# Measuring top income shares in the UK

**Arun Advani**[1,2,3,4] iD **, Andy Summers**[2,3,4,5] **and Hannah Tarrant**[3]

[1]University of Warwick, Coventry, UK
[2]The Institute for Fiscal Studies (IFS), London, UK
[3]The LSE International Inequalities Institute (LSE III), London, UK
[4]CAGE Research Centre, Coventry, UK
[5]LSE Law School, London, UK

*Address for correspondence:* Arun Advani, Department of Economics, University of Warwick, Gibbet Hill Road, Coventry
CV4 7AL, UK. Email: economics@arunadvani.com

## Abstract

Information about the share of total income held by the richest 1%, or other top income groups, is increasingly used to discuss inequality levels and trends within and between nations. A top income share is the ratio of the total income held by the top income group divided by total personal income (the 'income control total'). We compare two approaches to estimating income control totals: the 'external' approach used by the World Inequality Database, and an augmented 'internal' approach. We argue in favour of the latter, with reference to five desirable properties that a top share series would ideally possess. The choice matters: our augmented 'internal' approach yields estimates of the UK top 1% share that are around 2% points higher than the 'external' approach.

**Keywords:** income inequality, measurement, National Accounts, top shares

## 1 Introduction

Top income shares—the amount of income earned by some fraction of the population, say the top 1%, divided by total income in the population—provide an important insight into the unequal distribution of resources. As well as being a matter of increasing public concern in itself, the share of income captured by the top is also used by economists to understand the dynamics of entrepreneurship, innovation, growth, and other macroeconomic outcomes (Aghion et al., 2019; Gabaix et al., 2016; Jones & Kim, 2018). Early work by Atkinson (2005b), later extended to produce the UK top share series in the widely-cited *World Inequality Database* (WID), illustrated how such income inequality in the UK has evolved over time.

Subsequent developments in measurement, both in the UK and elsewhere, have focused on the accurate quantification of the incomes of the richest (Atkinson, 2007; Auten & Splinter, 2019; Piketty & Saez, 2003, 2020), i.e., the numerator of a top income share calculation. These incomes are poorly measured in survey data, through a combination of lower response rates by the rich and weaker coverage of the types of income sources received by the rich (Advani, Ooms, et al., 2022; Burkhauser et al., 2018a, 2018b). This has motivated the use of administrative data to replace or augment survey responses. By contrast, relatively little attention has been paid to measurement issues affecting the income control total, i.e., the corresponding income total for the entire population (the denominator of a top income share calculation).

In this paper, we examine the alternative methods and data sources that can be used to construct the income control total, and the quantitative importance of these choices. After showing that the two approaches we consider provide income control totals that differ by 15%, we explain why we

favour one approach over the other, with reference to five desirable properties which help us to structure our discussion.

In principle, the income control total should be straightforward to measure: once we have a target definition of income, and a way to measure it among top individuals, the same approach can be extended to the rest of the population, creating an 'internal' control total. This approach was taken in the main UK top share series produced by Atkinson (2005b), henceforth referred to as the 'Atkinson series'. However, administrative tax data, which are most appropriate for capturing top incomes, exclude very low-income individuals who fall below the minimum threshold required to pay tax, known in the UK as the 'personal allowance'. This is not only an issue in the UK, but also in US studies which rely on tax return data. In the UK, this 'missing income' problem has become more pressing over time as the personal allowance has increased, tripling over the past 20 years. Since 2010, an alternative 'external' income control total constructed from National Accounts (NA) data has instead been used for the Atkinson series (Alvaredo, 2017; Atkinson, 2012, 2013, 2014; Atkinson & Ooms, 2015, extending Atkinson, 2005b). We compare the merits of using an 'augmented internal' control total—using survey data to augment the missing administrative tax data—to using an external control total, as has become the standard in the UK.

Consistent with the Atkinson series, we focus on assessable income, defined as all income that is assessable for personal income taxation. The Atkinson series is currently published as the 'fiscal' income series on the WID. Extensions of the series beyond 2010 have also used assessable income as their reference point, even though they have used National Accounts data rather than tax data: see Atkinson (2012, 2013, 2014), Atkinson and Ooms (2015), and Alvaredo (2017). By contrast, the headline top share series currently featured on the WID is based on a National Accounts-consistent income definition. For a brief comparison of these approaches, see Online Supplementary Material, Table A1.

We construct our augmented internal control total by summing the income assessed by tax authorities, obtained from tax data, and adding to this an estimate of total income among the non-taxpaying population using survey data. For our alternative external control total, we use information from the National Accounts, retaining components of National Income which have a counterpart in assessable income.

Our main finding is that choice of income control total is quantitatively important: aggregate income is 15% (£119bn) higher on average using the external approach, relative to the augmented internal total. We frame our discussion of which approach is preferable around five desirable properties that—conditional on having chosen a particular income definition—any top share series would ideally possess. These are (i) comparability between the numerator and denominator (income control total); (ii) comparability over time; (iii) international comparability; (iv) statistical performance; and (v) practical considerations. In the case of our assessable income series, we argue that our augmented internal approach has favourable attributes when it comes to (i), (ii), and (v), while our external approach lacks four of these properties and cannot be assessed on (iv).

Measurement choices in the income control total affect the level of top share estimates: the income share of the top 1% rises by 2% points when an augmented internal income total is used relative to an external total. Along with this higher level, our augmented internal control total exhibits a smaller drop in top shares following the Financial Crisis relative to the Atkinson series. We find that the top 1% share of assessable income rose from 12.2% in 1996–97 to 15.2% in 2007–08. Top shares fell in the aftermath of the Financial Crisis, and have risen slightly in recent years, with the top 1% receiving 14.3% of assessable income in 2018–19. The 0.8% point post-Crisis rise in our series between 2010–11 and 2014–15 (from 13.4% to 14.2%) compares with a 1.3% point rise (from 12.6% to 13.9%) in the Atkinson series.

The purpose of this paper is not to argue in favour of one income definition above all others. Indeed, the principles and methods we set out are complementary to a recent strand of literature on measuring top income inequality, which focuses on measuring top shares using income definitions that are harmonised across countries (Alvaredo et al., 2020, 2013; Atkinson, 2005a, 2007; Fesseau & Mattonetti, 2013; Garbinti et al., 2018; ONS, 2015; Piketty et al., 2018; Tonkin et al., 2020). There are different definitions of income that one could use to measure inequality. Historically, the two most widely used have been assessable income, and Canberra income: a broader definition of income, including all receipts received at annual or more frequent intervals, typically measured using surveys. More recently, we have witnessed the development of inequality

series using National Accounts-consistent income definitions. These 'Distributional National Accounts (DINA)' methods seek to allocate components of National Income to households based on the distribution of observable income flows. The authors of the WID have been instrumental in popularising these methods (Alvaredo et al., 2020; Garbinti et al., 2018; Piketty et al., 2018), though several separate research teams have developed their own DINA series in recent years (Auten & Splinter, 2022; Batty et al., 2017; Fesseau & Mattonetti, 2013; ONS, 2015; Tonkin et al., 2020). For some supporters of this approach, the appeal of National Accounts-consistent measures of income inequality lies in their consistency with macroeconomic aggregates and the possibility of harmonisation across countries (Chancel et al., 2021), although achieving the latter is far from guaranteed.

At the same time, assessable income remains an important definition for several reasons: it is consistent with the best data source for measuring the incomes of the richest; it has, in the UK and several other countries, the longest historical availability; it is the income concept targeted by tax authorities for redistribution; and it continues to be widely used by economists as the foundation for producing inequality series using more comprehensive income definitions, including the DINA series published in the WID (Advani & Summers, 2020; Atkinson & Jenkins, 2019; Burkhauser et al., 2018a, 2018b; Jenkins, 2017; Piketty et al., 2018). Despite the addition of DINA series to the WID, the assessable income series continue to be published. The Atkinson series remains the longest-running time series for the UK, and has recently been extended based on our 'augmented internal' estimates (Advani et al., 2021). In this paper, we present our arguments for revising the methods used to construct the UK's assessable income series. Through our discussion of which approach is preferable in this specific case, we provide a framework for thinking about how one might construct an income control total when using an alternative income definition.

Our reasoned argument for favouring one approach over the other offers a resolution to an issue that has held up the production of UK top share statistics in recent years. The use of National Accounts to construct income control totals for estimating top shares dates back to Kuznets (1953), and has been widely adopted since (Piketty, 2003; Piketty & Saez, 2003). Until 2009, the Atkinson series relied on the augmented internal control method. Subsequently, Atkinson switched to using the external control method, using National Accounts data. When this change was implemented, estimates for previous years were *not* revised. The year 2009 is, therefore, both the year in which the methodology changed, and the year from which the series produced by the new methodology commenced. This switch passed without much attention, partly because the two approaches produced similar results at the time of the switch. More recently, however, delays in producing the series have partly been driven by a need to reconcile the growing gap between the two approaches, as also highlighted by Burkhauser et al. (2018b). The desirable properties we set out to aid comparison of the alternative options can be revisited as data availability evolves in the UK, and be applied to decisions about the choice of income control total in other countries.

The remainder of the paper is organised as follows. Section 2 outlines the data sources. Section 3 describes the methodology used to construct our numerator. Section 4 describes the two approaches we use to construct the income control total. Section 5 sets out our arguments for favouring the augmented internal approach with reference to five desirable properties any top share series ought to possess. Section 6 presents our updated series for top assessable income shares in the UK. Section 7 concludes. Throughout the paper, we refer to supplementary tables that can be found in the Online Supplementary Material, Appendix. These tables and figures are identified by having a letter before their figure number, denoting the relevant Online Supplementary Material, Appendix.

## 2 Data and income definitions

The goal of this paper is to examine how best to construct the income control total when estimating top income shares. We, therefore, remain close to the existing literature in the remainder of our choices around defining the income measure and units to allow a sharp focus on the specific effects of income control total choice.

In particular, our target measure of income inequality is the share of assessable income that goes to particular top shares of the population, for example, the top 1%, before the deduction of taxes on income. In the UK, assessable income includes earned income from employment, self-employment, partnerships, rental income, interest, dividends, pension income (from private and

social security pensions), and certain types of welfare payments. It excludes capital gains and some tax-exempt forms of investment income. In Online Supplementary Material, Appendix C, we present estimates of *post-tax* top shares, which we construct by deducting Income Tax and employee National Insurance (social security) Contributions from assessable income.

Consistent with work in the UK and elsewhere (Atkinson, 2005b; Atkinson & Piketty, 2007; Burkhauser et al., 2018a, 2018b; Jenkins, 2017; Piketty & Saez, 2003), our definition of assessable income follows the statutory definition of receipts that are chargeable to Income Tax on individuals. This excludes, for example, employer payroll tax contributions and corporation tax paid on profits, which are subsequently distributed as dividends.

We use individuals as our unit of analysis throughout, as individuals have been the tax unit for UK Income Tax purposes in all of the years for which we have microdata (since 1996–97). Atkinson (2005b) produces assessable income shares covering years as far back as 1908, though as the tax unit in the UK changed from married couples to individuals in 1990, so too did the unit of analysis used by Atkinson to construct top shares. In the WID, the UK assessable income series, therefore, only extends as far back as 1990, over which period the unit of analysis is comparable.

Figure 1 illustrates the key data sources that we use to construct our top share estimates and how these feed into the different estimates we present. In each series, we use administrative tax microdata from the Survey of Personal Incomes (SPI), produced by HM Revenue and Customs, KAI Data, Policy and Co-ordination (2021), combined with external population control totals from the Office for National Statistics (ONS), to construct the numerator (see Section 3). The difference between the top share estimates we present therefore stems entirely from the methods and data used to construct the income control total. Our 'augmented internal' control total combines the tax data used to construct the numerator—the SPI—with household survey data from the Family Resources Survey (FRS), produced by Department for Work and Pensions, Office For National Statistics, NatCen Social Research (2021). Our 'external' control total draws on the Households sector balance sheet in the UK National Accounts. For further details on how our methodology and series coverage compares to the Atkinson series, as well as to the DINA series published in the WID, see Online Supplementary Material, Table A1.

## 2.1 Survey of Personal Incomes

The SPI Public Use Tapes are released annually by His Majesty's Revenue and Customs (HMRC). The data are a stratified random sample of administrative tax records drawn from the universe of UK income taxpayers, and cover the tax years 1996–97 to 2018–19, although no data were published for 2008–09. Henceforth, we refer to tax years by the later year, i.e., we refer to 2018–19 as 2019. This is consistent with the terminology practiced by HMRC, but differs from the WID database which refers to the earlier year. We exclude UK taxpayers who are not resident in the UK. The tax unit is the individual.

The SPI sample size increased rapidly over the first decade, from 61,000 in 1997 to 566,000 in 2007, and has subsequently increased steadily, reaching 766,000 by 2019. Weights are provided in the microdata, which reflect the sampling probabilities for each individual (see Online Supplementary Material, Appendix B for further details on the sampling design). We use these weights throughout our analysis, both in allocating observations to quantile groups and constructing income totals.

The data contain information on all income assessable for Income Tax. For individuals with incomes exceeding the tax exemption threshold (the standard personal allowance, set at £12,500 in 2021), the SPI 'provides the most comprehensive and accurate official source of data on personal incomes' (HMRC, 2021). For this reason, we use the SPI as our main source of information on incomes above the personal allowance. The key SPI variable used to compute the total income of those earning above the personal allowance is *total income* (TI), subject to harmonisation of the treatment of dividends (see Online Supplementary Material, Appendix B for details).

## 2.2 Family Resources Survey

Tax data do not comprehensively capture individuals with incomes below the personal allowance. This presents a growing challenge to the construction of top income *shares*, which require a good estimate of the total personal income in the economy. Historically, the personal allowance was
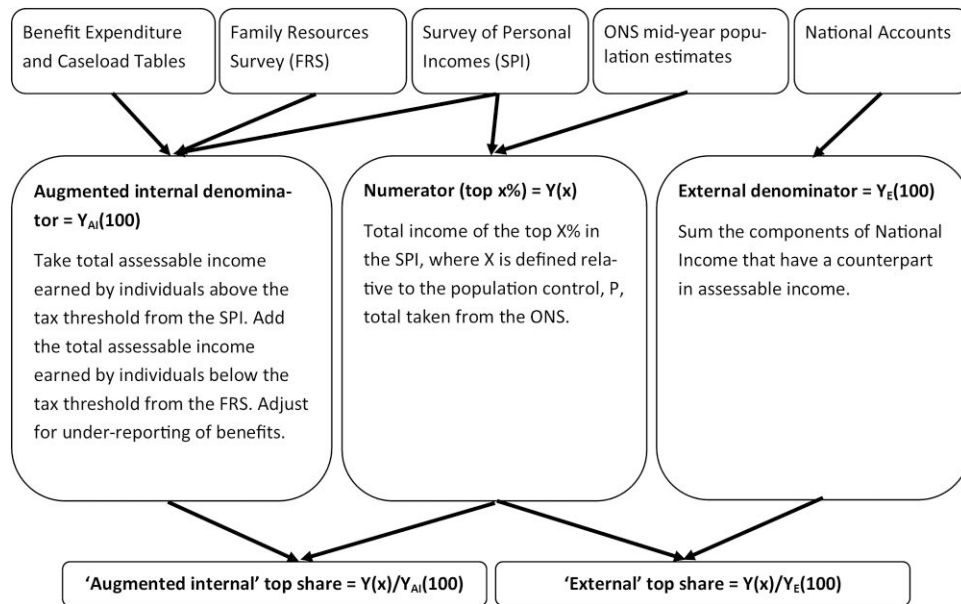
**Figure 1.** Data and methodology flowchart.

relatively low, so the small amount of income going to people with income below the threshold was ignored in the production of the Atkinson series, with the exception of an adjustment for pension income (Atkinson, 2005b, 2007). However, the personal allowance has risen substantially, almost tripling over the past 20 years—from £4,195 in 1998–99 to £11,850 in 2018–19. Moreover, as the personal allowance has increased, so has the average income of each individual below the threshold. This means that income totals based only on the taxpaying population miss a growing proportion of total personal income. In 2018–19, 38% of adults had incomes below the personal allowance, covering 8% of total income. Though the SPI does capture a significant number of individuals with income below the personal allowance, HMRC note that 'the SPI is not a representative data source for this part of the population' (HMRC, 2021). To capture income below the tax threshold, we supplement our tax data with information drawn from the Public Use Files of the FRS, an annual cross-sectional survey of British households.

The sample size has varied over time, ranging from just over 33,000 adults in 2019 to 51,000 in 2004. The sampling frame consists of addresses of all UK private dwellings, and excludes individuals living in institutional settings (e.g., prisons, care homes, and student accommodation) (see Online Supplementary Material, Appendix B for further details on the sampling design). Weights are provided which account for both the sampling probability of each observation and differential non-response. We use the individual-level weights provided to construct our aggregate income estimates. Although, in principle, the FRS is representative of the population in private dwellings when the survey weights are used, there is known under-coverage at the top of the income distribution (Burkhauser et al., 2018a, 2018b; Jenkins, 2017). Hence, the SPI is a preferable data source for this segment of the population.

Assessable income is not directly measured in the FRS. However, the Public Use Files contain cleaned and weeklyised income receipts from different sources at an individual level, enabling us to construct a measure of assessable income which corresponds closely to the tax code. We convert weekly assessable income receipts to an annual basis by applying a multiplier of 365/7 (366/7 in leap years).

We include all individuals with assessable income below the standard personal allowance in our sample, regardless of whether they are likely to pay Income Tax or not (some individuals may pay tax if they are not entitled to the standard personal allowance). We thus use the standard personal allowance as the nominal cut-off for joining our SPI and FRS samples. In Online Supplementary

Material, Figure A1, we show, for a plausible range of joining thresholds, that this choice makes little difference to the income control total.

### 2.3 Benefit Expenditure and Caseload Tables

There is known under-reporting of benefit income in the FRS (Corlett et al., 2018). As benefit income is mostly received by those on low incomes, this could lead to the under-estimation of income below the personal allowance if not addressed. To correct for this, we use administrative data on benefit expenditure from the UK government's Benefit Expenditure and Caseload Tables (Spring 2020), which are released with each budget. Note that although investment income is also poorly captured in the FRS (Advani, Ooms, et al., 2022; Ooms, 2019), this will only have a small impact on our estimates since those with incomes below the personal allowance receive only a small fraction of total investment income.

### 2.4 National Accounts

Our external control total is constructed using information contained in the 'Households' sector account of the most recent Blue Book publication (2021)—the annual publication of the UK National Accounts—which includes disaggregated components of household sector income as far back as 1987.

To define our income variable, we draw predominantly on the primary and secondary distribution of income accounts of the household sector (Tables 6.2.3 and 6.2.4S). Primary income of the household sector consists of total income from employment (compensation of employees), self-employment income (gross mixed income), imputed rent of owner-occupiers (gross operating surplus), and property income received (e.g., interest and dividends) net of interest payments. The secondary distribution of income account contains information on all social contributions and transfers paid and received by the household sector. We supplement this with information contained in the secondary distribution of income account for General Government (Table 5.2.4S), which provides a breakdown of government expenditure on social transfers by benefit type, allowing us to obtain estimates of total expenditure on taxable benefits only. In Section 4.2, we set out precisely what components of these data we include to most closely harmonise the definition with assessable income, as well as the limitations in our ability to do this.

The National Accounts are published on a calendar year basis. To convert our estimates to tax years (as the SPI, and hence our numerator, is published on this basis), we follow Atkinson (2012, 2013, 2014) and Atkinson and Ooms (2015) and take three-fourths of the total for the earlier calendar year and one-fourth of the total for the later calendar year. This approximates the UK tax year, which runs from the 6th April to the following 5th April.

### 2.5 ONS mid-year population estimates

For our population control, we use data from the ONS mid-year population estimates for the UK adult population aged 15 and over (Online Supplementary Material, Table A2). This is the same population control as is used to construct the Atkinson series. Unlike the weighted population totals obtained in survey data, which omit individuals living in institutional settings, the ONS mid-year population estimates provide a comprehensive measure of the entire UK resident population. Since the SPI captures all income taxpayers—including those living in institutional settings—using a population control which includes all UK residents is more appropriate than using a survey-based population control for estimating the numerator.

## 3 Numerator: total income held by the top $x\%$

To construct the numerator of our top share series, we use microdata on individual incomes from the SPI. The aggregate income of the top $x\%$ is estimated as the total income of the top N individuals whose survey weights sum to $x\%$ of $P$, where $P$ is our population control total. To estimate this, we first rank individuals according to their total assessable income, $y_i^{spi}$. Let $P_i$ be the cumulative sum of individual survey weights $w_i^{spi}$ for individuals with income above $y_i^{spi}$ such that $P_i = \sum_{j : y_j^{spi} \geq y_i^{spi}} w_j^{spi}$. Let $j(x)$, $k(x)$ be the two consecutive sample individuals in the ranking for

whom the cumulative sum of individual survey weights lie either side of the population target $x/100 \cdot P$, i.e., $P_{j(x)} < x/100 \cdot P \leq P_{k(x)}$. Then, we estimate our numerator by summing the weighted incomes of individual $k(x)$ and higher, adjusting the survey weight of individual $k(x)$ such that the sum of (adjusted) survey weights hits our population target exactly, i.e.,

$$Y(x) = \sum_{i\,:\,y_i^{spi} \geq y_{j(x)}^{spi}} w_i^{spi} y_i^{spi} + \bar{w}_{k(x)}^{spi} y_{k(x)}^{spi} \tag{1}$$

where $\bar{w}_{k(x)}^{spi}$ is the partial weight of individual $k(x)$ such that $\sum_{i\,:\,y_i^{spi} \geq y_{j(x)}^{spi}} w_i^{spi} + \bar{w}_{k(x)}^{spi} = x/100 \cdot P$.

This differs from Atkinson's approach, which applied Pareto interpolation methods to tabulations of SPI data (Atkinson, 2005b). Access to microdata allows us to calculate the numerator without needing to make assumptions on the underlying shape of the income distribution, and without missing high-income individuals who have zero tax liability.

The magnitude of the numerator depends on the choice of population control, as the adult population implied by our combined SPI/FRS sample is lower than the ONS estimate for the UK adult population. This is particularly important in the early years of our sample, with around 9% of individuals missing from the SPI/FRS in 1997–2003 relative to the ONS population control total. We believe that this is the result of under-coverage in the SPI/FRS, rather than overestimation by the ONS for two main reasons. First, by construction the FRS omits individuals living in institutional settings. Many of those individuals are likely to be below the personal allowance, since students, prisoners, and people in care typically have low assessable incomes. They will therefore be missing from our SPI/FRS sample. Second, tax evasion could result in some individuals with incomes above the personal allowance being absent from the tax data, or falsely reporting income below the personal allowance in the tax data.

A priori, it is unclear how population under-coverage impacts top share estimates. If the SPI/FRS sample has perfect coverage of individuals in the top $x\%$ and only misses those further down the income distribution, the estimate of the numerator will be correct when we use the ONS population control total. Top shares will nevertheless be overstated because of under-coverage of incomes that should be included in the income control total.

On the other hand, if there is also population under-coverage at the top of the distribution, then whether or not top shares are over- or under-stated depends on the shape of the income distribution. In Online Supplementary Material, Appendix D, we discuss this issue further and illustrate how top shares differ when an internal population control—taken from the count of individuals in the grossed-up data—is used instead. In either case, the choice of population control only affects top shares through the numerator, regardless of the approach used for the income control total, so it has no bearing on the comparison between the income control total options that is at the heart of this paper.

## 4 Denominators: total income held by the whole population

We next describe how we construct our augmented internal and external income control totals, before providing a comparison of the estimates. We postpone a discussion of how to select between them until Section 5.

### 4.1 Augmented internal control total

To construct an estimate of total income, we augment the internal income control from the SPI with information on incomes below the personal allowance from the FRS. Precisely, we sum the (weighted) incomes of individuals with income above the personal allowance in the SPI with the (weighted) assessable income of those below the personal allowance in the FRS.

Our construction of an (augmented) internal control total departs from the prior Atkinson methodology for an internal total in three ways. First, our approach systematically adds in all sources of income for individuals with total assessable income below the personal allowance, rather than only adjusting for omitted pension income as in the Atkinson series (see Online Supplementary Material, Appendix E.1 for further details).

Second, we are also able to include individuals with incomes above the personal allowance who do not pay Income Tax, for example, those with large incomes but also large deductions and/or reliefs. Were we to omit these individuals from our sample, their incomes would be missing altogether from the income control total and (where the income is sufficiently large) the numerator. We are able to do this through the use of the SPI microdata, whereas the tabulations used by Atkinson covered only the *taxpaying* population.

Third, we use administrative data on benefits to adjust for under-coverage and/or under-reporting of benefit income that is assessable for Income Tax. This is known to be an issue in the FRS: Corlett et al. (2018) find a gap of up to 42% for some taxable benefits. These missing benefits affect the income control total, but are unlikely to affect the numerator, as the vast majority of benefit receipts are concentrated at the bottom of the income distribution. Even with under-coverage, 94% of total benefit income in 2018–19 went to those below the personal allowance, estimated using the SPI and FRS combined; by contrast they received only 8% of all assessable income. We adjust the augmented internal income total by adding the difference between what the government report spending on taxable benefits (including state pension) according to the Benefit Expenditure and Caseload Tables, and the total amount received according to the SPI and FRS combined. This adjustment increases the income total slightly (Online Supplementary Material, Figure E1), but by less than 1% in recent years.

The formula used for our augmented internal control total is given in Equation (2):

$$Y_{AI}(100) = \sum_{i:y_i^{spi}>\bar{y}} w_i^{spi} y_i^{spi} + \sum_{j:y_j^{frs}\leq\bar{y}} w_j^{frs} y_j^{frs} + \left( B - \sum_{i:y_i^{spi}>\bar{y}} w_i^{spi} b_i^{spi} - \sum_{j:y_j^{frs}\leq\bar{y}} w_j^{frs} b_j^{frs} \right) \quad (2)$$

where $y_i^{data}$ is the assessable income of individual $i$ in the data, where *data* may be SPI or FRS; $w_i^{data}$ is the survey weight assigned to individual $i$ in the data; $\bar{y}$ is the personal allowance; $b_i^{data}$ denote total taxable benefits received by individual $i$ in the data; and $B$ denotes aggregate taxable benefits as reported in the Benefit Expenditure and Caseload Tables.

While our top shares account for under-reporting of benefit income, we do not adjust for evasion. Evidence from representative audits finds that tax evasion as a share of reported income is higher towards the bottom of the reported income distribution, both in the UK (Advani, 2022; Advani, Elming, et al., 2023) and US (DeBacker et al., 2020; Johns & Slemrod, 2010). Recent evidence suggests that *offshore* tax evasion specifically—the deliberate under-reporting or hiding of wealth overseas—is highly concentrated among the wealthy (Guyton et al., 2020). The latter is much less well picked up in representative audits, and is based on wealth rather than income, so the direction of the net effect on top income shares is unclear.

## 4.2 External control total

We construct our external income control total by retaining the components of National Income that are assessable for Income Tax. This is the same principle as used in constructing the post-2009 Atkinson control total series, which is also based on National Accounts. Our external control total differs from this in two ways.

First, from the outset, we include only the household sector, excluding the Non-Profit Institutions Serving Households (NPISH) sector, i.e., charitable organisations, trade unions, religious organisations, political parties, universities, and further education establishments. Data limitations meant the Atkinson series included NPISH, as this had previously been combined with households in the UK National Accounts. To account for this, the Atkinson series had previously made an ex-post adjustment, removing 10% from the income control total as (what was seen as) a plausible estimate of the share of NPISH. As we show in Online Supplementary Material, E.3.2, this estimate was too large, though this could not have been known at the time.

Second, we refine the external income control formula to be more closely aligned with the target definition of income. The Atkinson method included several income components that are not assessable for Income Tax, including a deduction for interest payments made by the household

---

**Box 1:** components of National Income that are assessable for Income Tax

Wages and salaries (Table 6.2.3)

Gross mixed income (self-employment income) (Table 6.2.3)

Interest before Financial Intermediation Services Indirectly Measured (Table 6.2.3)

Dividends (Table 6.2.3)

Withdrawals from the income of quasi-corporations (Table 6.2.3)

Earnings on property investment (Table 6.2.3)

Rent (from natural resources) (Table 6.2.3)

Social security pension benefits in cash (Table 6.2.4S)

Other social insurance pension benefits (Table 6.2.4S)

Incapacity benefit (Table 5.2.4S)

Carer's allowance (Table 5.2.4S)

Job Seeker's Allowance (Table 5.2.4S)

Widow's and Guardian's allowance (Table 5.2.4S)

Statutory sick pay (Table 5.2.4S)

Statutory maternity pay (Table 5.2.4S)

Unemployment benefit (Table 5.2.4S)

*Notes:* The table numbers refer to the Blue Book table in which the income component is recorded (Office for National Statistics, 2021).

---

sector and many non-taxable benefits. In Online Supplementary Material, Appendix E, we discuss precisely how to obtain our external income total using the Atkinson series as the point of departure. The set of income components included in our external control total are shown in Box 1.

The formula used to construct our external income total can therefore be formalised as follows:

$$Y_E(100) = \sum_{c \in F \subset C} NatInc_c \tag{3}$$

where $C$ denotes all components of National Income, and $F$ is the strict subset of components that are assessable for Income Tax. The Atkinson series included some components that are not assessable for Income Tax (i.e., some $c \in C \backslash F$), while the DINA estimates published in the WID (which target a different income definition) include all components of National Income (i.e., all $c \in C$).

Although it is possible to make some progress in aligning National Accounts income components with assessable income, conceptual differences preclude any attempt to achieve this in full. This is a significant drawback of the National Accounts approach. For example, the National Accounts concept of income from employment makes various adjustments to employment income as measured in the SPI to account for forms of income not subject to taxation, such as rent-free dwellings and meal vouchers provided to employees. Moreover, all income components reported in the National Accounts are subject to a final adjustment during a reconciliation exercise which balances estimates of GDP obtained using the three different approaches (production, expenditure, and income). Conceptual differences between the National Accounts and SPI definitions thus plague all categories of income, even if the income source is assessable for tax in principle.

## 4.3 Comparing our income control totals

Applying the methods described in the previous two sections, we find that the income total obtained via the augmented internal approach is substantially smaller than the income total obtained using the National Accounts (Figure 2). The difference between our external total and our
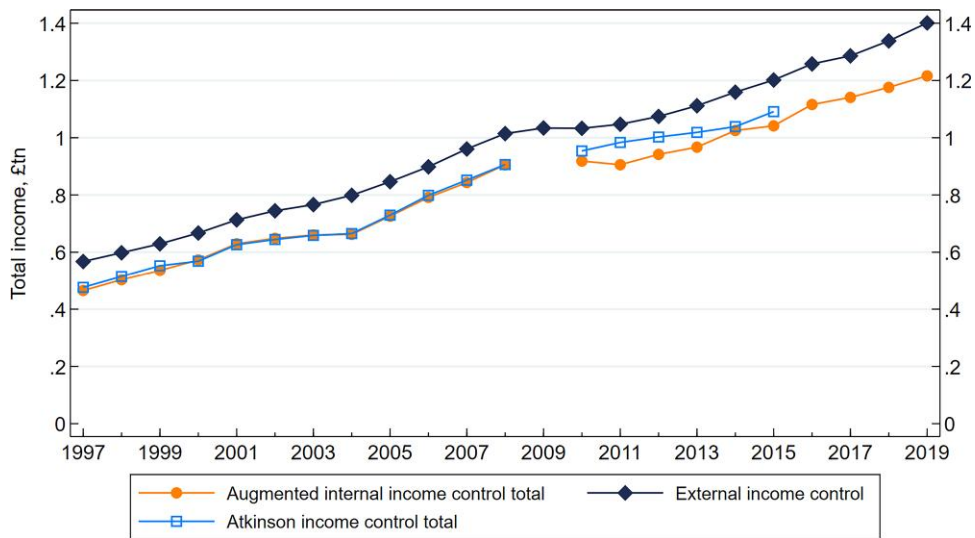
**Figure 2.** Aggregate assessable income using our augmented internal method, our external method, and the Atkinson series.

*Notes:* 'Augmented internal income control total' is constructed by summing individual incomes above the standard personal allowance (based on the Survey of Personal Incomes, SPI); individual incomes below the standard personal allowance (based on the Family Resources Survey, FRS); and an adjustment for under-reported benefit income based on administrative Benefit Expenditure and Caseload Tables (as outlined in Section 4.1). 'External income control total' is constructed by summing income components in the 'Households' sector of the National Accounts (NA) 2021 Blue Book (as outlined in Section 4.2). 'Atkinson income control total' is the income total developed by Atkinson (2005b) and subsequently extended in Atkinson (2012, 2013, 2014), Atkinson and Ooms (2015), and Alvaredo (2017).

*Source:* Authors' calculations based on the SPI, FRS, and Benefit Expenditure and Caseload Tables (augmented internal); the UK National Accounts (external); and WID (Atkinson).

augmented internal total is primarily a level difference: total income is 15% (£119bn) higher on average over the period using the external measure. The two series largely follow similar time trends, although the external total has grown slightly faster in recent years.

The trends in both of our series diverge from the Atkinson series from 2010 onwards, following Atkinson's methodological switch. Both our income control series grow faster than the Atkinson total after 2010, with implications for the growth in top shares. The growth rates of our two income control total series are much more aligned with one another than with the Atkinson series, which we find reassuring given the steps we take to reconcile the National Accounts with the assessable income definition (see Online Supplementary Material, Appendix E).

## 5 Desirable properties in income share series

In this section, we set out five desirable properties for a 'good' top share series, which are conditional on having chosen a target definition. These facilitate our discussion of which approach we think is preferable for measuring top assessable income shares.

### 5.1 Comparability between numerator and denominator

For top income share measures to be meaningful, the definition of income must be consistent between the numerator and denominator (income control total). If all incomes were reported to a single authority using a consistent definition, top income shares could be constructed by simply taking the share of reported income accruing to the richest $x\%$ of those individuals. In practice, no such data exist. Constructing income control totals for top share estimates that are representative of the whole population, therefore, requires combining multiple sources of data, and reconciling income definitions between these data sources as far as possible with one's chosen definition.

By taking the data source used for the numerator as the main data source for our income control total, our augmented internal approach allows for comparability between the numerator and

denominator. Though we supplement this with external survey data, the incomes measured in the FRS are sufficiently granular to produce a measure consistent with our target definition. By contrast, external totals from the National Accounts cannot be fully reconciled with assessable income.

## 5.2 Comparability over time

While comparability between the numerator and denominator ensures that top income shares are meaningful at a given point in time, much of the value in estimating income inequality comes from observing what happens over time. There are challenges to interpreting trends in assessable income shares as changes in income inequality. First, the definition of assessable income changes naturally as the tax code evolves (Burkhauser et al., 2012, 2015; Splinter, 2018). Variations in which sources of income are included in the tax base may affect the distribution of income assessed for tax purposes, but not the distribution of income measured according to a more comprehensive definition. This issue must be borne in mind by users of top share statistics. For our purposes, the goal is not to have an accurate measure of living standards, but to have an accurate measure of the assessable income series itself, which is then the starting point from which more welfare-relevant income inequality measures can be produced.

However, this property of assessable income—that the definition changes over time—creates the following measurement issue: data sources and methods used to construct top shares must be flexible to definitional changes. This is particularly difficult in light of the fact that top share estimation must draw on multiple sources of data in order to be representative of the whole population.

Income tax data lend themselves naturally to the measurement of top income shares according to an assessable income definition: income measured by the tax authorities automatically follows changes in the tax code. However, any alternative sources of data used to construct the series, such as the National Accounts or survey data, must be sufficiently disaggregated into specific income components in order to construct a measure of income which is closely related to the target definition. This is true of the survey data we use to supplement tax data in our augmented internal control total, but it is not true of the National Accounts. The latter are neither sufficiently disaggregated nor is the procedure for constructing them sufficiently well documented to ensure consistency with tax data definitions.

Our augmented internal series also aids the study of inequality trends over a longer time horizon. The series we present in this paper covers years since 1997, for which microdata are available. The Atkinson series in WID goes further back, to 1990 (since when the tax unit has been individual), by using tabulations of Income Tax data. To produce estimates that can be interpreted as an extension of this longer-run historical series, it is preferable to use similar data sources and definitions over time.

## 5.3 Comparability across countries

Valuable insight can be gained from comparisons of income inequality across countries and recent work has pushed the frontiers of inequality measurement with a particular focus on international comparability (Alvaredo et al., 2020; Fesseau & Mattonetti, 2013; Garbinti et al., 2018; ONS, 2015; Piketty et al., 2018, 2019; Tonkin et al., 2020).

In the context of the current exercise, an important question to ask is whether or not it is sensible to compare trends in *assessable* income inequality at all. What is included in assessable income varies across countries as tax codes differ. For example, the Netherlands includes the imputed rent of owner-occupiers in its Income Tax base and, therefore, its assessable income series (Salverda, 2013), whereas the UK does not. Changes in the tax code from one year to the next could affect the relative trends in inequality across countries even if inequality as measured using a more comprehensive income definition remains unchanged. A dramatic change in assessable income inequality occurred in the US following the 1986 tax reform, which broadened the tax base and lowered the marginal rate. This incentivised individuals to shift their business income in order to report this through the personal tax system—i.e., as part of their assessable income—rather than the corporate tax system (Auten & Splinter, 2019; Feenberg & Poterba, 1993, 2000; Gordon & Slemrod, 2000; Piketty & Saez, 2003). In the UK, changes in dividend tax rates prompted dividend-forestalling responses which are reflected in the changes in assessable inequality observed in the

aftermath of the Financial Crisis. Comparisons of such changes in inequality trends across countries must be interpreted with great care.

Assessable income series can be made comparable across countries to the extent that the methods used to construct them abide by the same principles. However, comparability of the income control total alone does not ensure the international comparability of the series as a whole, as both the numerator and the tax code remain highly country-specific. Thus, no matter what approach one uses to construct the income control total, we argue that no top share series which uses a target definition that is itself incomparable across countries can possess this property. This includes both the augmented internal and external series presented in this paper.

### 5.4  Statistical performance

A desirable property of any top share estimator is good statistical performance. For example, one may be willing to accept a more biased estimator if it has substantially lower sampling variability. Unfortunately, standard measures of uncertainty cannot be produced for the National Accounts-based income control total, ruling out a comparison of the statistical performance of our alternative approaches. This is both because we do not have access to the underlying micro-data which go into the National Accounts, and because the construction of the National Accounts involves many adjustments to ensure consistency in the aggregate numbers across the three alternative approaches to estimating GDP. This rules out any analytical approach to constructing standard errors. However, it is worth noting that regardless of the approach used to estimate the income control total, uncertainty in our estimation of the numerator will likely dominate overall uncertainty in our top share estimates. The standard error of the augmented internal income control total, which we can estimate since the control total is constructed as a weighted sum of individual incomes observed in microdata (see Equation (2)), was only 0.5% of the estimated value of that control total in 2019. This uncertainty as a share of the total value is relatively low compared with uncertainty in the numerator. For example, the standard error of the numerator in the top 1% share was 2.0% of the estimated value of aggregate income for that group in 2019.

### 5.5  Practical considerations

Developing a top share series which works well in theory is important, but it also needs to work in practice. We identify two desirable practical properties. First, the series should be easy to update using the chosen methods and definitions, and in a timely manner. This means that any sources of data used to construct the numerator and the income control total must be easy to obtain, clean, and aggregate if the series is to be sustainable.

Second, the series would ideally be produced and interpreted using data available at a given point in time, without requiring any updating of the past. Neither tax nor survey data, once collected and released, are subject to revisions in general. This means that an assessable income series which draws only upon these data sources will be fixed from the point of estimation. In contrast, National Accounts figures are subject to frequent revisions, an outcome of the trade-off between timeliness and accuracy. These revisions can be quantitatively important: cumulative revisions made to the Blue Book estimates for 2015 between the publications of the 2016 and 2021 Blue Books resulted in a 3.6% increase in the income control total based on the Atkinson series method (see Online Supplementary Material, Figure E3), implying a 0.5% point fall in the top 1% share for 2015. In the Blue Book, the ONS warn that 'expectations of accuracy and reliability in early estimates are often too high' (Office for National Statistics, 2021). An assessable income series which draws on the National Accounts thus ought to, in the interest of accuracy, be updated as previous Blue Book figures are revised.

Our 'augmented internal' approach better satisfies the practical considerations set out above. In part, this is because we already use the SPI to construct the numerator, and so using this as a data source for the denominator comes at limited additional cost. One argument commonly put forward against using SPI data, in general, is that the SPI Public Use Tapes are released with a longer time lag relative to the National Accounts, causing a delay in the availability of policy-relevant statistics. For instance, the SPI dataset covering 2016–17 was only released in November 2019, whereas initial National Accounts estimates for 2017 were released in July 2018. However, in

our setting, use of the National Accounts does not help since producing the numerator already relies on the release of SPI data.

Supplementing the SPI with survey data requires an additional time investment. However, we argue that this is a necessary burden. In the absence of this step, there is a risk that the income total obtained from the SPI will continue to diverge from the true income total as the personal allowance increases, giving rise to a top income share series which is superficially steep (see Online Supplementary Material, Figure E1). Adding the adjustment for missing benefit incomes using admin data imposes little extra work as these tabulations are readily available and user-friendly, though in practice this step makes only a small difference to total income. Both the FRS and expenditure tabulations are made available well ahead of the SPI Public Use Tapes, so these adjustments do not come at the expense of timeliness.

## 6 Estimates of top income shares

To construct our two alternative top share series, we divide the numerator, $Y(x)$, which is the same in both series, by either the augmented internal control total, $Y_{AI}(100)$, or the external control total, $Y_E(100)$.

Figure 3 illustrates how the choice of income control total affects top assessable income shares. The predominant difference is in the levels: the assessable income share of the top 1% is 1–2% points higher using the augmented internal control total than the external total. This means that by using an income control total which diverges from the assessable income definition, we understate the extent of income inequality in the UK.

Using an augmented internal control total, the income share of the top 1% rose in the lead-up to the Financial Crisis, from 12.2% in 1996–97 to 15.2% in 2007–08, an increase of 25%. This was followed by a steep decline immediately after the Financial Crisis, though this is likely to reflect income-forestalling and income-delaying responses to the increase in the top rate of Income Tax (Browne & Phillips, 2017; Seely, 2014). Between 2010–11 and 2018–19, the top 1% share rose slightly, from 13.4% to 14.3%. Using an external control total implies a slightly steeper rise in inequality in the late 1990s, but since then the two series follow similar trends.

Since 2009–10, our series diverges from the Atkinson top income share series (Figure 4). The top 1% share rose by 1.3% points between 2010–11 and 2014–15 according to the Atkinson series, but by just 0.8% points according to our augmented internal series. Our results, therefore, affect our understanding of what has been happening to UK inequality in recent years. Atkinson's series implies that in the aftermath of the Financial Crisis, income inequality dropped below levels observed since the beginning of the 21st Century, before rising again from 2013–14 onwards. By contrast, our estimates imply that top shares dropped less sharply, down to levels observed immediately prior to the Financial Crisis in 2005–07.

Top shares have risen in the past two decades, but in relative terms much more so at the very top of the income distribution (Online Supplementary Material, Figure A2). While the share of income earned by the top 10% remained stable between 1996–97 and 2018–19, the top 1% (0.1%) share grew by 17% (37%) over the same period.

## 7 Conclusion

We outline two approaches one could adopt to construct an income control total for measuring top income shares: an augmented internal control total based on tax and survey data; and an external control total based on the National Accounts. We set out our reasons for favouring the augmented internal approach with reference to five desirable properties that a 'good' top share series should possess: (i) comparability between the numerator and denominator (income control total); (ii) comparability over time; (iii) comparability across countries; (iv) statistical performance; and (v) practical considerations. We argue that while our external income total lacks four of these properties, and cannot be assessed on (iv), the augmented internal income total has favourable attributes when it comes to (i), (ii), and (v). On this basis, we advocate the use of an augmented internal income control total for constructing an assessable income series.

Our top share series for the UK based on this augmented internal control total displays a higher level of inequality and a slightly flatter trend relative to the assessable income series published in
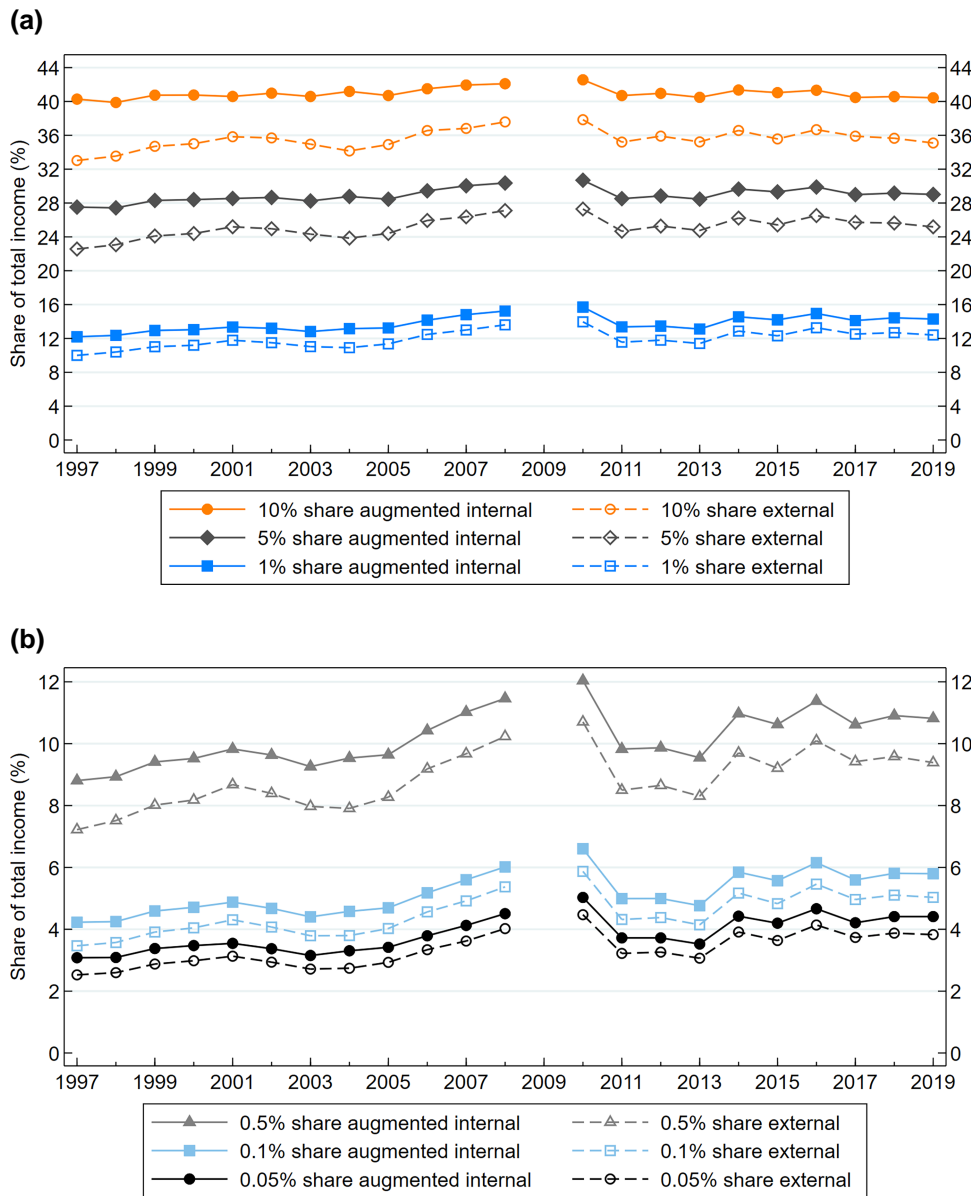
**(a)**



**(b)**



**Figure 3.** Top assessable income shares using our augmented internal and external income control totals. (a) Top 10%, 5%, and 1% shares. (b) Top 0.5%, 0.1%, and 0.05% shares.

*Notes:* We construct augmented internal top shares by dividing aggregate assessable income among the top *x*% (based on the Survey of Personal Incomes, SPI) by our preferred SPI-based assessable income control total (Section 4.1). We construct external top shares by dividing aggregate assessable income among the top *x*% (based on the SPI) by our National Accounts (NA) based assessable income control total (Section 4.2). We define all top shares relative to the total number of individuals aged 15 or older in the population living in the UK.

*Source:* Authors' calculations based on the SPI, Family Resources Survey and Benefit Expenditure and Caseload Tables (augmented internal); and the UK National Accounts (external).

the WID (Alvaredo, 2017). Using an updated external control total, the assessable income share of the top 1% rose from 10.0% to 12.4% between 1996–97 and 2018–19. In contrast, our augmented internal series suggests the top 1% share was around 2% points higher over this period, rising from 12.2% to 14.3% over the same period. This increase in income shares is even more pronounced, in relative terms, further up the income distribution.
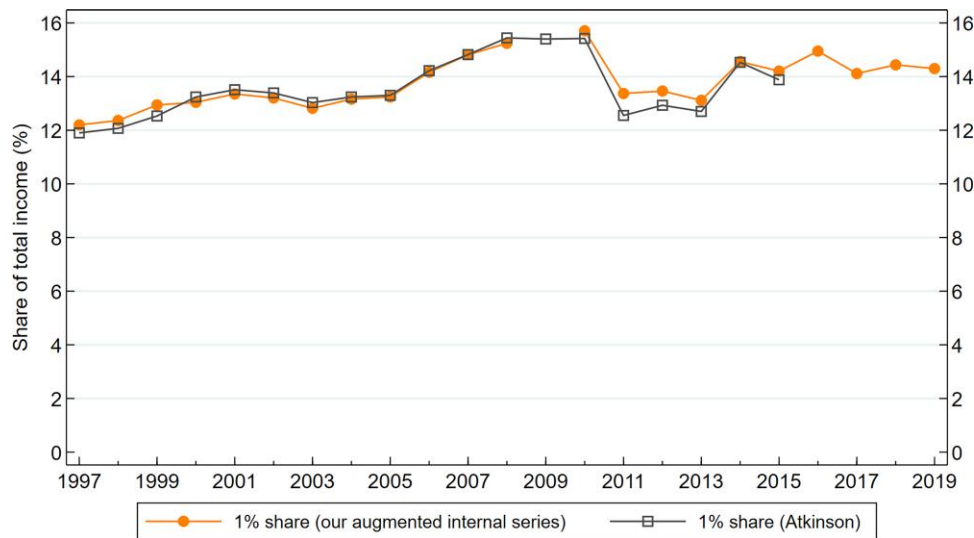
**Figure 4**. Top 1% share: our augmented internal series and the Atkinson series.

*Notes:* We construct our 'augmented internal' by dividing aggregate assessable income among the top $x$% (based on the Survey of Personal Incomes, SPI) by our preferred augmented internal income control total (Section 4.1). We define all top shares relative to the total number of individuals aged 15 or older in the population living in the UK. 'Atkinson' is the assessable income series developed by Atkinson (2005b) and subsequently extended in Atkinson (2012, 2013, 2014), Atkinson and Ooms (2015), and Alvaredo (2017).

*Source:* Authors' calculations based on the SPI, Family Resources Survey (FRS) and Benefit Expenditure and Caseload Tables (our augmented internal); and WID ('Atkinson').

Prior to this work, the WID had not updated the UK's assessable income series for years after 2015, as a growing gap between alternative estimates of the income control total made it unclear which methodological approach should be adopted (Alvaredo, 2017; Atkinson, 2005b). We resolve this issue by making a principles-based selection from among the alternatives, and set out a method for constructing the UK's assessable income control total that can be easily replicated in future years. Our augmented internal control total shows that inequality declined less in the aftermath of the Financial Crisis than previous results suggested (Atkinson, 2012, 2013, 2014; Atkinson & Ooms, 2015).

Though we focus on the UK, there are broader lessons to be learned from our findings. Regardless of the income definition one chooses to target, constructing accurate top share estimates almost always requires combining multiple data sources as, in most countries, no single data source covers incomes received by the whole population. We show that using macroeconomic aggregates from the National Accounts is not a neat and tidy solution to this problem: unless one is targeting National Income as defined in the National Accounts (as in the headline estimates on the WID), it is challenging to reconcile National Accounts components with one's chosen definition. This can have a significant quantitative effect on the results.

## Acknowledgments

## Supplementary material

Supplementary data is available online at *Journal of the Royal Statistical Society* online.

*Conflict of interest*: None declared.

## Funding

No: ES/W012650/1), and by the ERC Synergy Grant 'Towards a System of Distributional National Accounts' (DINA).

## Data availability

This work contains statistical data from Department for Work and Pensions, Office For National Statistics, NatCen Social Research (2021), HM Revenue and Customs, KAI Data, Policy and Co-ordination (2021), and Office for National Statistics (2021), which are Crown Copyright. The research data sets used may not exactly reproduce HMRC or ONS aggregates. The use of HMRC and ONS statistical data in this work does not imply any endorsement of these organisations in relation to the interpretation or analysis of the information.

   Data sharing is not applicable to this article as no new data were created or analysed in this study. The data used in this study are all publicly available at: http://doi.org/10.5255/UKDA-SN-8869-1, SN: 8869 (Survey of Personal Incomes); http://doi.org/10.5255/UKDA-SN-8633-1, SN: 8633 (Family Resource Survey); https://www.ons.gov.uk/economy/grossdomesticproductgdp/compendium/unitedkingdomnationalaccountsthebluebook/2021 (National Accounts); https://www.gov.uk/government/publications/benefit-expenditure-and-caseload-tables-2020 (Benefit Expenditure and Caseload tables); and https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/timeseries/ukpop/pop (Mid-year population estimates).

## References

Advani A. (2022). Who does and doesn't pay taxes? *Fiscal Studies*, *43*(1), 5–22. https://doi.org/10.1111/1475-5890.12257

Advani A., Elming W., & Shaw J. (2023). The dynamic effect of tax audits. *Review of Economics and Statistics*, *105*(3), 1–17. https://doi.org/10.1162/rest_a_01101

Advani A., Ooms T., & Summers A. (2022). Missing incomes in the UK: New evidence and policy implications. *Journal of Social Policy*, 1–21. https://doi.org/10.1017/S0047279422000290

Advani A., & Summers A. (2020). Capital gains and UK inequality. CAGE Working Paper 465, CAGE Research Centre, University of Warwick.

Advani A., Summers A., & Tarrant H. (2021). UK estimates of top fiscal income shares: Note on revised methods. WID.world Technical Note.

Aghion P., Akcigit U., Bergeaud A., Blundell R., & Hémous D. (2019). Innovation and top income inequality. *Review of Economic Studies*, *86*(1), 1–45. https://doi.org/10.1093/restud/rdy027

Alvaredo F. (2017). UK estimates of top income shares 2013–2014 and 2014–2015: Note on methods. WID.world Technical Note.

Alvaredo F., Atkinson A. B., Blanchet T., Chancel L., Bauluz L., Fisher-Post M., Flores I., Garbinti B., Goupille-Lebret J., Martinez-Toledano C., Morgan M., Neef T., Piketty T., Robilliard A., Saez E., Yang L., & Zucman G. (2020). *Distributional National Accounts Guidelines 2020: Concepts and methods used in the World Inequality Database*. WID.World Working Paper.

Alvaredo F., Atkinson A. B., Piketty T., & Saez E. (2013). The top 1 percent in international and historical perspective. *Journal of Economic Perspectives*, *27*(3), 3–20. https://doi.org/10.1257/jep.27.3.3

Atkinson A. B. (2005a). Comparing the distribution of top incomes across countries. *Journal of the European Economic Association*, *3*(2–3), 393–401. https://doi.org/10.1162/jeea.2005.3.2-3.393

Atkinson A. B. (2005b). Top incomes in the UK over the 20th century. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *168*(2), 325–343. https://doi.org/10.1111/rssa.2005.168.issue-2

Atkinson A. B. (2007). The distribution of top incomes in the United Kingdom 1908–2000. In A. B. Atkinson & T. Piketty (Eds.), *Top incomes over the twentieth century. A contrast between continental European and English-speaking countries* (Chap. 4). Oxford University Press.

Atkinson A. B. (2012). UK estimates of top income shares 2009–2010: Revised note on methods. WID.world Technical Note.

Atkinson A. B. (2013). UK estimates of top income shares 2010–2011: Note on methods. WID.world Technical Note.

Atkinson A. B. (2014). UK estimates of top income shares 2011–2012: Note on methods. WID.world Technical Note.

Atkinson A. B., & Jenkins S. P. (2019). A different perspective on the evolution of UK income inequality. *Review of Income and Wealth*, *66*(2), 253–266. https://doi.org/10.1111/roiw.v66.2

Atkinson A. B., & Ooms T. (2015). UK estimates of top income shares 2012–2013: Note on methods. WID.world Technical Note.

Atkinson A. B., & Piketty T. (2007). *Top incomes over the twentieth century. A contrast between continental European and English-speaking countries*. Oxford University Press.

Auten G., & Splinter D. (2019). Top 1 percent income shares: Comparing estimates using tax data. *AEA Papers and Proceedings*, *109*, 307–311. https://doi.org/10.1257/pandp.20191038

Auten G., & Splinter D. (2022). *Income inequality in the United States: Using tax data to measure long-term trends*. Retrieved October 26, 2022, from https://davidsplinter.com

Batty M., Bricker J., Briggs J., Holmquist E., McIntosh S., Moore K., Nielsen E., Reber S., Shatto M., Sommer K., Sweeney T., & Volz A. H. (2017). *Introducing the distributional financial accounts of the United States*. Finance and Economics Discussion Series 2019–017. Board of Governors of the Federal Reserve System.

Browne J., & Phillips D. (2017). Estimating the size and nature of responses to changes in income tax rates on top incomes in the UK: A panel analysis. IFS Working Paper W17/13. https://doi.org/10.1920/wp.ifs.2017.W1713

Burkhauser R. V., Feng S., Jenkins S. P., & Larrimore J. (2012). Recent trends in top income shares in the United States: Reconciling estimates from March CPS and IRS tax return data. *Review of Economics and Statistics*, *94*(2), 371–388. https://doi.org/10.1162/REST_a_00200

Burkhauser R. V., Hahn M. H., & Wilkins R. (2015). Measuring top incomes using tax record data: A cautionary tale from Australia. *Journal of Economic Inequality*, *13*(2), 181–205. https://doi.org/10.1007/s10888-014-9281-z

Burkhauser R. V., Hérault N., Jenkins S. P., & Wilkins R. (2018a). Survey under-coverage of top incomes and estimation of inequality: What is the role of the UK's SPI adjustment? *Fiscal Studies*, *39*(2), 213–240. https://doi.org/10.1111/fisc.2018.39.issue-2

Burkhauser R. V., Hérault N., Jenkins S. P., & Wilkins R. (2018b). Top incomes and inequality in the UK: Reconciling estimates from household survey and tax return data. *Oxford Economic Papers*, *70*(2), 301–326. https://doi.org/10.1093/oep/gpx041

Chancel L., Piketty T., Saez E., & Zucman G. (2021). World Inequality Report 2022. World Inequality Lab.

Corlett A., Clarke S., D'Arcy C., & Wood J. (2018). The Living Standards Audit 2018. Resolution Foundation report.

DeBacker J., Heim B., Tran A., & Yuskavage A. (2020). Tax noncompliance and measures of income inequality. *Tax Notes*.

Department for Work and Pensions, Office For National Statistics, NatCen Social Research (2020). Family Resources Survey, 1997–2017. UK Data Service [data collection]. SN: 8633. http://doi.org/10.5255/UKDA-SN-8633-1

Feenberg D. R., & Poterba J. M. (1993). Income inequality and the incomes of very high-income taxpayers: Evidence from tax returns. *Tax Policy and the Economy*, *7*, 145–177. https://doi.org/10.1086/tpe.7.20060632

Feenberg D. R., & Poterba J. M. (2000). The income and tax share of very high-income households, 1960–1995. *The American Economic Review*, *90*(2), 264–270. https://doi.org/10.1257/aer.90.2.264

Fesseau M., & Mattonetti M. (2013). Distributional measures across household groups in a National Accounts framework: Results from an experimental cross-country exercise on household income, consumption and saving. OECD Statistics Working Papers, No. 2013/04. OECD Publishing.

Gabaix X., Moll B., Lasry J.-M., & Lions P.-L. (2016). The dynamics of inequality. *Econometrica*, *84*(6), 1–45. https://doi.org/10.3982/ECTA13569

Garbinti B., Goupille-Lebret J., & Piketty T. (2018). Income inequality in France, 1900–2014: Evidence from Distributional National Accounts. *Journal of Public Economics*, *162*, 63–77. https://doi.org/10.1016/j.jpubeco.2018.01.012

Gordon R., & Slemrod J. (2000). Are 'real' responses to taxes simply income shifting between corporate and personal tax bases. In J. Slemrod (Ed.), *Does Atlas shrug? The economic consequences of taxing the rich*. Harvard University Press/Russell Sage Foundation.

Guyton J., Langetieg P., Reck D., Risch M., & Zucman G. (2022). Tax Evasion by the wealthy: Measurement and implications. In R. Chetty, J. N. Friedman, J. C. Gornick, B. Johnson, & A. Kennickell (Eds.), *Measuring distribution and mobility of income and wealth*. University of Chicago Press. https://www.nber.org/books-and-chapters/measuring-distribution-and-mobility-income-and-wealth/developing-indicators-inequalityand-poverty-consistent-national-accounts

HMRC (2021). Survey of personal incomes public use tape documentation: 2019. Available from UK Data Service.

HM Revenue and Customs, KAI Data, Policy and Co-ordination (2021). Survey of Personal Incomes, 1997–2019. UK Data Service [data collection]. SN: 8869. http://doi.org/10.5255/UKDA-SN-8869-1

Jenkins S. P. (2017). Pareto models, top incomes and recent trends in UK income inequality. *Economica*, *84*(334), 261–289. https://doi.org/10.1111/ecca.2017.84.issue-334

Johns A., & Slemrod J. (2010). The distribution of income tax noncompliance. *National Tax Journal*, *63*(3), 397–418. https://doi.org/10.17310/ntj.2010.3.01

Jones C. I., & Kim J. (2018). A Schumpeterian model of top income inequality. *Journal of Political Economy*, *126*(5), 1785–1826. https://doi.org/10.1086/699190

Kuznets S. (1953). *Shares of upper income groups in income and savings*. National Bureau of Economic Research.

Office for National Statistics (2021). UK National Accounts, The Blue Book: 2021 [data collection]. https://www.ons.gov.uk/economy/grossdomesticproductgdp/compendium/unitedkingdomnationalaccountsthebluebook/2021

ONS (2015). The distribution of household income, consumption and savings, an OECD study. National Accounts Article.

Ooms T. (2019). *Income from capital, inequality indicators and social policy* [PhD thesis]. University of Oxford.

Piketty T. (2003). Income inequality in France, 1901–1998. *Journal of Political Economy*, *111*(5), 1004–1042. https://doi.org/10.1086/376955

Piketty T., & Saez E. (2003). Income inequality in the United States 1913–1998. *Quarterly Journal of Economics*, *118*(1), 1–41. https://doi.org/10.1162/00335530360535135

Piketty T., & Saez E. (2020). Income inequality in the United States, 1913–1998: Tables and figures updated to 2018. Retrieved September 10, 2020, from https://eml.berkeley.edu/saez/

Piketty T., Saez E., & Zucman G. (2018). Distributional National Accounts: Methods and estimates for the United States. *Quarterly Journal of Economics*, *133*(2), 553–609. https://doi.org/10.1093/qje/qjx043

Piketty T., Saez E., & Zucman G. (2019). Distributional diversity in the national accounts: Simplified Distributional National Accounts. *American Economic Association Papers and Proceedings*, *109*, 289–295. https://doi.org/10.1257/pandp.20191035

Salverda W. (2013). Extending the top-income shares for the Netherlands from 1999 to 2012: An explanatory note. WID.world Technical Note.

Seely A. (2014). Income tax: The additional 50p rate. House of Commons Library Standard Note SN 249.

Splinter D. (2018). *Comment: Inequality and philanthropy: High-Income giving in the United States 1917–2012*. Retrieved September 10, 2020, from https://davidsplinter.com

Tonkin R., White S., Stoyanova S., Youssef A., Sidhu S., & Payne C. (2022). Developing indicators of inequality and poverty consistent with national accounts. In R. Chetty, J. N. Friedman, J. C. Gornick, B. Johnson, & A. Kennickell (Eds.), *Measuring distribution and mobility of income and wealth*. University of Chicago Press. https://www.nber.org/books-and-chapters/measuring-distribution-and-mobility-income-and-wealth/developing-indicators-inequalityand-poverty-consistent-national-accounts