

Tax Evasion by the Wealthy: Measurement and Implications *

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Abstract

This paper combines random audit data with new data on offshore bank accounts to estimate the size and distribution of individual income tax evasion in the United States. We show that evasion through offshore financial institutions is highly concentrated at the very top of the income distribution, and that random audits virtually never detect this form of evasion. Data from random audits alone suggests an increasing rate of tax evasion through the income distribution up to the 99th percentile, but a sharp drop-off in the rate of evasion by income within the top 1 percent. Accounting for evasion through offshore financial institutions partly reverses this drop-off at the top, leading us to revise upwards random-audit estimates of the tax gap for very-high-income earners by 4 to 6 percentage points.

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1 Introduction

Globalization has opened new tax evasion opportunities, such as owning undeclared assets abroad through offshore accounts, shell companies, and trusts. At the same time, there is continued tax evasion by wealthy and less wealthy individuals through more traditional channels (e.g., unreported labor income, inflated business expenses, etc.). In this paper we provide a first attempt at improving estimates of the size of and distribution of individual income tax evasion in the United States by combining random audit data with new data on offshore wealth.

The size and distribution of tax evasion matters for two main reasons. First, knowing how tax evasion is distributed is helpful for tax authorities, as it can help them better target their enforcement efforts. It is also important for tax policy, as tax evasion affects the effective tax burden of the various groups of the population, and enforcement can affect the distribution of tax burdens. Last, and perhaps most importantly, it matters for the study of the distribution of income and wealth. Over the last twenty years, scholars have increasingly relied on tax data to study distributional issues, especially trends in top income and wealth shares (see Roine and Waldenström (2015), for a recent survey). Tax returns are the best available data source to study the top-end of the distribution, because, unlike surveys, they do not suffer from sampling errors—everybody above a certain income level has to file a return. Yet, since tax rates, the supply of tax avoidance services, and tax enforcement strategies differ across countries and have changed dramatically over time, tax return data may paint a distorted picture of the cross-country and time-series patterns in inequality.

Estimating the size and distribution of tax evasion is hard because there is no single source of information capturing all of it. The key source used so far in the United States (and many other developed countries) is stratified random audits. Random audits are a powerful way to estimate the extent of unreported self-employment income, abuses of tax credits and, more broadly, all relatively simple forms of tax evasion. The Internal Revenue Service relies on random audits (the National Research Program, NRP) to estimate the tax gap, that is, the total amount of unreported income and unpaid taxes. Based on the latest wave of the NRP, the IRS (2019) estimates that the tax gap for all federal taxes amounts to 14.2 percent of actual (paid plus unpaid) tax liability in 2011-2013. Moreover, academics have fruitfully used random audits to gain insights on the determinants and implications of tax evasion (e.g., Johns and Slemrod (2010)).

One limitation of random audits such as the NRP is that they may not allow one to study tax evasion by the very wealthy satisfactorily, for two reasons. First, these audits often have

small sample sizes of very wealthy individuals. Second, and more fundamentally, sophisticated forms of evasion involving legal and financial intermediaries may be difficult to detect in the context of random audit programs. Alstadsaeter et al. (2019) find that random audits conducted in Scandinavia under-estimate substantially true tax evasion at the very top of the wealth distribution. This limitation means that random audits need to be supplemented with other data sources to study tax evasion among the rich. Such data, however, have so far proven elusive in the United States.

In this paper, we analyze new data on offshore wealth to shed light on high-end tax evasion. These data include two sets of individuals who, based on their later behavior, were quite likely to be concealing offshore accounts in the years we study. Specifically, we examine participants in the Offshore Voluntary Disclosure Program (OVDP) and individuals who started reporting an account on a Foreign Bank Accounts (FBAR) between 2009 and 2011, focusing on people with US addresses and bank accounts in tax havens.¹ Johannesen et al. (2019) find that it is highly likely that these individuals had concealed offshore accounts and were evading tax on the investment income earned in those accounts. By combining these new data with estimates of the stock of offshore wealth owned by American taxpayers, we provide revised estimates of the size of individual income tax evasion.

We first show that concealed offshore accounts were essentially never undetected by NRP auditors. There is enough overlap between our two groups of likely offshore evaders (OVDP participants and first-time FBAR filers with US addresses and accounts in havens) and the NRP sample that we can conduct simple statistical analysis. We find that NRP auditors essentially never detected a concealed offshore account, even, for instance, for individuals who just a year or two later entered the OVDP and admitted to non-compliance. This finding suggests that the NRP contains little to no coverage of this form of evasion.

We next conduct a descriptive analysis of our two sets of likely owners of concealed offshore wealth. We find that ownership of offshore wealth is highly concentrated at the top of the income distribution. Seven percent of all members of the top 0.01 percent of the US income distribution appear in at least one of these two samples of tax evaders, compared to a negligible percentage for the bottom 99% of the income distribution. In terms of the amount of offshore wealth, we find that over 20% of offshore wealth is owned by individuals in the top 0.01% of

¹The list of tax havens used in this work is the OECD list that can be found on page 17 of the 2000 progress report found at <http://www.oecd.org/ctp/harmful/2090192.pdf>. We also add Switzerland and Luxembourg to our list. This list does not have any official role in IRS enforcement efforts; the IRS does not have an official definition of a tax haven.

the income distribution. Another roughly 30% is owned by individuals between the top 0.1% and the top 0.01%, and just under 30% is owned by individuals in the top 1% but below the top 0.1%. These numbers imply that offshore wealth is significantly more concentrated than non-hidden wealth; for instance Saez and Zucman (2016) estimate that less than 10% of wealth is held by individuals at the top 0.01% of the income distribution.

We next consider what can be learned about the distribution of individual income tax evasion from the NRP data alone. We are primarily interested in estimating the share of income under-reported as a share of total true income, and tax evaded as a share of total tax due, by rank in the true income distribution. Importantly, we use a method the IRS calls Detection-Controlled Estimation (DCE) to account for evasion that is detected by some auditors and not others. Income from offshore accounts is so seldom detected (even by the best auditors) that it will not be accounted for by this correction, which captures more easily detectable forms of non-compliance (such as unreported self-employment income). Consistent with earlier results in Johns and Slemrod (2010), we find that income under-reporting shares and tax evasion shares are increasing with income when we rank by true income through most of the distribution, but at the very top, above the 99th percentile, there is a declining profile of the share of income under-reported and tax evaded. We show that ranking individuals by their estimated true income rather than originally reported income sharply affects these estimates, which highlights the importance of accounting for re-ranking when distributing the tax gap by rank in the income distribution. Likewise, the use of DCE sharply affects the estimates, as for instance there is almost no evasion detected at all at the very top of the income distribution in the raw NRP data.

Finally, we consider how the estimates of the distribution of income tax evasion should be modified to account for evasion via offshore accounts. We distribute the estimated macro stock of concealed US offshore wealth using distributions from our FBAR data and from Alstadsaeter et al. (2019), and then convert the wealth to income via a rate of return. This exercise involves some uncertainty, but we make this first attempt using our best guess at the relevant uncertain parameters to highlight the importance of offshore wealth for the overall extent and profile of evasion. Our adjustments lead to an increase in estimates of the tax gap by a few percentage points for top earners relative to baseline estimates from random audits. We find that accounting for income from offshore wealth increases estimated tax evaded as a fraction of total tax due by 6 percentage points for the top 0.01 percent of the income distribution, and by about 3 percentage points for taxpayers in the top 0.1 percent of income but not the top 0.01 percent. Accounting

for offshore concealment increases the overall tax gap by 0.8 percentage points according to our preferred estimate.

Finally, we present sensitivity analysis for our exercise of distributing income from concealed offshore wealth, using alternative estimates of the stock of concealed offshore wealth, the distribution of offshore wealth, and the rate of return on offshore wealth. We find that the estimated rates of income under-reporting and evasion are sensitive to all these parameters, but that the most important source of uncertainty quantitatively is the rate of return on offshore wealth. Alternative estimates of the rate of return can shrink our benchmark adjustment of the official NRP evasion rates by more than half, or more than double it. There is less variation in estimates of the stock of offshore wealth, and alternative assumptions for the distribution of wealth reallocate offshore income modestly between groups at the very top of the income distribution.

2 Measuring Tax Evasion: Methodology

2.1 National Research Program Data

The NRP random audit data are the main data source used to study tax evasion² in the United States (see, e.g., Andreoni et al. (1998); Johns and Slemrod (2010), and IRS (2016, 2019)).

Although a key data source, random audits face two main limitations. First, some evasion may not be detected by auditors in the context of a random audit. The Tax Gap Estimates from the National Research Program (NRP) acknowledge this issue by employing a technique called Detection Controlled Estimation (DCE), under which detected evasion is scaled up to account for undetected evasion. DCE methodology is based on Feinstein (1991). The detection process is modeled by positing that conditional on evasion occurring, only a fraction is detected depending on the characteristics of the return examined (presence of self-employment income, schedules filed, etc.) and of the examiner (experience, age, etc.). Feinstein (1991) estimates such a model by maximum likelihood and finds that about a third of tax evasion goes detected (i.e., if all examiners were as perceptive as the examiners who uncover the most evasion, three times more evasion would be detected). To adjust for unreported income that examiners were unable to detect, the IRS applies DCE to the returns subject to audit, in effect multiplying the forms of evasion detected (mainly evasion by the self-employed) by about 3 (with adjustments depending on the type of income, low visibility vs. high visibility). For more details on DCE methodology

²We use the term evasion in this paper to refer to unintentional and intentional non-compliance with tax obligations. We do not attempt to distinguish between intentional evasion and unintentional non-compliance and acknowledge that the boundary between these is fuzzy.

as of the 2001 wave of the NRP, see Johns and Slemrod (2010). In this paper, we will use the version of DCE methods described in Johns and Slemrod (2010) for simplicity. However, we note that DCE methods have been revised somewhat in more recent tax gap studies, see IRS (2019).

This Detection Controlled Estimation procedure faces a number of limitations. It is sensitive to parametric assumptions (the correlation between the error terms in the evasion and detection equations). More importantly, the model assumes for identification that the best examiner captures 100% of total evasion. However, given the information available to the IRS, some forms of tax evasion are very difficult to detect in the context of random audits, no matter how talented or thorough the examiner. This limitation is inherent in any random audit study, and it is the first key limitation we attempt to speak to in this paper.

The second limitation of the use of random audits to estimate the size and distribution of the tax gap involves heterogeneity in evasion through the income distribution. DCE methods deal with the possibility of differential undetected evasion across the income distribution only coarsely. The adjustment is conducted separately for those with reported total positive income (TPI)³ above and below \$100,000. Therefore, the DCE method implicitly assumes that for the same type of income, the relationship between detected and undetected evasion is the same across the income spectrum within these broad groups. However, it seems plausible that sophisticated forms of evasion involving legal and financial intermediaries are more likely to be used by higher income and higher wealth taxpayers, and may have been less likely to be detected in random audits.

There is good reason to believe that these limitations are especially important when it comes to evasion via offshore financial intermediaries. NRP audits consist of line-by-line information about what the taxpayer reported and what the examiner concluded was correct. As one moves up the wealth distribution, the share of capital in taxable income rises. Examiners can check that taxpayers duly report the capital income earned through domestic financial institutions, because these institutions automatically and generally truthfully report data to the tax authority. However, NRP auditors would have difficulty checking that taxpayers duly report income earned through offshore financial institutions, because they typically receive limited information from tax havens, and they cannot audit all the world's providers of offshore services.

Overall, in fact, random audits found little tax evasion on capital income. The NRP finds that about 4% of taxable interest and dividends are unreported (Johns and Slemrod (2010),

³Total positive income is the sum of all positive taxable income amounts reported on the Form 1040, and therefore excludes net negative income items.

Table 1). The figure is greater for capital gains (12%), maybe because the cost basis on stock investments was not reported to the IRS until 2011, making tax evasion relatively less risky. In Denmark, only 2.2.% of capital income earners are found to evade taxes, the smallest figure across all income categories (Kleven et al. (2011), p. 669). These low rates could reflect low actual evasion on capital income, but the results of this paper suggest they are also likely to reflect the limitations of random audits when it comes to uncovering high-end tax evasion. In addition to capital income, detecting sophisticated forms of business income tax evasion also raises formidable difficulties, as evidenced by the fact that in the United States, 30% of partnership income (which is highly concentrated) cannot be traced to any ultimate beneficiary, hence is essentially un-auditable (Cooper et al. (2016)).

3 Tax Evasion at the Top: Evidence From Recent Enforcement Initiatives

3.1 Background and Data

In this section, we consider what can be learned about tax evasion at the top of the income distribution from recent enforcement initiatives targeting undisclosed offshore wealth. This enforcement began in 2008-2009 with a whistleblower-instigated lawsuit by the US Department of Justice against the Swiss Bank UBS. UBS eventually agreed to turn over information on Americans that had been evading U.S. tax via accounts at UBS. This episode was the first of an increasingly broad set of enforcement initiatives over the next several years, including the issuance of John Doe Summonses to several financial institutions targeting offshore evasion schemes, the signing of several information exchange treaties facilitating tax enforcement, the establishment of Offshore Voluntary Disclosure (OVD) programs whereby taxpayers could disclose prior non-compliance and pay penalties but avoid potential criminal prosecution, and, most ambitiously, the passage and implementation of the Foreign Accounts Tax Compliance Act. These policies are described in more detail in Johannesen et al. (2019).

Johannesen et al. (2019) found that enforcement caused a large increase in reporting of offshore wealth and the associated financial income by US taxpayers. We build on these findings to construct two datasets of individuals that are very likely to have been evading taxes on income from their offshore assets. The data in this paper is the same data used in Johannesen et al. (2019), slightly updated to include additional years. Further details on the dataset can be found in Johannesen et al. (2019).

The first dataset of likely evaders are participants in the Offshore Voluntary Disclosure Program. We gathered data on all participants in OVDP from 2009 to 2015 and matched 50,020 OVD participants⁴ to their individual tax returns. We refer to this sample as the *OVDP participant* sample.

U.S. persons that are the beneficial owners of more than \$10,000 in offshore wealth have been required to disclose this wealth to the government since the 1970s by filing a Foreign Bank Account Report (FBAR). The second dataset of likely evaders we use consists of individuals reporting that they own offshore assets by filing an FBAR for the first time between 2009 and 2011. We use only those first-time FBAR filers with U.S. addresses disclosing an account in one of several countries we designated a tax haven (see footnote 1). Johannesen et al. (2019) provides compelling evidence that the large majority of these taxpayers had been evading U.S. tax on these assets prior to disclosing them in response to enforcement. We match 31,752 such taxpayers to their individual income tax returns. We refer to this sample as the *first-time FBAR filer* sample.

For both sets of taxpayers, we then use data from their income tax return to know their rank in the income distribution. Specifically, we use income data for the tax year after these individuals' disclosure of offshore wealth, as the results in Johannesen et al. (2019) suggest that this is the year in which individuals start to comply fully with their tax obligations on their offshore wealth. We use three income concepts here for various purposes: adjusted gross income (AGI), total positive income, and financial capital income. Adjusted gross income is taken directly from the individual tax return. As we find a significant number of individuals with large business losses holding substantial offshore wealth, we also rank individuals by total positive income, which re-codes the income components of AGI that can be negative—net capital losses and business losses—to zero when they are negative and re-computes AGI. Finally, to attempt to rank people by capital income, we use the sum of interest, dividends, and realized capital gains and losses as a measure of total financial capital income.

For the first-time FBAR filer sample, we also use data on the amount of offshore wealth disclosed on their FBARs. These particular FBAR filers, those with US addresses newly disclosing tax haven accounts, disclosed \$124 Billion in wealth between 2009 and 2011. For comparison, *total* reported FBAR wealth was about \$290 Billion for a given year in the same period, sug-

⁴This 50,020 figure does not include approximately 6,000 program participants who we could not match to their individual tax returns. About two thirds of these were businesses participating in the OVD program. The rest did not file a tax return in the year we wished to analyze, either because their participation in OVDP was too recent or for some other reason.

gesting that a sizable share of the overall wealth reported on FBARs in this period came from newly disclosures of wealth in tax havens. However, estimates of total wealth concealed in tax havens are much higher. As we discuss further below, our preferred estimate of this amount from Alstadaeter et al. (2018) is just over \$1 Trillion, suggesting that roughly 11 percent of all offshore wealth in tax havens is disclosed by individuals in our first-time FBAR filer sample. All of this is consistent with the results of Johannesen et al. (2019).

3.2 Results

We first show directly that NRP audits very seldom detected offshore evasion in the time period we study. As both our offshore disclosers samples and the NRP stratified random audit sample contain disproportionately many observations of high-income individuals, it turns out that there is enough overlap between them for some simple statistical analysis: 378 first-time FBAR filers and 135 OVDP participants were selected for NRP audits between 2006 and their disclosure of an offshore account. In Figure 1, we show that the auditor only discovered that the individual had offshore wealth and should have been filing an FBAR in a handful of cases – about 7 percent in total. It seems highly likely that a large majority of these taxpayers had offshore wealth during this period that they should have disclosed in the year they were audited.⁵ This finding implies that audits seldom detect concealed offshore wealth, and that even DCE-adjusted estimates of the tax gap for this time period will not capture tax evasion via offshore financial assets.

The next several figures depict the fraction of the overall population in a particular range of income that are present in one of these samples of likely evaders. Figure 2 plots the fraction of the population in the first-time FBAR filer sample by rank in the income distribution. We observe that the probability of being in the sample is much higher at the very top of the income distribution, with a nearly trivial fraction of the bottom 99 percent of the income distribution disclosing an offshore account. We observe that the overall profile is very similar for the three different income concepts, though it is steepest for capital income, followed by positive income. Figure 3 plots the same thing for OVDP participants. We observe a very steep profile, though slightly less steep than what we see for first-time FBAR filers.

Figure 4 combines these results, and accounts for overlap between the samples - OVDP

⁵Churn in the population of owners of offshore accounts could imply that some of the individuals disclosing offshore wealth in our data did not own an offshore account when they were audited under the NRP, but this possibility seems unlikely to affect our key takeaways. In a given year, about 30% of all FBAR filers do not file in the subsequent year; turnover is smaller for large accounts in tax havens. Even if we supposed that only 70% of our overlap sample actually owned an offshore account when they were audited under the NRP, we would conclude that the auditor only detected offshore wealth in $0.07/0.7 = 10\%$ of cases. In other words, the overall detection rate is so low that no realistic amount of churn will imply a high detection rate.

participants were required to file any delinquent FBARs as part of participating in the program. We observe that almost 7% of taxpayers in the top 0.01% of the income distribution – 999 taxpayers to be exact – were part of one of these samples of likely evaders.

In Figure 5, we turn to the distribution of wealth by rank in the income distribution. For this analysis we used only the first-time FBAR filer sample. We calculate the share of all wealth reported on FBARs in this sample that is attributable to taxpayers at different parts of the income distribution. For contrast, we use results from the capitalization method of Saez and Zucman (2016) to depict wealth shares for non-hidden wealth. We observe that FBAR wealth held in havens is much more concentrated at the top of the income distribution than non-hidden wealth, with over 20% of the wealth attributable to the top 0.01%, compared to less than 10% of non-hidden wealth. For reference, the total population of FBAR filers discloses \$124 billion in offshore wealth, with about \$26 billion in the top 0.01% and \$36 billion between the 99.9th and 99.99th percentiles. This result confirms that the findings in the previous figures were not simply driven by the overall concentration of wealth at the top of the income distribution, but rather that concealed offshore wealth is *especially* concentrated at the top.

Further analysis suggests that even the modest amount of FBAR wealth attributed to the bottom 90% of the income distribution may actually belong at the top of the distribution. Most of the observed FBAR wealth in the bottom 90 percent of the income distribution is driven by a very small number of extremely large accounts, which dramatically skews the distribution of FBAR wealth in these income groups. For instance, the median level of FBAR wealth for those in the bottom 50% of the income distribution is around \$200,000 and the mean is \$2.5 million. With such an extremely skewed distribution, a small number of very high-wealth individuals in the bottom 90% accounts for almost all of the wealth. We therefore suspect that the vast majority of the FBAR wealth for the bottom 90% of the income distribution – 11% of all FBAR wealth using total positive income and 17% using AGI – should in fact be assigned to top income groups. As such, we depict in Figure 5 the impact on the FBAR wealth shares of reassigning wealth from the bottom 90 percent to the top 10 percent of the income distribution, in proportion with the FBAR wealth already attributed to the top 10%.

3.3 Limits of current analysis

We find that concealed offshore wealth was virtually undetectable in random audits and is highly concentrated at the top of the income distribution. In the next section, we will explore the implications of this finding for the estimation of the tax gap, especially at the top of the

income distribution. Before we do so, however, it is important to acknowledge a key limitation of these data. Both of these samples contain data on offshore wealth of *voluntary* disclosers of offshore wealth, those who selected to participate in the OVDP or to engage in a likely *quiet disclosure* (see Johannesen et al. (2019)).⁶ As such they cannot be regarded as a representative sample of all owners of offshore wealth. Ideally, we would combine these data with arguably more representative data on evasive offshore accounts, such as data from whistleblowers or John Doe Summonses, in order to more fully understand the distribution of offshore wealth. For instance, Alstadsaeter et al. (2019) use this type of data on Scandinavian taxpayers and estimate that 52% of offshore wealth was owned by taxpayers in the top 0.01 percent of the income distribution in those countries.

4 Combining offshore data with random audits

To estimate the level and distribution of total federal income tax evasion, we combine NRP random audit (2006–2012) data with our estimate of offshore tax evasion. All our computations on offshore evasion are for year 2007 and we assume that the pooled 2006–2012 NRP data are representative of 2007; therefore our results should be seen as representative of 2007. We note that using 2007 as the base year implies that any progress made on offshore evasion due to enhanced enforcement that began in 2008 is not captured by the estimates. However, estimates of the extent of tax evasion that do not account for offshore evasion also constitute a best-case-scenario for the extent of tax evasion after new offshore enforcement, supposing that all evasion via offshore financial accounts ceased and that no other evasion strategies became widespread in the wake of the crackdown on offshore accounts.

4.1 Analysis of NRP data

Figure 6 shows the estimated fraction of taxpayers found under-reporting income in the 2006–07, 2008–09, and 2010–12 NRP waves. This fraction rises from about 20% for low-income taxpayers to 60% for taxpayers in the bottom half of the top 1% (percentiles P99 to P99.5), before leveling off to 50% for the highest earners.

We next estimate income tax evasion as a fraction of tax due. Doing so requires careful specification. First, we should decide whether to position individuals in the income distribution according to their originally reported income, the income as corrected by the NRP auditor

⁶A “quiet disclosure” is when a taxpayer begins to report a previously undisclosed foreign account and the income in that account without participating in an OVD program.

(exam-corrected income), or DCE corrected income. Which of these we use matters because individuals move up in the income distribution when auditors detect non-compliance, leading to re-ranking. Our benchmark in our preferred specification is to use DCE corrected income throughout. If the goal of the research is to understand inequality, we should rank individuals and calculate rates of evasion according to *true* income. Ranking by DCE-corrected income uses the best estimate of true income that we can obtain from the NRP data.

Figure 7 reports our DCE-adjusted NRP estimates for income undeclared as a fraction of true (reported plus unreported) income, by rank in the income distribution. Estimated income under-reporting rises with income from just over 5% of true income to 25% in the lower half of the top 1%. It then falls sharply at the top end, to just over 10%. That is, according to the DCE-adjusted NRP data, there is a lot of heterogeneity in evasion within the top 1% (with relatively high evasion in the bottom of the top 1% and relatively low evasion for the top 0.01% highest earners). In total, estimates from NRP data alone suggest that \$3.4 trillion in income was under-reported in total, with \$ 2.3 trillion of income under-reported by the bottom 99% and \$1.04 trillion under-reported by the top 1%, and \$137 billion of that total coming from the top 0.01%.

Figure 8 compares our results with those obtained by Johns and Slemrod (2010) in their analysis of the 2001 NRP. We use the same binning as Johns and Slemrod (2010).⁷ As shown by Figure 8, the recent waves of the NRP deliver similar results as the 2001 NRP. The main difference is that the more recent waves suggest slightly more evasion between percentiles 99 and 99.5 (25% vs. 20% in 2001). But overall the patterns are qualitatively and quantitatively similar.

We next turn from income under-reporting to evaded amounts of tax. Figure 9 reports analogous estimates for evaded tax as a fraction of taxes owed. This fraction hovers around 20% at the bottom half of the distribution, falls slightly to around 18% from the 50th percentile to the 90th percentile, rises steeply to about 27% at the 99th percentile. As with income under-reporting, there is significant heterogeneity within the top 1 percent, and the evasion rate declines sharply with income within the top 1%. In total, these estimates from NRP data alone suggest that total tax evaded in the population was \$228 billion, with \$147 billion attributed to the bottom 99% of the income distribution, \$81 billion attributed to the the top 1%, and, due to the low estimated evasion rate at the very top from the NRP, only \$7 billion to the the top 0.01%.

⁷Since the top group considered by Johns and Slemrod (2010) is the top 0.5%, we also consider the top 0.5% as our top group in this figure.

We next discuss how using DCE-corrected income and accounting for re-ranking affect the estimates. Figure 10 shows how alternative specifications with respect to DCE corrections and the question of how we treat re-ranking. Panels A and C show estimated income under-reporting and tax evasion, respectively, with no DCE. In these panels, individuals are ranked by either originally reported income or exam-corrected income. We observe that evasion is relatively concentrated at the bottom of the *reported* income distribution, but that accounting for re-ranking significantly reduces the concentration of evasion at the bottom. We also observe that examiners directly detect very small amounts of non-compliance for individuals at the top of the reported or exam-corrected income distribution, consistent with the notion that offshore evasion is largely undetected in the NRP. In Panels B and D of Figure 10, we report DCE-adjusted estimates of income under-reporting and tax evasion, respectively. Individuals are ranked according to their exam-corrected income or their DCE-adjusted income. The overall under-reporting and evasion rates are more than twice as high when we account for DCE. Accounting for re-ranking after DCE adjustments leads to a very large change in the concentration of evasion rates at the bottom, and it significantly increases evasion rates in the top 1%. The effect of DCE adjustment is particularly large at the top of the distribution for two reasons. First, less visible forms of income that receive a larger DCE adjustment, like business income and capital gains – see Johns and Slemrod (2010) for full details – are more prevalent at the top of the income distribution. Second, DCE leads to significant re-ranking, because scaling up detected non-compliance by DCE adjustment factors moves non-compliant taxpayers higher up in the income distribution.

The fact that re-ranking matters a great deal is important for the interpretation of distributional statistics on tax evasion.

4.2 Adding offshore income

To estimate the amount of offshore evasion, we proceed in four steps. Each step entails an assumption, which we list in the first column of Table 2. We alter each of these assumptions in subsequent sensitivity analysis to help us understand the inherent uncertainty in this exercise.

First, we start with an estimate of aggregate offshore wealth in tax havens owned by U.S. households in 2007. Our haven wealth stock is \$1,058 Billion, taken from Alstadaeter et al. (2018), Appendix Table A.3, with no modification whatsoever. Second, we assume some fraction of that wealth was hidden. Our preferred number is that 95% of this wealth was hidden. Some accounts were certainly properly declared and compliant in 2007, but a 95% rate is broadly consistent with the United States Senate (2008, 2014) reports, which found that 90%–95% of

the wealth held by American clients of a number of Swiss banks were undeclared before FATCA.

Third, we assume a nominal rate of return (including capital gains) on this offshore wealth. Our preferred rate of return of 6.0%. This rate of return is inferred from what is known about the portfolio composition of global offshore wealth around 2007 and the rate of return on assets at that time. More precisely, Zucman (2013) estimates that in 2007–2008, around 75% of global offshore wealth was invested securities (mostly equities and mutual fund shares) and 25% in bank deposits.⁸

Fourth, we distribute the macro amount of offshore wealth and income. To do this allocation, we take a weighted combination of the distribution of offshore wealth observed among (self-selected) U.S. filers who disclose a haven accounts by filing an FBAR for the first time in 2009, 2010, 2011 (depicted in Figure 5), and the distribution of hidden wealth estimated by Alstadsaeter et al. (2019) in Scandinavia. We put equal weight on the U.S. self-selected distribution and the Alstadsaeter et al. (2019) distributions. This implies that 60% of hidden wealth belongs to the top 0.1% highest earners, and 35% to the top 0.01% (vs. more than 50% in Scandinavia). Ideally, it would be preferable to base our allocation of offshore wealth only on U.S. data. We hope to refine our allocation in the future using additional U.S. data where self-selection might be more limited.

With offshore income tax evasion factored in, total income tax evasion amounts to about 21% on average (20.1% detected in NRP, 0.7% offshore). Figure 11 shows how adding offshore income modifies the NRP estimates of the distribution of income tax evasion. Unsurprisingly adding offshore income has no visible effect in the bottom 90% of the distribution and a trivial effect between the 90th and 99th percentile of income. However, we find that excluding offshore income biases the point estimate for the fraction of true income under-reported downward by 4.3 percentage points in the top 0.01 percent of the income distribution, and by 3.2 p.p. for the top 0.1 percent excluding the top 0.01 percent. Relative to a baseline evasion rate of 10.8 percent, estimated evasion in the top 0.01% is 40% higher when accounting for offshore income. In total, our estimates suggest that about \$60 billion of offshore financial income was under-reported, with \$40 billion of that total belonging to the top 0.1 % and \$23 billion in the top 0.01% alone.

Figure 12 presents estimates of the amount of taxes evaded, as a fraction of taxes owed, adding offshore accounts to our NRP estimates. When calculating the tax rate on offshore income, we make the simplifying assumption that in each income bin the average tax rate is the

⁸The average interest rate paid by Swiss banks on their term deposits was 4.3% in 2006; the US Federal fund rate was in range of 4.3% to 5.25%; the total nominal return (dividends reinvested) was 13.4% for the the S&P500 and 20.65% for the MSCI world.

same as the marginal tax rate (i.e., if a group under-reports 2% of its income through offshore accounts, it also evades 2% of its tax liability), except for the top 0.01% where we assume that the applicable marginal rate is 1.4 times higher than the average rate.⁹ Failing to account for evasion on offshore income would therefore bias estimates of the tax gap at the top of the distribution downwards by comparable amounts in percentage points to income under-reporting. As shown by Figure 12 the main effect of adding offshore income is to stabilize the ratio of taxes evaded to taxes owed within the top 1% to about 20% (instead of the dip observed in the NRP data). In total, we estimate that \$12.2 billion in taxes was evaded from offshore accounts, with \$8.3 billion of this total attributed to the top 0.1%, and \$4.9 billion attributed to the top 0.01% alone.

Finally, we conduct some sensitivity analysis to the four assumptions that form the core of our estimates of the extent and distribution of evasion on offshore financial income. For simplicity, we construct two alternative scenarios: a lower-bound scenario in which we construct each assumption so as to minimize the amount of offshore evasion at the very top, and an upper-bound scenario in which we construct each assumption so as to maximize the amount of offshore evasion at the very top. The resulting specifications therefore represent the two the most extreme scenarios that we deem plausible. The first and third columns of Table 2 describe these alternate assumptions.

The lower-bound of the amount of offshore wealth held offshore comes from the Boston Consulting Group's Wealth Report of 2007. It is estimated that North American hold about \$37.7 trillion of wealth, 2% of which is held offshore. The upper-bound is based on Guttentag and Avi-Yonah (2005), who estimate total wealth held offshore by individual US tax-payers. Their computation builds on the BCG Wealth Report of 2003, according to which the total holdings of high net worth individuals in the world were \$38 trillion, including \$16.2 trillion for North America residents. About 10% of this wealth would be held offshore according to the BCG, giving an approximate \$ 1.5 trillion of US offshore wealth. The lower-bound of the fraction of offshore wealth which is actually hidden is based on United States Senate (2008, 2014) reports investigating the practices of several Swiss banks in the US. In these reports, the investigation committee find that about 90% of the wealth held by US taxpayers at UBS Switzerland was undeclared, and that between 85% and 95% of the accounts held by US taxpayers at Credit Suisse were undeclared. For the rate of return on wealth held offshore, the conservative figure

⁹This rough approximation is meant to correct for the very low average rates at the very top in 2007 (16.6% among top 400 taxpayers in 2007 according to IRS statistics; see <https://www.irs.gov/pub/irs-soi/14intop400.pdf>).

corresponds to the average daily 10-year Treasury rate for the year 2007, while the upper-bound number is the return on average equity for all US banks, average over the year 2007. Total income under-reporting via offshore accounts is \$60.3 billion in the preferred scenario, \$28.7 billion in the lower bound scenario, and \$165 billion in the upper bound scenario. Finally, our preferred estimate of the distribution of offshore wealth and income was a weighted combination of our (potentially self-selected) FBAR distribution and the distribution from leaks in the Nordic countries (Alstadsaeter et al., 2019), so for the sensitivity analysis we put 100% of the weight on one or the other of these.

Figures 13 and Figure 14 display the results for income-under-reporting and tax due, respectively. Our overall conclusion is that there is substantial uncertainty in these estimates, which is reflected in the aggregates above. In the upper bound scenario, estimated income under-reporting as a share of true income is 7.3 p.p. higher in the top bin than in our preferred scenario, which amounts to \$62.5 billion more income under-reporting in the top 0.01%. For tax due, income under-reporting is \$14.4 billion higher in the top bin in the upper-bound scenario than in the preferred scenario. For the lower bound scenario, in contrast, there is a very small amount of under-reporting in offshore accounts in general, and this is reflected in the fact that adding offshore income leaves us very close to the DCE-adjusted NRP totals under these assumptions.

We next unpack the assumptions to see which assumptions matter most for the wide range of estimates between the upper and lower bound. Figure 15 builds up the upper bound scenario by modifying the assumptions of the preferred scenario one by one, and Figure 16 does the same thing for the lower bound scenario. In both cases, we observe that the most important adjustment comes from the higher or lower rate of return in the offshore accounts in these scenarios. Uncertainty over the rate of return on offshore wealth, especially at the very top of the distribution, is therefore the most important dimension of uncertainty in these results. Our own assessment is that the low, 4.5% rate of return used in the lower-bound scenario is quite likely too low a rate of return for individuals at the top 0.01% of the income distribution. However, we acknowledge that direct evidence on this question is limited. The next-most important assumption after the rate of return is the distribution of offshore assets. Changing this distribution primarily affects the amount of evasion allocated to the 0.01 percent and the rest of the top 1%, which makes a significant difference for the upper bound scenario and relatively little difference for the lower bound scenario.

5 Conclusion and next steps

Combining data from NRP random audits and offshore wealth, we find that existing estimates of the extent of tax evasion were unlikely to fully account for evasion via concealed offshore wealth in the period we study. Accounting for this type of evasion significantly increases estimated rates of evasion at the top of the income distribution. Our current estimates suggest that estimated evasion increases by 4 to 6 percentage points for the top 0.01 percent of the distribution when we account for income from concealed offshore wealth. However, sensitivity analysis suggests that there is significant uncertainty in these overall aggregates, and that it would be particularly informative to know the rate of return on offshore assets for top-income taxpayers.

Our finding that NRP audits essentially never detected offshore wealth during this time period highlights an important caveat for the use of random audits in general. Our work on offshore wealth is proof of concept for the idea that some forms of evasion are nearly impossible to detect in a random audit, but that we can learn about them with data from other sources. In fact, data from other sources than random audits enabled the IRS not only to learn about the extent of tax evasion at the top of the distribution, but also to pursue sweeping, comprehensive enforcement of offshore tax evasion in the years immediately following the period we study here.

NRP audits are quite thorough, but auditors will always have limited information when taxpayers, especially sophisticated taxpayers, attempt to conceal information to reduce their tax liability. Evasion via offshore financial intermediaries is likely not the only type of evasion that was, at least in the past, virtually undetectable by random audit. Other possibilities include untraceable cash or cryptocurrency transactions and a wide variety of more complex evasion and dubiously legal avoidance strategies involving foundations, trusts and pass-through business entities. Some of this behavior may be present throughout the income distribution. However, for behaviors that require significant legal or financial expertise, we expect that, like offshore concealment, those behaviors are concentrated at the top of the income distribution. Additionally, operational audits are more common at the top of the distribution, making forms of evasion that cannot be detected by an auditor especially attractive for those taxpayers. Future work should attempt to further understand how to supplement random audit data with other sources of information on tax evasion.

Our results should be regarded as preliminary at this stage. Our ongoing work attempts to improve the estimates along several dimensions. First, we are evaluating options for using data from whistleblowers and/or John Doe Summonses to improve the estimated distribution of offshore wealth, address selection bias, and reduce our reliance on estimates from Nordic

countries. Second, we are exploring sensitivity analysis of the main estimates to a number of alternate assumptions. Third, we may use data from operational audits to benchmark and/or bound random-audit-based estimates of non-compliance. Fourth, we are working on further refinements to DCE estimation, including newer, higher-dimensional methods and Empirical Bayes estimators.

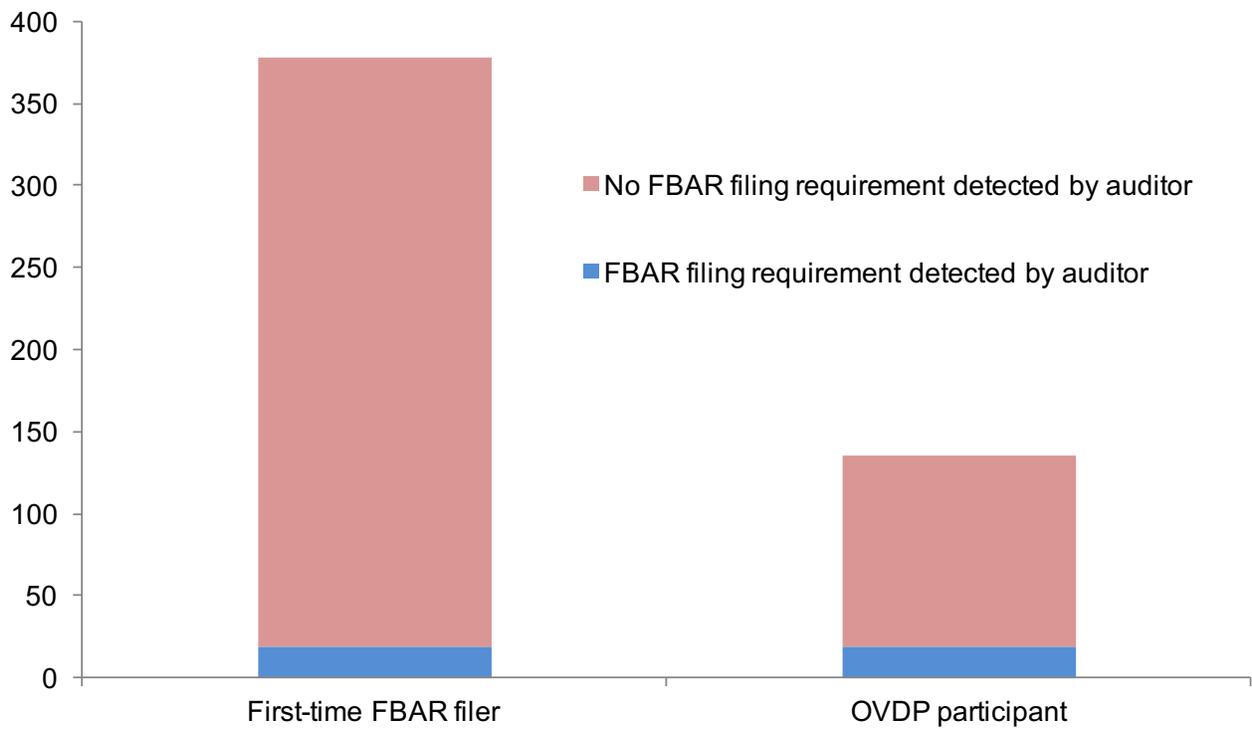
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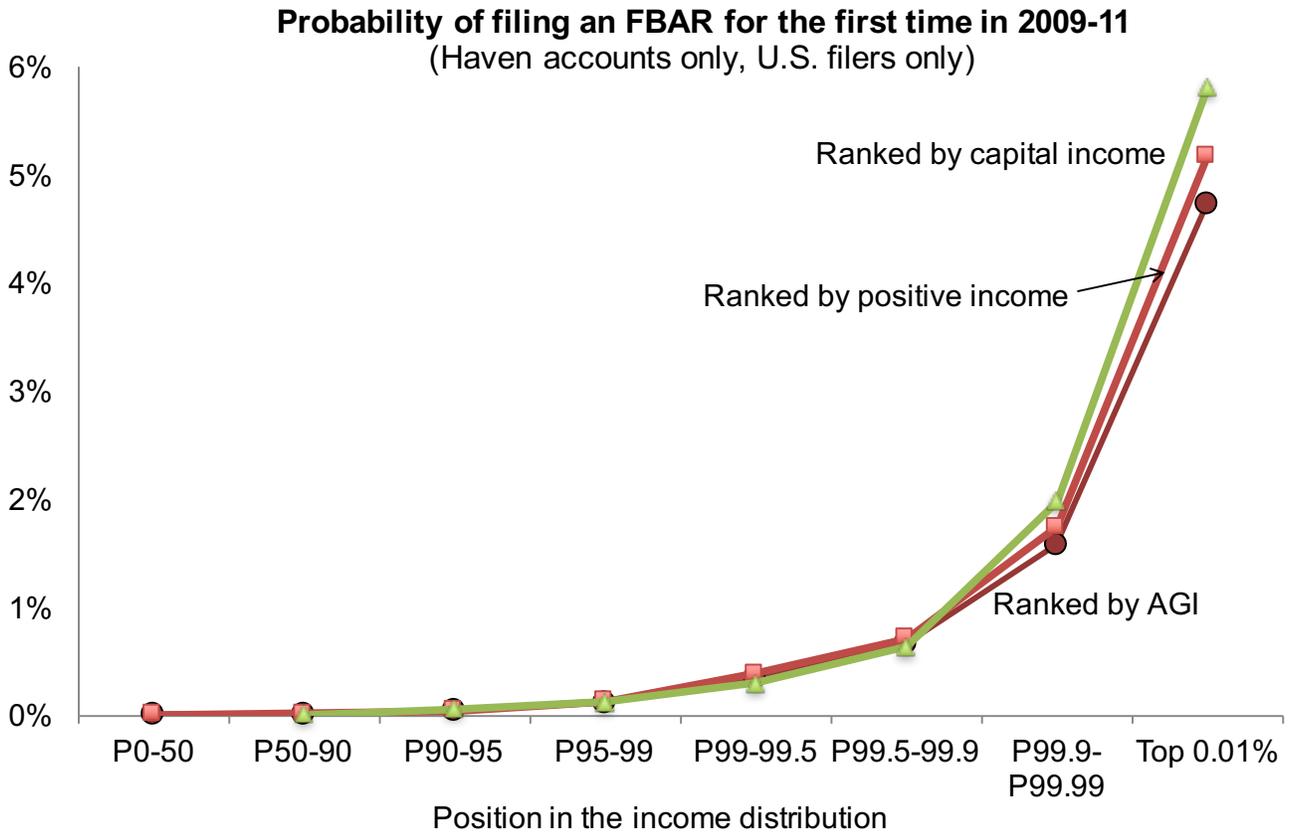
Figure 1: Do NRP audits detect offshore evasion?

Randomly audited taxpayers who subsequently disclosed an offshore account



Note: This figure shows that in both samples containing likely evaders with respect to offshore wealth, the individuals within those samples that happened to be audited in the NRP were almost never discovered. This is despite the fact that these taxpayers later disclosed offshore wealth through either the OVDP or by filing an FBAR with wealth in a tax haven.

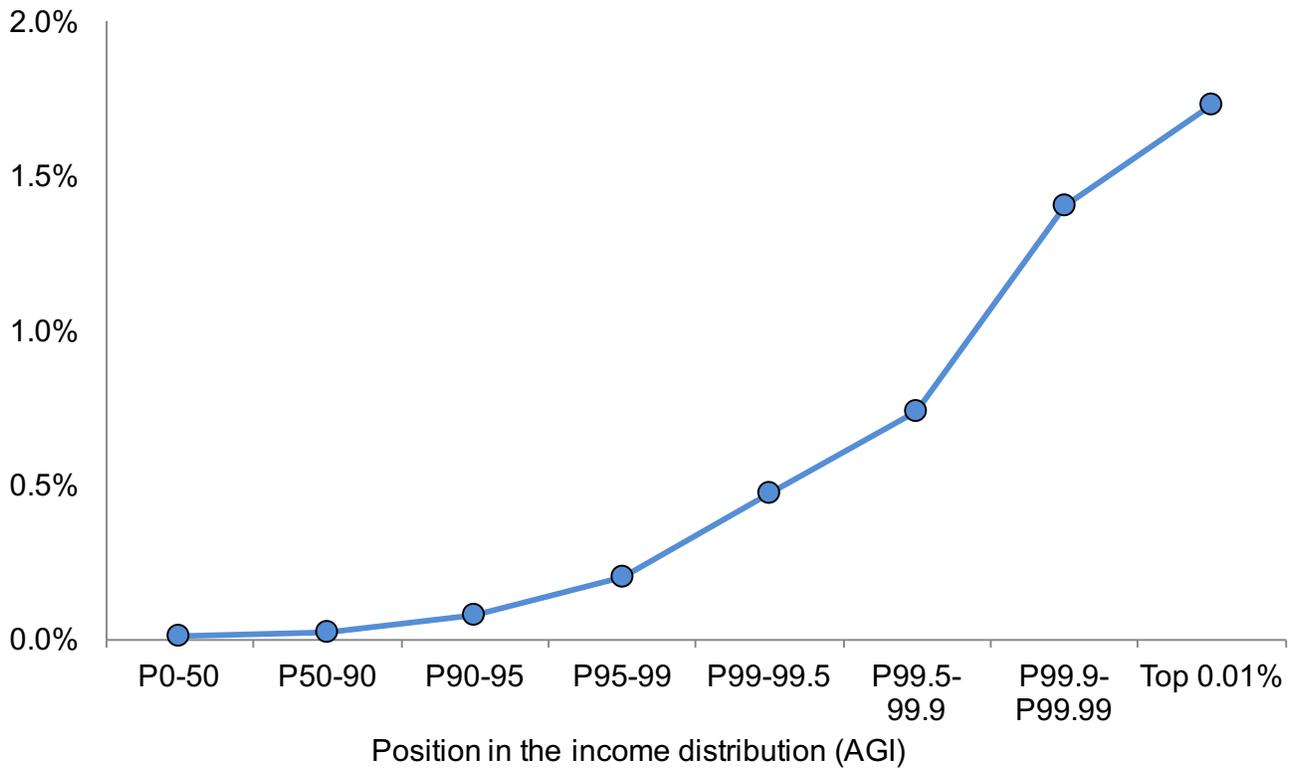
Figure 2



Note: This figure plots the fraction of the population within each part of the income distribution that are present in the first-time FBAR filer sample. We observe that the probability of being in the sample is much higher at the very top of the income distribution, with a nearly trivial fraction of the bottom 99 percent of the income distribution disclosing an offshore account. We observe that the overall profile is very similar for the three different income concepts, though it is steepest for capital income, followed by positive income.

Figure 3

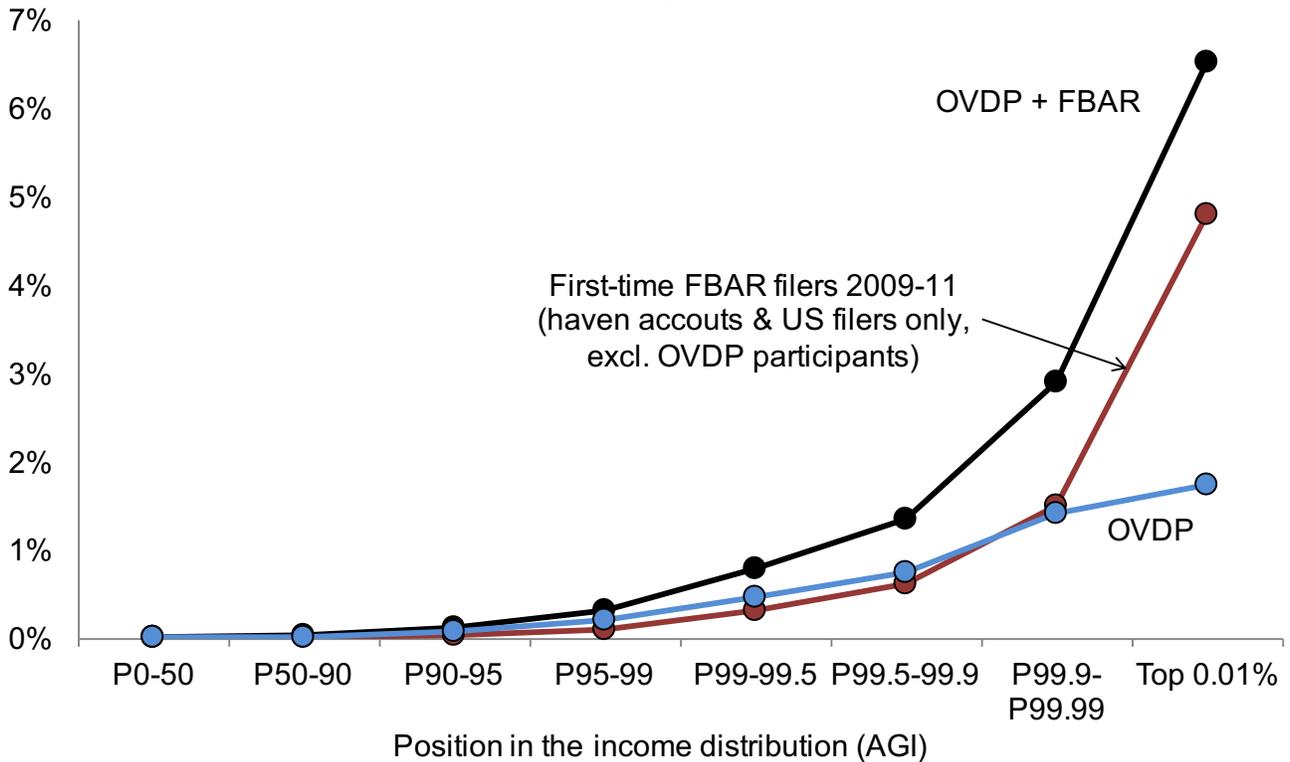
**Probability of using the offshore voluntary disclosure program
(2009-2015), by AGI group**



Note: This figure plots the fraction of the population within each part of the income distribution that are part of the OVDP sample. As with first-time FBAR filers, we once again observe that the probability of being in the sample rises steeply at the top of the income distribution and trivially small in the bottom 99 percent of the income distribution.

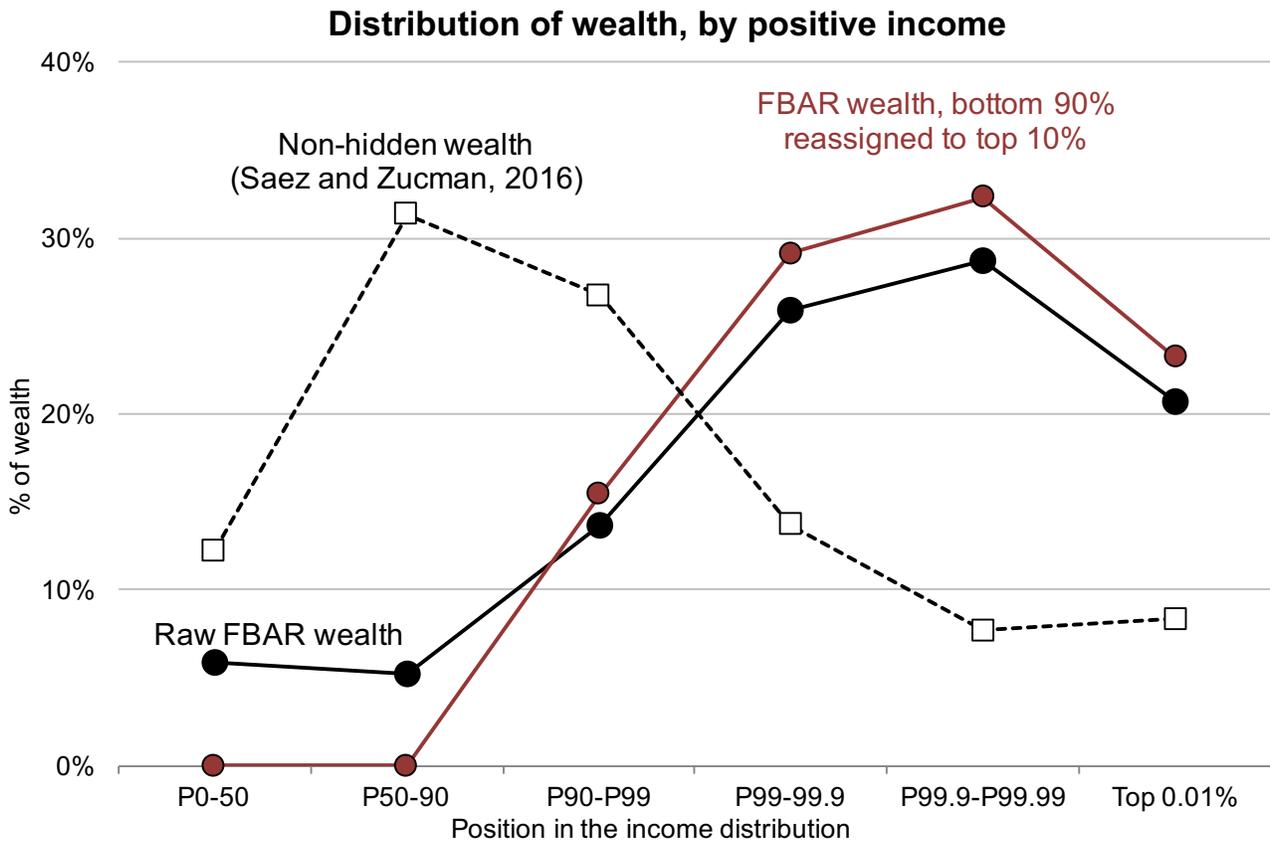
Figure 4

Probability of reporting a previously unreported account,
by AGI group



Note: This figure combines data from the two previous figures, and accounts for overlap between the first-time FBAR filer and OVDP participant samples. We observe the steep profile of the probability of disclosing a previously evasive account by income rank from the previous two figures. The main difference between the profiles from the two samples appears to be the presence of many more individuals in the top 0.01 % of the income distribution in the first-time FBAR filer sample. We find that in total nearly 7% of people in the top 0.01 percent of the income distribution appears in one of the two samples of likely evaders.

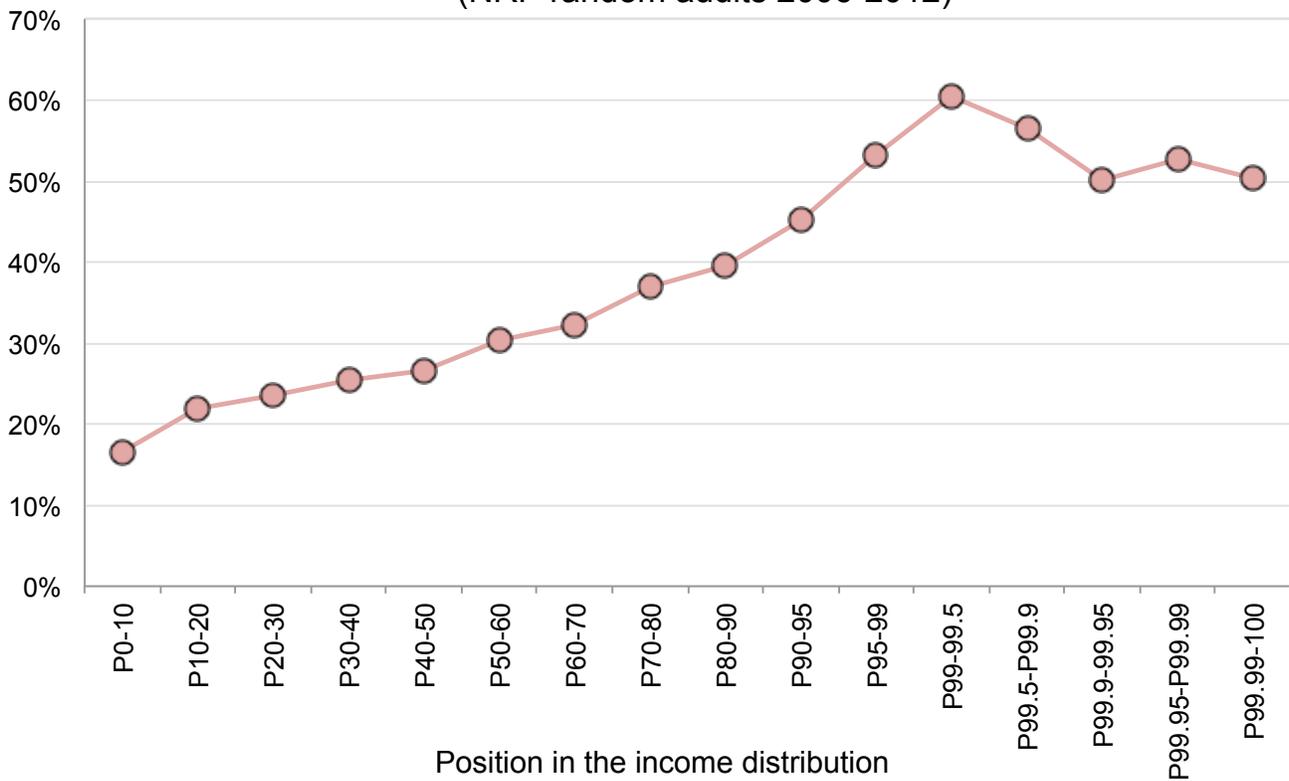
Figure 5



Note: This figure plots wealth shares for non-hidden wealth (Saez and Zucman (2016)) versus wealth reported on FBARs by the first-time FBAR filers with US addresses and accounts in tax havens. We observe that FBAR wealth is quite concentrated at the top of the income distribution.

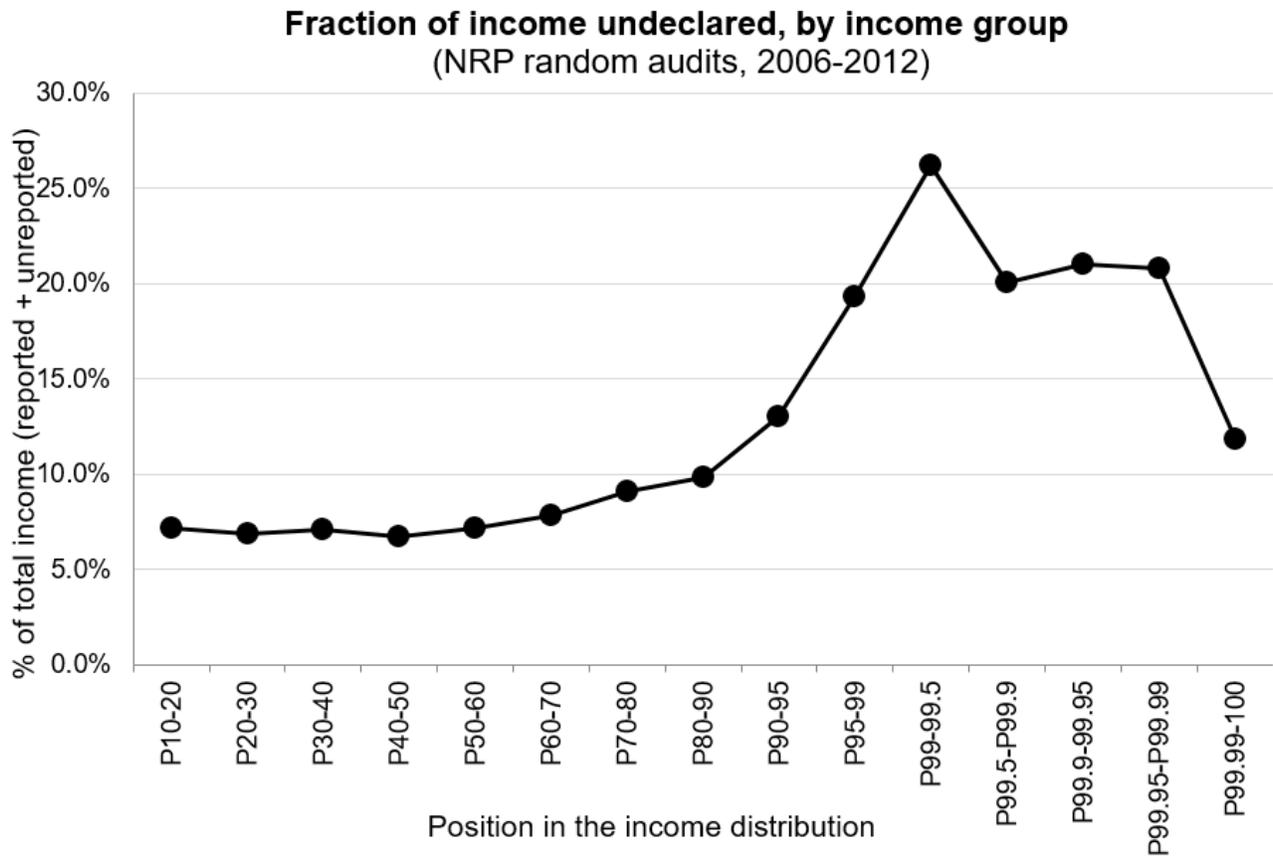
Figure 6

Fraction of tax units underreporting income, by income group
(NRP random audits 2006-2012)



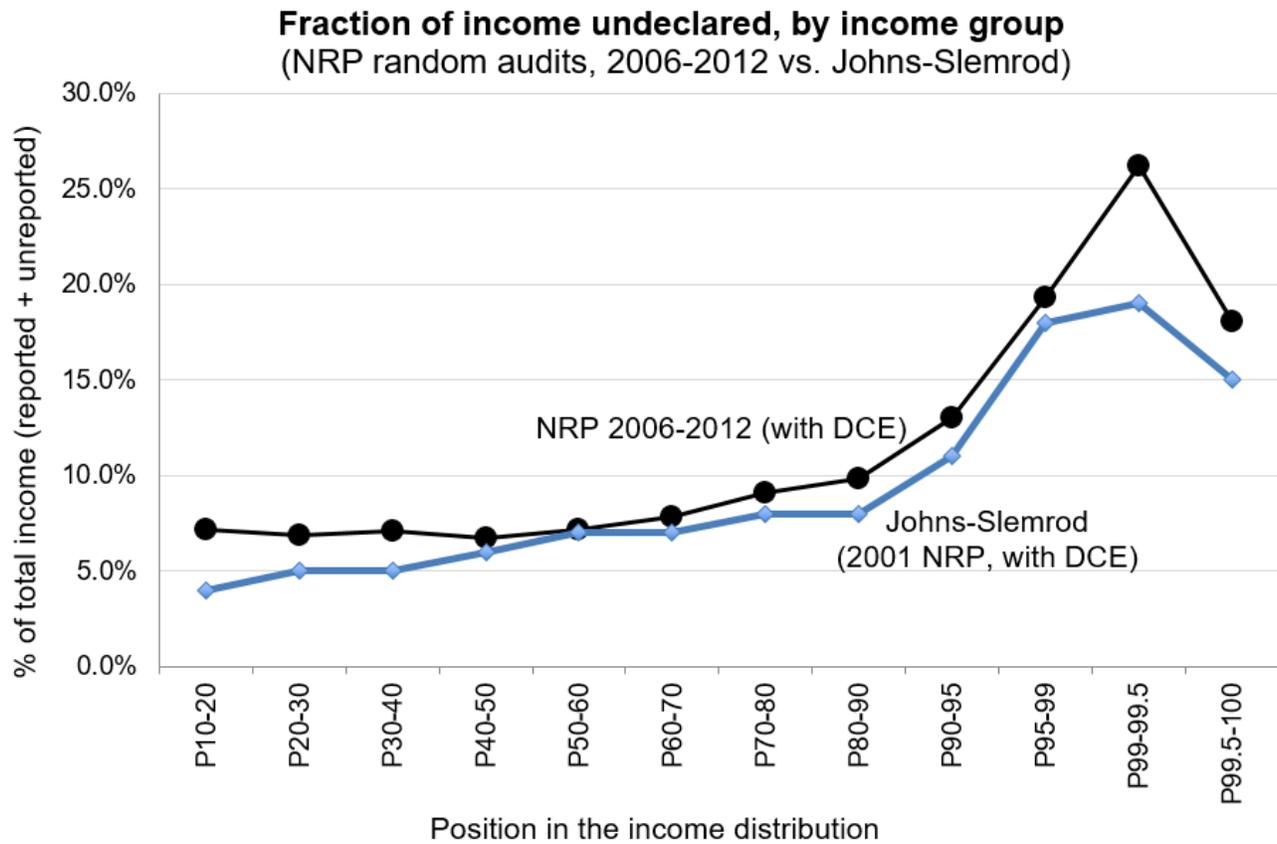
Note: This figure shows the fraction of taxpayers found under-reporting income in the 2006–07, 2008–09, and 2010–12 NRP waves. Taxpayers are ranked by their estimated true AGI.

Figure 7



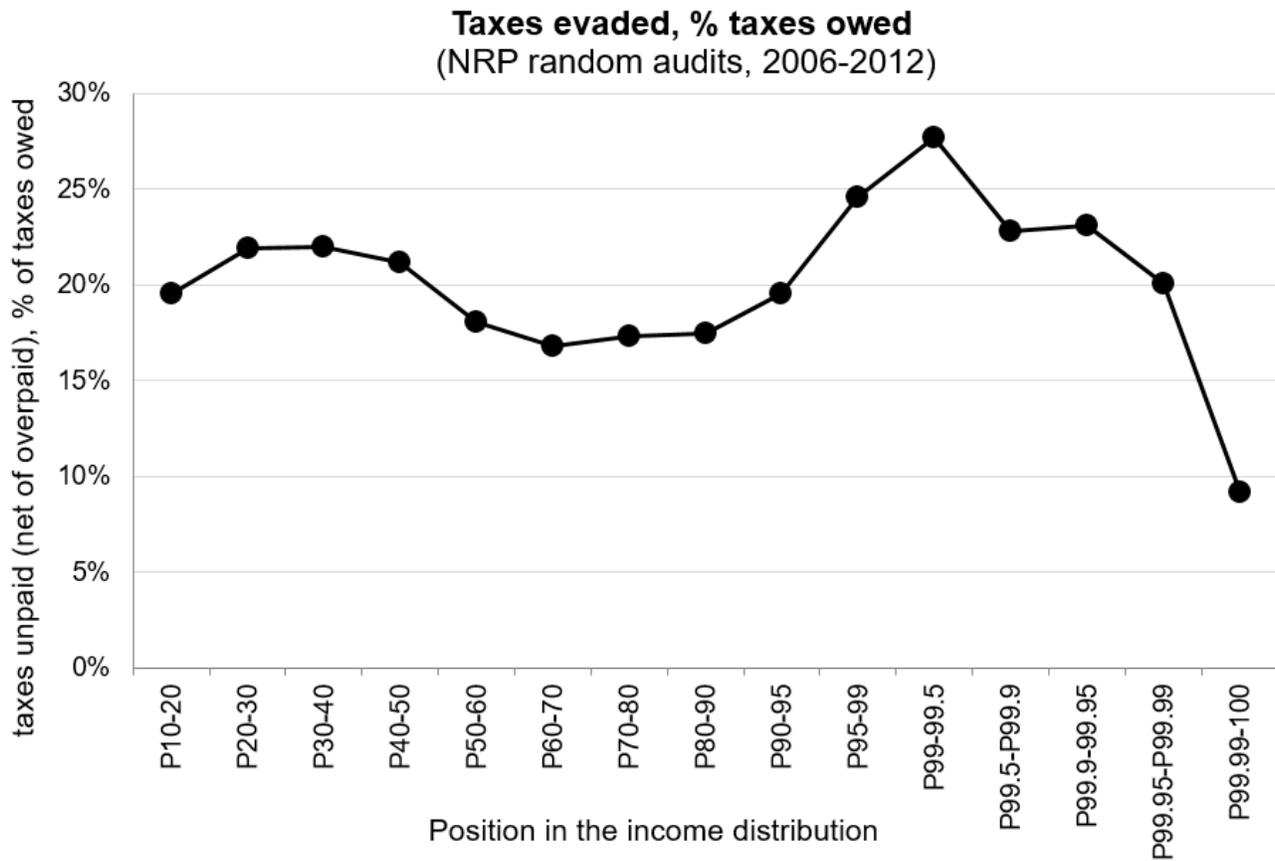
Note: This figure shows the fraction of true income (reported plus unreported) that is unreported in the 2006–07, 2008–09, and 2010–12 NRP waves. Taxpayers are ranked by their estimated true AGI. We observe that the rate of income under-reporting is increasing with income in general, but that within the top 1 percent of the income distribution there is significant heterogeneity. In the top 0.01 percent of the distribution, estimated under-reporting falls significantly relative to other top income groups.

Figure 8



Note: This figure compares the fraction of income which is under-reported in the 2006–07, 2008–09, and 2010–12 NRP waves vs. the 2001 wave studied by Johns and Slemrod (2010). Taxpayers are ranked by their estimated true AGI. We observe that estimates from the more recent waves of NRP are similar to those of Johns and Slemrod (2010), with some differences at the very top of the distribution.

Figure 9



Note: This figure shows the fraction of true taxes (paid plus evaded) that is evaded in the 2006–07, 2008–09, and 2010–12 NRP waves. Taxpayers are ranked by their estimated true AGI.

Figure 10

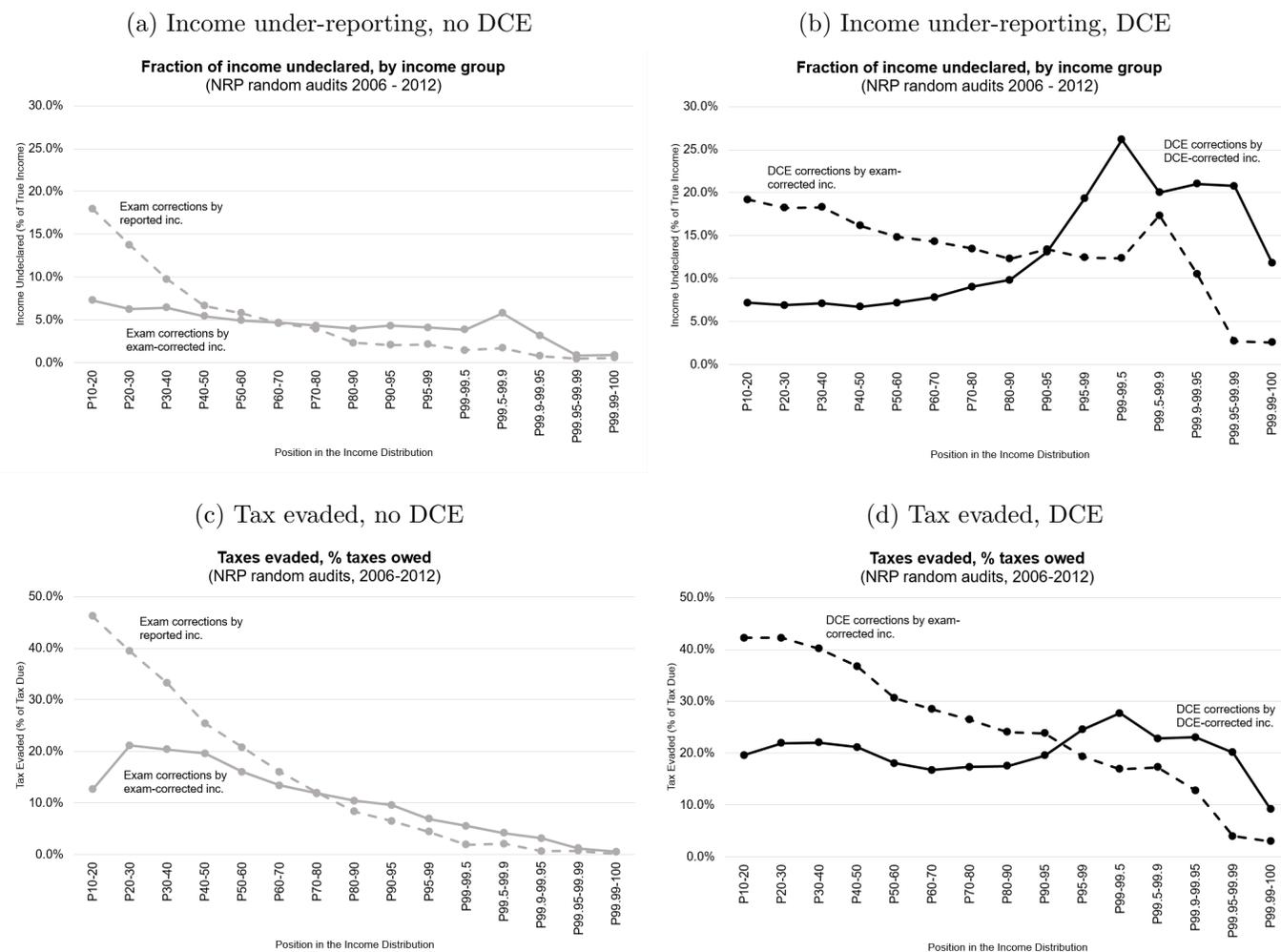
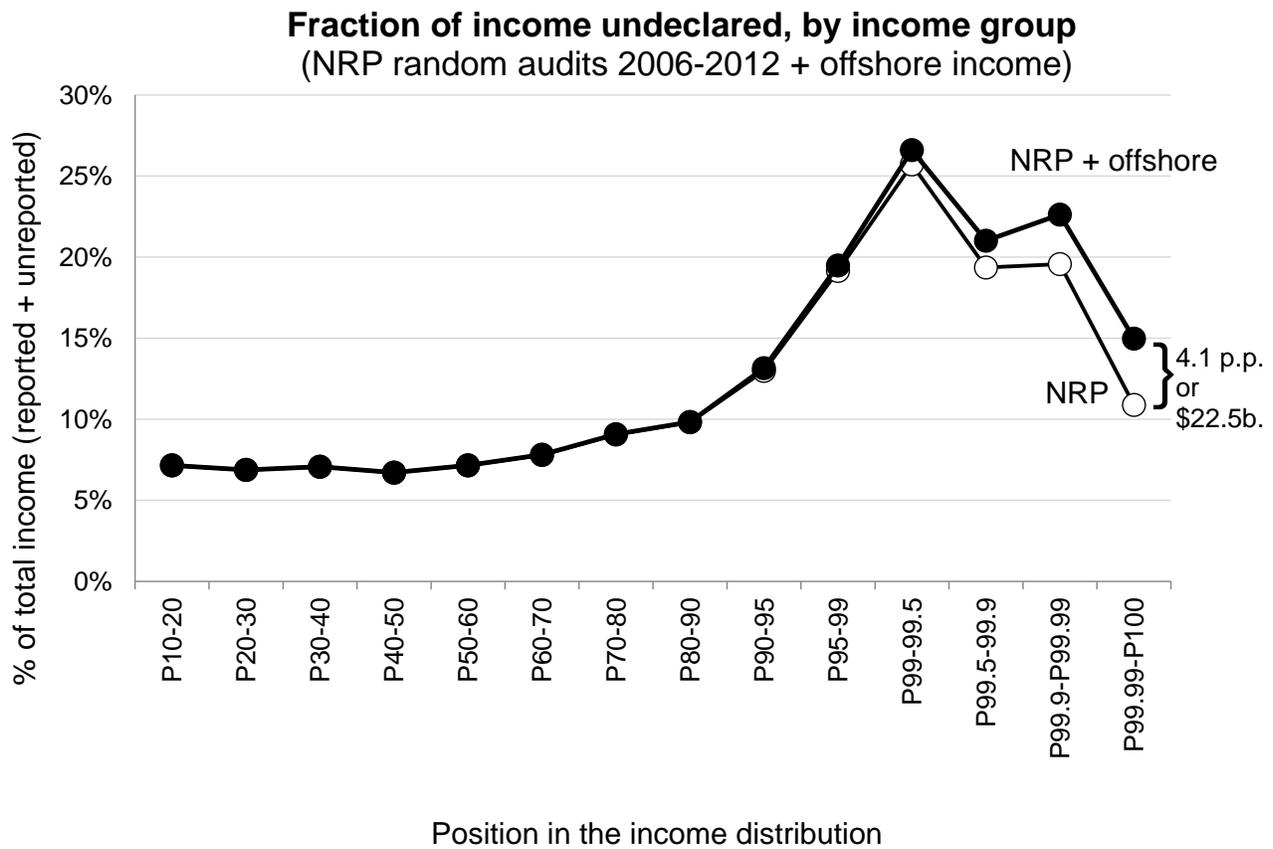
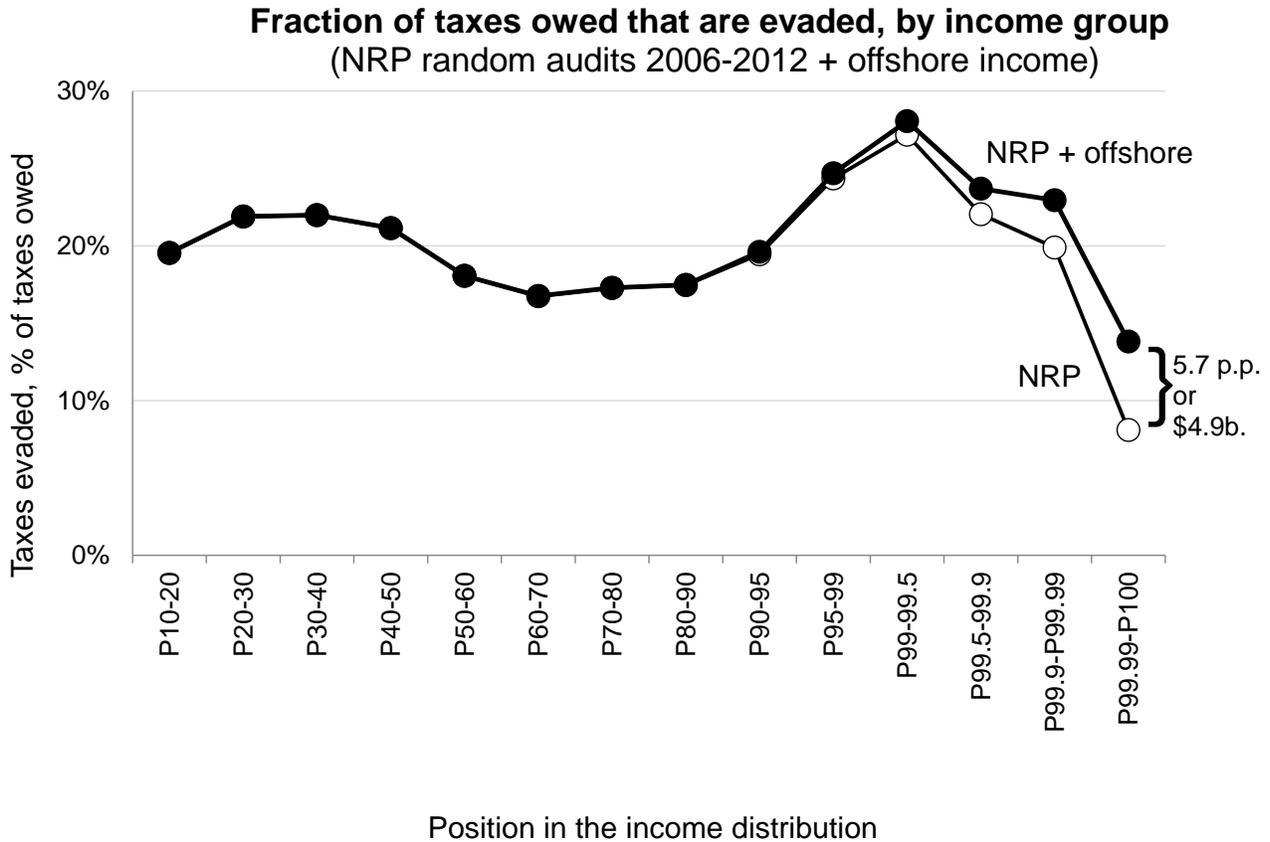


Figure 11



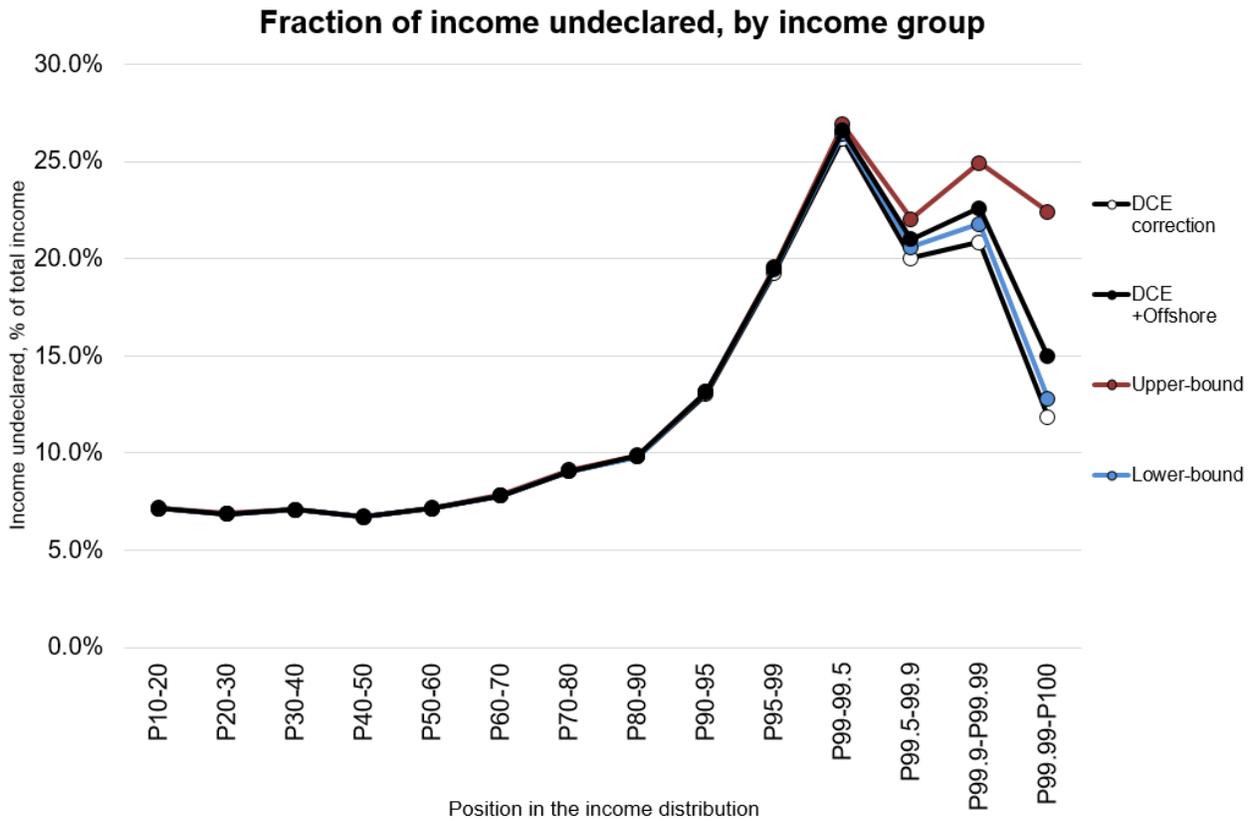
Note: This figure plots the estimated income under-reporting with and without adding non-compliance via offshore wealth. We find that estimated under-reporting as a fraction of true income increases significantly at the very top of the income distribution when accounting for offshore wealth. The point estimate for the top 0.01 percent increases by 4.1 percentage points.

Figure 12



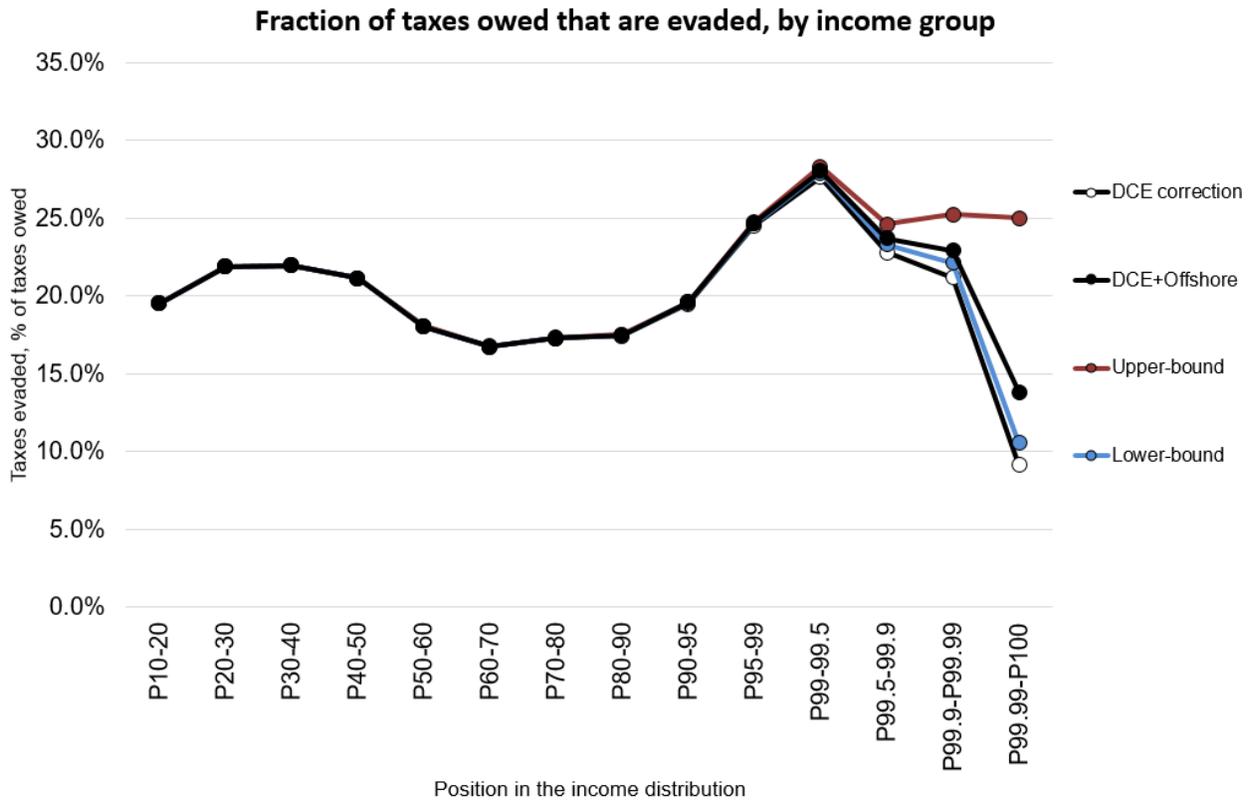
Note: This figure plots taxes evaded over taxes due by rank in the income distribution with and without accounting for offshore wealth. Note that estimated evasion rates from the NRP data are provisional at this time (see the text for details). We estimate that accounting for offshore income reverses much of the decline in evasion rates with income within the top 1 percent of the income distribution. The point estimate for the top 0.01 percent of the distribution increases by 5.7 percentage points by accounting for offshore wealth. Taxpayers are ranked by their estimated true AGI.

Figure 13



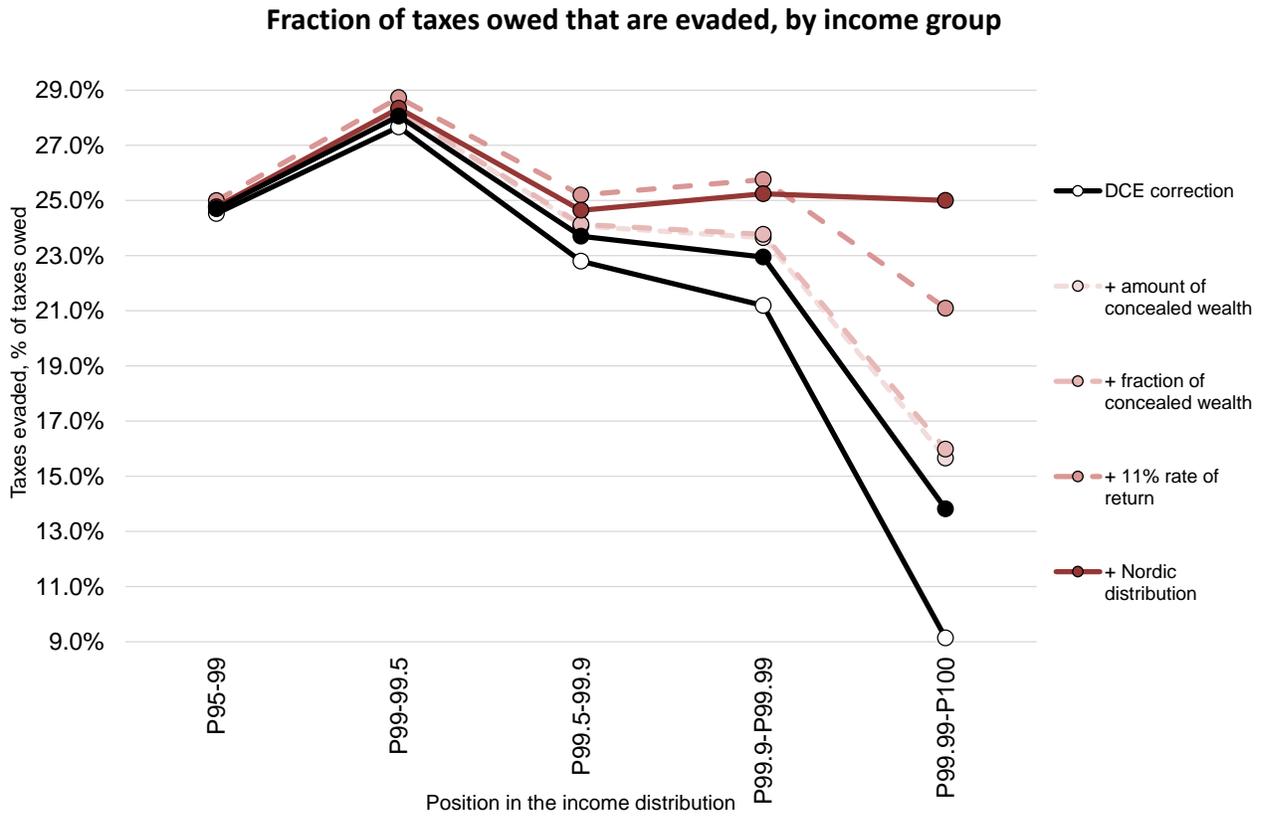
Note: This figure plots the estimated income under-reporting with and without adding non-compliance via offshore wealth. Non-compliance via offshore wealth is evaluated according to three different scenarios. Taxpayers are ranked by their estimated true AGI.

Figure 14



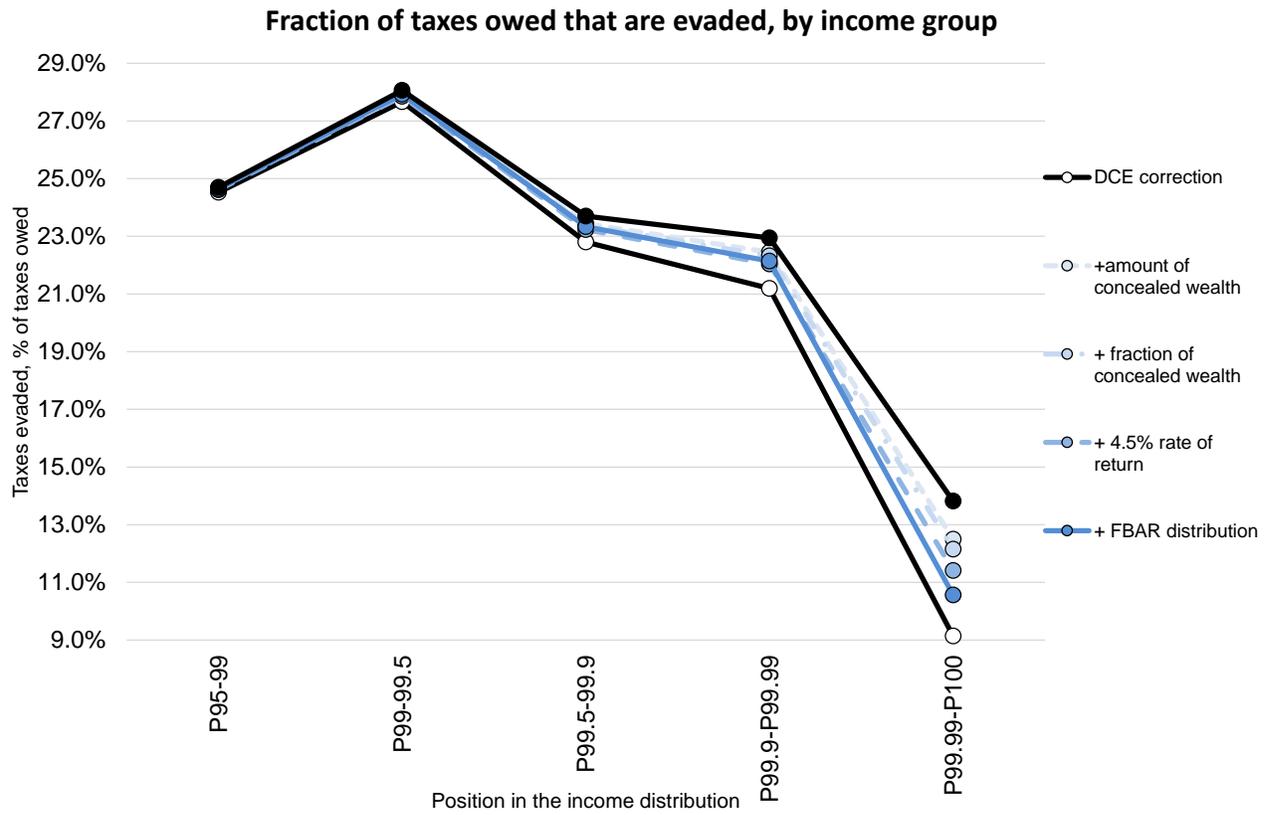
Note: This figure plots taxes evaded over taxes due by rank in the income distribution with and without accounting for offshore wealth. Non-compliance via offshore wealth is evaluated according to three different scenarios. Taxpayers are ranked by their estimated true AGI.

Figure 15



Note: This figure plots taxes evaded over taxes due by rank in the income distribution with and without accounting for offshore wealth. Taxpayers are ranked by their estimated true AGI.

Figure 16



Note: This figure plots taxes evaded over taxes due by rank in the income distribution with and without accounting for offshore wealth. Taxpayers are ranked by their estimated true AGI.

Table 1: Offshore evasion scenarios

Parameter	Lower-bound scenario	Preferred scenario	Upper-bound scenario
Amount of US offshore wealth (in billion \$)	750	1,058	1,500
Fraction of offshore wealth concealed	85%	95%	100%
Rate of return on offshore wealth	4.65 %	6%	11%
Distribution of offshore wealth	FBAR dis.	Average of FBAR and Nordic dis.	Nordic dis.

Note: This table reports the alternative assumptions about the amount and distribution of offshore income made in our three different scenarios.

Table 2: Estimated tax due and income evaded, in \$ billion

	NRP-DCE income under-reported	NRP-DCE tax evaded	Offshore income evaded	Offshore tax due
Bottom 99%	2,295.5	145.9	6.5	1.0
Top 1% (inclusive)	1,042.3	81.8	53.7	11.2
Top 0.1% (inclusive)	427.6	30.5	39.9	8.3
Top 0.01%	136.8	7.3	22.5	4.9

Note: This table reports estimates of the total income under-reported and taxes evaded, for NRP-DCE results and for offshore estimates. All the figures are presented in billion dollars.

Table 3: Income Under Reporting and Evasion by Income Rank

	Unreported income, Unreported income, Unreported income, Taxes evaded, Taxes evaded, Taxes evaded, % of true income, % of true income, % of true income, % of owed, % of owed, % of owed, NRP (with DCE) offshore NRP + offshore NRP (with DCE) offshore NRP + offshore					
P10-20	5.1	0.0	5.1	21.0	0.0	21.0
P20-30	5.5	0.0	5.5	21.0	0.0	21.0
P30-40	5.7	0.0	5.7	21.0	0.0	21.0
P40-50	6.1	0.0	6.1	21.0	0.0	21.0
P50-60	6.5	0.0	6.5	20.0	0.0	20.0
P60-70	7.4	0.0	7.4	16.0	0.0	16.0
P70-80	9.0	0.0	9.0	16.0	0.0	16.0
P80-90	9.7	0.0	9.7	14.0	0.0	14.0
P90-95	12.9	0.2	13.1	16.9	0.2	17.1
P95-99	18.8	0.4	19.2	20.9	0.4	21.2
P99-99.5	24.7	0.9	25.7	24.7	0.9	25.7
P99.5-99.9	19.2	1.7	20.9	19.2	1.7	20.9
P99.9-99.99	19.1	3.2	22.3	19.1	3.2	22.3
P99.99-100	11.6	4.3	15.9	15.6	6.0	21.6

Note: This table reports the data from Figure 11 and 12. See the notes to these figures for details.