid in the form of corporate, payroll, and sales taxes is a tax incidence question." PSZ, however, describe the tax-incidence based AS allocation of sales taxes as "assumed to reduce inequality and its rise" due to a "conceptual issue." This is inaccurate.

Finally, the same tax incidence should apply to both allocating missing amounts and then deducting those same amounts for after-tax measures.[28] But PSZ argue one should use different allocations: add pre-tax sales taxes by factor income (ignoring incidence) but then deduct different amounts (considering incidence) to get after-tax measures. This is an inconsistent approach.

4. Government consumption

Government consumption includes non-transfer government spending and should be allocated by its likely economic incidence. PSZ describe their government consumption allocation (proportional to after-tax income) as leaving these amounts "out of distributional considerations." We disagree. This PSZ allocation assumes a particular incidence of this government spending but provides no reason for it. AS, in contrast, provides a long discussion of why we allocate government consumption half per capita and half by after-tax income. Additionally, AS sensitivity tests show little impact of alternative assumptions on long-run changes in top 1% after-tax income shares.

The PSZ18 study had only one sensitivity test. It allocated education spending per capita, implying about 30% of government consumption amounts are per capita. This is closer to the half per-capita AS assumption than the no per-capita PSZ assumption. PSZ acknowledge that it makes sense to allocate education spending per capita but assert that no other non-transfer government spending "could in principle" be allocated this way. PSZ provide no reason for this claim. Instead, AS (p. 2211) already explained that the PSZ approach ignores "the redistributive and public goods aspects of government consumption captured by our half per capita allocation." This is a principle-based reason for the AS allocation.

PSZ also describe the AS allocation of government consumption as "assumed to reduce inequality and its rise." But that is not the reason for the AS assumption. Instead, the evidence discussed in AS supports a significant per-capita allocation due to school spending and the public-goods aspects of other government spending, such as on research and development. These are in-kind benefits, not a basic income as suggested by PSZ. The AS half per-capita assumption is also conservative—it implies a public goods aspect for only one-third of non-education government consumption. All the papers of which we are aware discussing this allocation (besides PSZ) argue for some per-capita allocation and half argue for 100% per-capita allocations. The AS paper discussed government consumption as follows:

> Prante and Chamberlain (2007) argued for an equal per-household allocation. The CBO (2013) considered the effects of allocating government consumption either all per capita or all by market income, suggesting that both rely on problematic assumptions. Reynolds and Smolensky (1977, 50) allocated this spending half per capita and half by income, arguing that "households benefit on some equalitarian

[28] Thus, sales tax incidence assumptions should have essentially no effect on after-tax income shares. PSZ18 (p. 570) also observed that "the incidence of sales taxes make[s] little difference to the level or trend of our income shares."

> basis as well as in proportion to income." Riedel and Stichnoth (2022) present evidence supporting a per capita allocation of public education spending, which is more than one-third of government consumption. To account for the mixture of types of government spending, we allocate government consumption half per capita and half by aftertax income...Allocating all government consumption per capita per Riedel and Stichnoth (2022) would have little effect on our estimated trends but would generally lower top 1% shares 0.75 pp. (AS p. 2203)

5. Government deficits

PSZ assume government deficits should be allocated half by government transfers and half by all taxes. Allocating deficits by transfers, however, effectively removes hundreds of billions of dollars of transfers that were received. Current-year transfers should not be reduced because of deficit financing. If future-year transfers are reduced due to current-year deficits that will already be reflected in future-year transfers, so no further deficit-based adjustment is needed. Rescaling transfers here, as in PSZ, would also imply government surpluses increase transfers, suggesting more redistribution than actually occurred in a year. This is not a "neutral" assumption, as claimed by PSZ, nor does it make sense to remove transfers received due to deficit financing. In contrast, AS allocates deficits by federal taxes because almost all deficits are federal and federal taxes have historically been changed to offset surpluses or deficits. AS (p. 2211) explained these points:

> Our allocation of deficits by current taxes is more consistent with the historical evidence than the PSZ assumption that current transfers would be significantly reduced…Ferriere and Navarro (2020) explain that historical government spending shocks were financed with higher tax progressivity, and Auten and Splinter (2020, 135) note that "federal surpluses have been followed by tax cuts (e.g., 1964 and 2001) and large federal deficits have preceded tax increases (e.g., 1982, 1984, and 1991)." In contrast, the PSZ approach implies that deficits result in cuts to Social Security benefits, Medicare and Medicaid, and refundable tax credits, which is inconsistent with historical experience.

III. Wealth inequality and capital income

PSZ assert that AS capital income estimates are inconsistent with wealth inequality estimates but provide no data on the increase of top capital incomes relative to wealth. Instead, PSZ rely on vague assertions. When considering specific estimated trends—as already done in response to this critique in Splinter (2023a)—we find the PSZ claims unconvincing because the AS capital income and the Federal Reserve's Distributional Financial Accounts (DFA) wealth estimates are compatible. Between 1989 and 2019, AS top 1% capital income shares increased 5 pp and DFA top 1% wealth shares (ranked by income to make more comparable) increased 8 pp. These are relatively similar.

There are many reasons to expect these top wealth share to have increased a bit more than top capital income shares over recent decades. This is due to differences in the units of observation, persistent differences in rates of returns and savings rates, an aging population, and falling interest rates. First, the DFA unit of observation of families likely

pushes up top wealth shares relative to the AS use of percentiles with equal number of individuals, which controls for falling marriage rates outside the top of the distribution. Second, wealth inequality differs from annual income inequality because differences can accumulate over time. Persistent individual differences in rates of return and savings rates and can cause increasing wealth inequality despite unchanging income inequality (Fernández-Villaverde and Levintal 2024). Third, an aging population allows more time for wealth dispersion to accumulate due to persistent savings and rate-of-return differences and more debt accumulation when young in recent cohorts. Makarski, Tyrowicz, and Żoch (2025) estimated that half the increase in U.S. wealth inequality since 1970 was from improvement in longevity. The large Baby Boom cohort also likely contributes to this effect. For example, AS found that top 1% income shares were highly correlated with the peak-earnings-age share (48-57 years old). Finally, the long-run decrease in interest rates can increase wealth inequality more than income inequality.[29] Splinter (2023a, p. 2) explained:

> Interest rates fell dramatically between 1989 and 2019—the federal funds effective rate fell from 9 to 2 percent. This decreased the ratio of interest-income to bond-wealth and therefore falling interest rates likely increased the gap between top income and wealth shares…Therefore, the Auten-Splinter estimates are consistent with increasing top wealth shares.

Many others have discussed how wealth-to-income ratios can be driven up by declines in interest rates (Moll 2020, Cochrane 2020, Greenwald et al. 2023). For example, Gomez and Gouin-Bonefant (2024 p. 201) empirically question the PSZ argument. They find "the secular decline in interest rates…can account for about 40% of the rise in Pareto [wealth] inequality." In part, this is because lower interest rates mechanically increase discounted present values even with no change to capital incomes. Looking across countries, Pfeffer and Waitkus (2021 p. 567) find a "lack of association between national levels of income and wealth inequality and concentration."

IV. Prior PSZ comments and AS responses

Previously, PSZ made five relevant comments on the AS methodology and estimates: PSZ18 appendix; Piketty, Saez, and Zucman (2019, 2023); Saez and Zucman (2020, 2021). We incorporated many of their prior suggestions into the published version of AS and listed these in the AS supplementary appendix. However, some of the earlier PSZ critiques are repeated in this recent comment despite already having been addressed in the revised version of our paper and our prior responses (Auten and Splinter 2019, 2020, 2021; Splinter 2020, 2023a, 2023b). PSZ's latest comment ignores these prior responses. For example, PSZ ignore the repeated AS explanation that taxed capital income shares are not relevant for untaxed capital income shares (e.g., AS Figure B16). This is because untaxed capital income has shifted away from the top of the distribution (due to declining corporate retained earnings) and toward more equal sources of capital income (due to growing housing imputed rents and retirement income).

[29] Falling interest rates causing rising wealth inequality is an old concern, expressed in John Locke's 1691 treatise *Some Considerations of the Consequences of the Lowering of Interest and the Raising of the Value of Money*.

V. Concluding remarks

A comment on a research paper should, in our view, at a minimum summarize the specific approaches of the original paper, the reasons they were used, and why the comment's proposed alternatives are preferable. PSZ's comment does not meet this minimum standard. PSZ fail to mention the AS reasons for each of the relevant allocations. Therefore, they also fail to explain why their proposed adjustments are preferable to the AS approaches. Moreover, PSZ ignore the reasons for each of the differences already discussed at length in AS. In summary, PSZ took the largest differences estimated by AS, asserted they were "assumed to reduce inequality," ignored the reasons provided for preferring AS relative to PSZ assumptions, and then reversed select AS estimates. As explained in this response, each of their adjustments require convincing reasons, data, and calculations—but none of their proposed adjustments meet these criteria.

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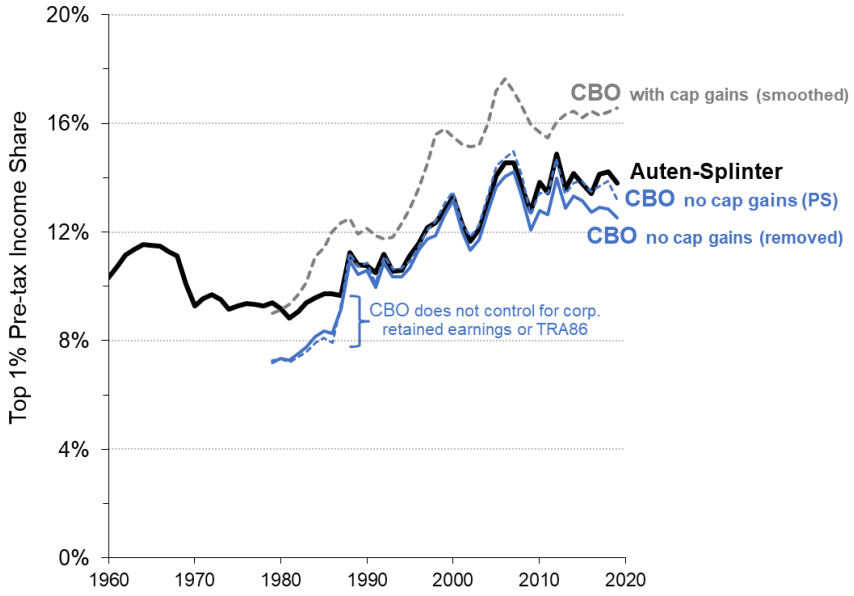
Appendix

To make Congressional Budget Office (2022, CBO) top 1% income share estimates comparable to national income estimates, realized capital gains must be removed. Two methods of removing capital gains from CBO estimates give similar top 1% income shares (Figure A1). The first approach multiplies CBO estimates by the ratio of top 1% income share without and with capital gains estimated by Piketty and Saez (2003 and updates). These estimates are shown in Figure 1 and since 1987 are almost identical to those estimated in Auten and Splinter (2024a). An alternative approach directly removes capital gains from top 1% incomes and total incomes and then re-estimates top 1% income shares without capital gains. Compared to the first approach, this gives nearly identical results in earlier decades and 0.7 pp lower results in the most recent decades. Note that the lower CBO top 1% shares before 1987 are due to not controlling for missing corporate retained earnings or income reporting changes from the Tax Reform Act of 1986. CBO has confirmed with us that their top 1% shares without capital gains are between the two estimates presented here. For more discussion of CBO income distributions, see Auten and Splinter (2019).

Figure A1: Pre-tax top 1% income shares: CBO estimates without capital gains



Notes: CBO top series includes capital gains realizations but smoothed over five years, middle series scales CBO estimates by the top 1% share without vs. with capital gains using estimates from Piketty and Saez (2003 and updates, PS), the bottom series removes capital gains from CBO's top 1% group and total income. The lower CBO top 1% shares before 1987 are due to not controlling for missing corporate retained earnings or income reporting changes from the Tax Reform Act of 1986. *Sources:* Auten and Splinter (2024a); Congressional Budget Office (2022, CBO), PS, and authors' calculations.