European Economic Review 178 (2025) 105076

Contents lists available at ScienceDirect

European Economic Review

journal homepage: www.elsevier.com/locate/eer

Measuring top wealth shares in the UK

Arun Advani [a,*,1], Andy Summers [b], Hannah Tarrant [c]

[a] University of Warwick Department of Economics, and Centre for the Analysis of Taxation (CenTax), United Kingdom
[b] London School of Economics Law School and CenTax, United Kingdom
[c] LSE Inequalities Institute, United Kingdom

ARTICLE INFO

JEL classification:
D31
E01
G51

Keywords:
Wealth inequality
Measurement
National accounts
Top shares

ABSTRACT

We examine how the measurement of *aggregate* wealth affects our understanding of wealth distribution. We explain why choices over wealth aggregates can affect the measured level and composition of wealth concentration. Applying this to the UK, we find estimates of the top 1% wealth share vary by 2.1pp – between 14.4% and 16.5% – in 2016–18, depending on the choices we make regarding aggregates and the source of distributional information. Alternative definitions for aggregates lead to a reranking of who is at the top, replacing 40% of individuals in the top 1%, and changing the share of women and older individuals. We discuss conceptual and measurement issues with the National Accounts as a source of wealth aggregates, and argue that in many cases they are poorly aligned in both regards with the measure of personal wealth one would like to target, and in practice are less comparable internationally than they initially seem. In the UK, where the wealth survey has reasonably good coverage across the distribution, we therefore prefer survey aggregates.

1. Introduction

Interest in the measurement of wealth inequality has grown in recent years, reflecting increasing public concern over the concentration of resources and inequality in living standards. Recent academic contributions have been motivated by a desire to understand the distribution of macroeconomic growth and make international comparisons (Atkinson and Piketty, 2007; Saez and Zucman, 2016; Piketty et al., 2018; Alvaredo et al., 2020), understand the drivers of wealth accumulation and intergenerational mobility (Artola Blanco et al., 2021; Fagereng et al., 2020; Martínez-Toledano, 2023), and to understand the potential for redistribution (Saez and Zucman, 2019; Advani et al., 2021b). Much of the recent debate has focused on the use of tax data combined with estimated rates of return on assets to capitalise income flows (Smith et al., 2023; Saez and Zucman, 2020, 2022). However, individual wealth estimates produced by this approach are usually still scaled up, separately by asset class, typically to the National Accounts (Alvaredo et al., 2020).

* Correspondence to: Department of Economics, University of Warwick, Gibbet Hill Road, Coventry, CV4 7AL, United Kingdom.
E-mail address: economics@arunadvani.com (A. Advani).

[1] The authors thank Facundo Alvaredo, multiple conference participants and the referees and editorial team for helpful comments, and Carla Kidd, Sarah Levy and Jorritt Zwijnenburg for insight into the underlying data sources. This research was supported by the Nuffield Foundation 'Broad Shoulders' grant (WEL/FR-000023787) and the ERC Synergy Grant 'Towards a System of Distributional National Accounts' (DINA). CenTax receives core funding from abrdn Financial Fairness Trust and the Thirty Percy Foundation. This work contains statistical data from HM Revenue and Customs (HMRC) which are Crown Copyright. The research data sets used may not exactly reproduce HMRC aggregates. The use of HMRC statistical data in this work does not imply the endorsement of HMRC in relation to the interpretation or analysis of the information. This work also contains statistical data from Department for Work and Pensions (2019) and Office for National Statistics (2021a, 2021c, 2022b) which are Crown Copyright. It also contains HM Land Registry data ′ Crown copyright and database right 2020. This data is licensed under the Open Government Licence v3.0.

https://doi.org/10.1016/j.euroecorev.2025.105076
Received 30 September 2024; Received in revised form 25 May 2025; Accepted 25 May 2025
Available online 8 July 2025

In this paper, we explore the impact of the choice of wealth aggregates for the wealth share and characteristics of the top 1%. We explain how and why different asset distributions affect the direction of changes in top shares that result from targeting different aggregates, and illustrate this using two of the commonly-used sources of distributional information: survey and income tax data. In doing so, we enable those who choose alternative sources of distributional information to better understand how aggregates play a role in explaining their results.

To examine the role of aggregates, we first show that top wealth shares can be decomposed into the share of each asset class held by the wealthiest, and the relative sizes of each asset class. In the UK, aggregate net wealth was £14.2 trillion in our survey data in 2016–18 — £4.3 trillion higher than the £9.9 trillion observed in the National Accounts. This difference is primarily driven by the treatment of pension and housing wealth, which are also relatively less concentrated than other asset classes.

The choice of aggregates matters quantitatively for estimates of wealth *concentration*. When there is heterogeneity in portfolio composition, scaling the value of a particular asset class in order to target a different aggregate produces a reranking of individuals, and a change in the aggregate value of wealth held at the top. Estimates of the share of wealth held by the top 1% vary by 2.1 percentage points – between 14.4% and 16.5% – in 2016–18, depending on the choices we make regarding aggregates and the source of distributional information.

The reranking of individuals as a result of switching from survey to National Accounts aggregates (NA aggregates) not only affects measured wealth concentration, but also the characteristics of those at the top. Using NA aggregates, 40% of individuals in the top 1% under the survey aggregates are no longer in the top 1%. The top 1% exhibits an older age profile and is less male-dominated relative to when survey aggregates are used.

National Accounts have become the de facto data source for measuring aggregate wealth, and methods to produce distributional statistics that are consistent with these aggregates have proliferated in recent years (Piketty et al., 2018; Saez and Zucman, 2016; Garbinti et al., 2021; Martínez-Toledano, 2023; Alvaredo et al., 2020; EG-LMM, 2020). As well as enabling us to understand the distribution of macroeconomic growth, the appeal of this approach lies partly in the fact that National Accounts are produced according to internationally standardised guidelines. Distributional statistics that are aligned with these aggregates are therefore considered to be internationally comparable (Chancel et al., 2022).

We argue that survey data should not be automatically dismissed in favour of National Accounts when it comes to measuring aggregate wealth for purposes of understanding wealth distribution. While National Accounts are appropriate for answering a certain set of research questions, they do not target the relevant definition of wealth for those interested in measuring inequality. These conceptual issues are not specific to the UK context: the fact that National Accounts are produced according to an internationally standardised framework implies that many of these issues apply elsewhere too. We also stress that, despite the common guidelines, there are significant differences in how National Accounts are constructed in practice, creating comparability issues across countries that are first order.

Recent research into wealth inequality has focused on the suitability of alternative sources of information on the distribution of assets, exploring the sensitivity of wealth concentration estimates to these choices (Kopczuk and Saez, 2004; Saez and Zucman, 2016; Alvaredo et al., 2018; Smith et al., 2023; Saez and Zucman, 2020). In this paper, we highlight the similar importance of how aggregate wealth itself is measured, showing that this also has important implications for estimates of the wealth distribution. Our work thus complements other studies which focus on different aspects of wealth measurement.

The remainder of the paper is organised as follows. Section 2 defines our target concept of wealth and describes the data sources. Section 3 sets out a conceptual framework for understanding the role of asset distributions and aggregates in explaining top wealth shares, and our approach to estimating these. Section 4 presents our results on aggregate wealth, and how and why it differs across the two data sources. Section 5 presents our results on top wealth shares and how these are affected by the choice of aggregates. Section 6 concludes.

2. Data and wealth definitions

Following Saez and Zucman (2016), we define wealth as:

"the current market value of all the assets owned by households net of all their debts. Following international standards codified in the System of National Accounts (United Nations 2009), assets include all the non-financial and financial assets over which ownership rights can be enforced and that provide economic benefits to their owners".

This includes housing, private businesses, equity, pension entitlements, deposits in financial institutions, and life and non-life insurance assets, net of mortgages and other financial debts.

As they are not included in the core National Accounts, we exclude unfunded DB pensions from our main National Accounts results (Section 4–5). However, we argue that these types of pension scheme should be included based on the definition outlined above (Section 4.1). We therefore provide, in Appendix F.2, estimates of the wealth distribution based on including unfunded DB pension wealth as reported in the supplementary National Accounts, which we compare to using only the core accounts.

We exclude consumer durables such as household goods, collectibles and valuables, and cars and other vehicles. This is because they are not included within the National Accounts framework, making it difficult to consistently compare these aggregates with our household survey data (where these assets are measured).

Our population of interest includes all UK resident individuals. For these individuals, we include their worldwide assets rather than just those assets situated within the UK's national borders. We do not include UK-situated assets owned by foreign individuals or other institutional sectors, such as social housing that is owned by housing associations.

For the adult population control total we use Office for National Statistics (ONS) mid-year population estimates of the number of individuals aged 20 or older, following the standard adult population definition used in the WID (Alvaredo et al., 2020).

2.1. Income tax data

To estimate wealth using the income capitalisation approach, we use administrative income tax data from the UK tax authority (HMRC). These cover the universe of personal tax returns filed for tax years 2006 to 2018,[2] as well as a sample of tax records for individuals whose tax is withheld at source. The tax unit is the individual, and we use individuals as our unit of analysis throughout.

Taxpayers are required to file a tax return if their incomes are not subject to a withholding tax, or if their income exceeds a nominal threshold (currently £100,000). Around a third of UK taxpayers filed a tax return in recent years. All individuals with significant investment income (be it rental income, dividends, or interest) are required to file a tax return. We thus observe the majority of investment income received by individuals in our tax return data.[3]

Individuals who are not required to file a tax return may still receive some investment income (such as interest on bank accounts), below the tax-free allowance for these income sources. HMRC provide an imputed measure of the investment income received by these individuals in the Survey of Personal Incomes (SPI), a dataset which draws upon a sample of administrative tax records from tax returns and PAYE (employer filed automatic withholding through Pay-As-You-Earn). HMRC impute investment – interest and dividends – income to individuals using data from financial institutions and household surveys, to provide a comprehensive measure of all income assessable for income tax. We supplement our tax return data with records for non-filers from the SPI, using the imputed measures of investment income for these individuals. Imputed dividends account for 4% of dividends observed in our data for 2016–18, while imputed interest accounts for 59%.

As part of the SPI, HMRC provide sampling weights which enable us to scale up our PAYE-derived sample to the full population of those present in PAYE who do not file a tax return. We use these probability weights when calculating aggregate income and wealth among our SPI-PAYE sample.

Finally, as we use the WAS to impute non-income-yielding wealth, we must combine multiple years of tax data to replicate WAS 'rounds', each of which spans a two-year period. To replicate this in our tax data, we pool the two years of tax data for which there is greatest overlap with the WAS reference period.

2.2. National accounts

The National Accounts record the aggregate net worth held by all UK resident 'sectors', including corporations, non-profit institutions, households, and different branches of government. The household sector covers all individuals residing in the UK. Following our target definition, we restrict our attention to the net worth of the household sector — known as 'personal net worth'. This is consistent with the definition of wealth used in the Distributional National Accounts framework adopted by Batty et al. (2019) and by the *World Inequality Database* (WID). Personal net worth encompasses financial and non-financial assets, less financial liabilities. It excludes consumer durables.

Wealth components are recorded in two separate tables in the UK National Accounts: the household sector table of the National Balance Sheet (Table 9.11 of the Blue Book); and the household sector Financial Balance Sheet (Table 6.2.11 of the Blue Book), which provides a more granular disaggregation of financial net worth than that presented in Table 9.11.

In principle, the National Accounts are constructed according to a common international framework: the System of National Accounts (SNA 2008), or the European System of Accounts (ESA 2010) which is largely consistent with the former. If the goal is to compare inequality statistics across countries, this standardisation offers an advantage over alternative measures of wealth based on tax or survey data, which tend to measure different things in different countries. However, in practice, the methods and concepts used to construct the National Accounts vary across countries, as does coverage of different asset classes. For example, the Spanish National Accounts omit non-financial assets such as housing and business assets (Artola Blanco et al., 2021). As a result, incorporating these asset classes requires drawing on external data sources, which may not be internationally standardised.

Wealth in the UK National Accounts is calculated on a calendar-year basis, and the latest 'Blue Book' publications provide consistent estimates of personal net worth dating back to 1995. To reconcile National Accounts estimates with the reference period used in the WAS, we adjust wealth totals in the National Accounts on a *pro rata* basis.[4]

2.3. Wealth and Assets Survey

Our survey-based aggregates and distributions draw upon microdata from the Wealth and Assets Survey (WAS), a comprehensive survey of wealth held by UK resident households. The WAS is a longitudinal survey conducted by the Office for National Statistics. Data are collected in sequential 2-year waves (or "rounds"), beginning in 2006–08. We use the six rounds which overlap with the period for which we have income tax data, from 2006–08 to 2016–18.

The WAS captures a broad range of asset classes, including property, financial assets, businesses, and pensions. Asset values are self-reported, though individuals are encouraged to consult documentation (e.g. pension fund reports) where applicable. Appendix A

[2] The UK tax year begins in April and ends in April the following year. Consistent with HMRC, we refer to tax years by the year end i.e. 2016–17 is referred to as 2017.

[3] For a more detailed treatment of what is reported, and how reported taxable income relates to national accounts income, see Advani et al. (2023).

[4] For example, for round 6 of the WAS which spans April 2016 to March 2018, we construct the equivalent 'round' in the National Accounts as $W_{r=6} = 0.5 \cdot (0.75 \cdot W_{2016} + W_{2017} + 0.25 \cdot W_{2018})$.

provides details on how each individual asset class is measured. In Section 4, we draw attention to the key measurement differences between the WAS and the National Accounts.

Our population of interest is all adults (aged 20+) in the UK. See Appendix C for details on how we adjust the WAS, which samples individuals living in private residences in Great Britain, to be representative of the UK. Although the population is sampled at household level, each individual within the household responds to the survey, the majority of wealth components are measured at an individual level, and appropriate individual sample weights are provided. This enables us to use individuals as the unit of analysis, consistent with the units observed in our tax data.

3. Decomposing top wealth shares

3.1. Conceptual framework

The full distribution of wealth can be characterised by the shares of wealth owned by different fractiles of the distribution. Starting at the top of the distribution – which is most common in the wealth inequality literature – we can write the share of wealth held by the top 1, 5, or 10 percent (for example) as

$$S_w(x) \equiv 1 - F_w(x) \tag{1}$$

for $x \in \{0.01, 0.05, 0.10\}$, where w is total wealth and $F_w(.)$ is the CDF of the wealth distribution.

This can in turn be decomposed as

$$S_w(x) = \sum_c S_c(x) \cdot \left[\frac{W^c}{W}\right] \tag{2}$$

where $W = \sum_c W^c$ denotes aggregate wealth and c represents different asset classes that make up total wealth. The wealth distribution therefore depends on how each asset class, c, is distributed across individuals ranked on total wealth, $S_c(x)$, and the relative aggregate size of these asset classes, $\frac{W^c}{W}$.

The main focus of recent debate has been around estimating the distributions of these asset classes, $\{S_c(x)\}^c$, with aggregates taken – in most cases – from the National Accounts (Saez and Zucman, 2016, 2020; Garbinti et al., 2021). In particular, the discussion has centred around the three data sources that can be used to obtain information on $S_c(x)$: income tax data, estates data, and survey data.

The Mixed Income Capitalization (MICs) approach draws on income tax data as the source of distributional information on assets which yield a taxable income flow, A, and survey data to estimate the distribution of non-income-yielding assets, N. Alvaredo et al. (2020). Top shares under the MICs methodology can therefore be written as:

$$\begin{aligned} S_w(x) &= \sum_{a \in A} S_a(x) \cdot \left[\frac{W^a}{W}\right] + \sum_{n \in N} S_n(x) \cdot \left[\frac{W^n}{W}\right] \\ &= S_A(x) \cdot \left[\frac{W^A}{W}\right] + S_N(x) \cdot \left[\frac{W^N}{W}\right] \end{aligned} \tag{3}$$

where $S_a(x)$ are estimated using income tax data and rates of return from the National Accounts; $S_n(x)$ are taken (often but not always) from survey data; and $\frac{W^a}{W}$ and $\frac{W^n}{W}$ are taken from the National Accounts.

The importance of which aggregates are used has received little attention. Even where some aggregates are not taken from the National Accounts (e.g. business wealth in Smith et al., 2023), there has been little discussion of what difference this makes to the overall wealth distribution. However, since different asset classes are very differently distributed, changes to the relative importance of different asset classes is first order in terms of the effects on the wealth distribution.

3.2. Empirical approach

In this paper, we present two alternative wealth distribution series which illustrate the importance of which aggregates are chosen. For both series, we use the same MICs methodology for estimating the distribution. The series differ only in which aggregates we use for capitalising investment income and imputing non-income-yielding wealth. Table 1 illustrates the data sources used to construct each component of Eq. (3) under our two main approaches.

Under the 'Income capitalisation, NA aggregates' approach, we capitalise income tax data to estimate the distribution of income-yielding assets. We use survey data to impute the distribution of non-income-yielding assets following the MICs approach, again scaling these to match NA aggregates. All asset classes are scaled to match NA aggregates.[5] Our 'Income capitalisation, survey aggregates' approach replicates the above, but taking aggregates from survey data rather than the NA.

However, the effect of choosing different aggregates also depends on the relative distribution of different asset classes. We illustrate this in Section 5.4, where we show the effect of applying different aggregates to survey distributions of individual asset classes, rather than using the income capitalisation approach. Under the 'Survey distribution, NA aggregates' approach, we take the

[5] In Appendix F.1, we illustrate the effect of choosing broader asset categories for capitalisation, following the basic framework set out in the DINA guidelines (Alvaredo et al., 2020).

Table 1
Data sources used to construct each series.

Series	$S_a(x)$	W^a	$S_n(x)$	W^n
Main approach				
Income capitalisation, NA aggregates	Income tax data	NA	Survey	NA
Income capitalisation, Survey aggregates	Income tax data	Survey	Survey	Survey
Alternative approach (Section 5.4)				
Survey distribution, NA aggregates	Survey	NA	Survey	NA
Survey distribution, Survey aggregates	Survey	Survey	Survey	Survey

Notes: Top shares in each series are produced by combining the listed data sources for the distribution and aggregate size of income yielding, and non-income yielding, wealth. Total wealth is constructed as the sum of total income-yielding wealth and total non-income-yielding for that series.

Table 2
Capitalisation categories for each series.

Income component	Wealth component
Series: Income capitalisation, NA aggregates	
UK interest	UK deposits
Foreign interest	Foreign deposits
Gilt interest	Bonds and gilts
UK dividends + partnership income (30% of trading income)	UK equity
Foreign dividends + foreign property income	Foreign equity
Mutual fund dividends	Mutual fund shares
Profits of sole proprietorships (30%)	Business assets
Series: Income capitalisation, survey aggregates	
UK + foreign interest	Deposits
Gilt interest	Bonds and gilts
UK dividends + partnership income (30% of trading income)	UK equity
Foreign dividends	Foreign shares
Foreign property income	Foreign property
Mutual fund dividends	Mutual fund shares
Profits of sole proprietorships (30%)	Business assets

distribution of all asset classes as they are observed in household survey data, scaling these to match NA aggregates. Our 'Survey distribution, survey aggregates' takes the distribution and aggregate value of all assets from survey data.

In Appendix F.3 we provide results after including a Pareto adjustment to the survey distribution, to account for undercoverage of WAS at very high levels of wealth. The Pareto adjusted series is actually our preferred series for the UK, but for purposes of comparison to the literature we focus on the capitalised income distribution because this has become the standard in the literature, so that we can focus on the impact of denominator choice.

To produce each of our series, we must first reconcile the income flows observed in the income tax data with the stocks of wealth observed in the National Accounts and the WAS, to determine the categories of income and wealth to be used in our capitalisation procedure. The capitalisation categories we use are presented in Table 2.

In the DINA guidelines, it is recommended that as a first approximation, constant scaling factors should be used (Alvaredo et al., 2020). We adopt this approach, while acknowledging its limitations. There has been much debate on whether the assumption of a constant rate of return is empirically justified (Saez and Zucman, 2016; Smith et al., 2023; Saez and Zucman, 2020). However, our focus on this paper is on the impact of aggregates. The assumptions we make are common across both of our headline series; it is the use of different aggregates which drives variation in our results.

Though partnership trading income and the profits earned by sole proprietors include a return on capital assets such as machinery and equipment, which do not yield a direct income flow, they also include a return on labour. The share of income that derives from capital assets is likely to vary across businesses. Some, such as sole proprietors providing personal services, will own few if any assets, while others will derive a large portion of their income as a return on assets they own. We adopt the common assumption made in the DINA literature, that 30% of partnership trading income and profits earned by sole proprietors represents a return on capital (Alvaredo et al., 2020; Garbinti et al., 2021; Martínez-Toledano, 2023). For further details on our income capitalisation approach, see Appendix B.1.

Next, we must impute the value of non-income-yielding assets to individuals in our tax data using distributional information from our survey data. To do so, we first group individuals into vigintiles (20 groups) of income-yielding wealth. We then further subdivide individuals within each vigintile of income-yielding wealth as follows: within each of the bottom 15 vigintiles (bottom 75%), we assign individuals into vigintiles of non-income-yielding wealth;[6] within each of vigintiles 16–19 of income-yielding wealth (75%–90%), we assign individuals into 30 groups of non-income-yielding wealth; within each of the top two vigintiles (top 10%) we assign individuals into 40 groups of non-income yielding wealth. This results in a total of 470 groups. As with all imputation procedures, there is a trade-off to be made between increased granularity (number of groups) and having a sufficient sample size

[6] Non-income-yielding wealth here includes net housing, currency, life insurance assets, pensions, and consumer loans.

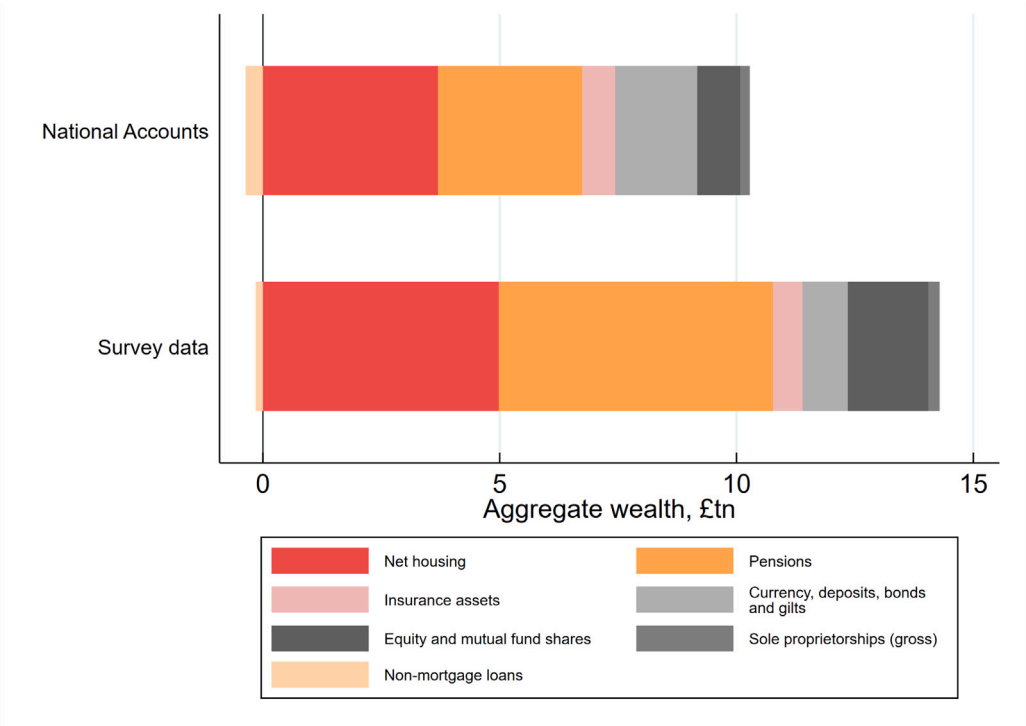

Fig. 1. Composition of aggregate wealth by data source, 2016–18 (£tn).
Notes: Table shows the aggregate value of reconciled asset categories. For further details on how asset categories have been reconciled, see Appendix A.
Source: Authors' calculations based on the National Accounts and the Wealth and Assets Survey.

in each imputation cell. The over-sampling of wealthier individuals in the WAS enables us to construct more granular imputation bins towards the top of the distribution, which helps us to better replicate the concentration of wealth at the top.

Within each imputation cell, we calculate the share of each non-income-yielding asset class held by each group to form our imputation matrix. In the tax data, we then allocate individuals to vigintiles of income-yielding wealth (as above). We then randomly allocate individuals to one of 10/20/30 groups within each cell (depending on the vigintile of income-yielding wealth). These groups are generated to enable us to replicate variation in non-income-yielding wealth within each income-yielding wealth vigintile. We impute the share of each non-income-yielding asset held by these groups using our survey-based imputation matrix. Finally, we apply this share to the aggregate for each asset class – which varies according to which of our four approaches we are using – and take the average to estimate the non-income-yielding wealth held by each individual in the income tax data. In Appendix B.2 we show that, compared to a range of alternative approaches to defining imputation cells, our chosen method better replicates the distribution of wealth observed in the WAS.

4. Aggregate wealth by asset class

Discrepancies between aggregate wealth in the National Accounts and in survey data have been documented across a wide range of countries (Albers et al., forthcoming; EG-LMM, 2020; Chatterjee et al., 2022; Batty et al., 2019). Both the magnitude and direction of the gap varies across asset classes, as does their explanation. Broadly, these can be attributed to two main factors: conceptual differences (differences in what the data source is trying to measure) and measurement differences (differences in the methods and data sources used to measure the concept of interest).

In this Section, we highlight both the conceptual and measurement issues that make the National Accounts problematic for studying the personal wealth held by individuals, and contrast these with what is measured in the WAS (see Appendix E for further details). Despite the limitations of the WAS – which we set out below – we argue there are compelling reasons for using it as the primary measure of personal wealth in the UK.

Aggregate differences. In the UK, aggregate wealth is higher in the WAS than in the National Accounts, and this gap has increased over time. Aggregate wealth was £1.2tn (17%) higher in the WAS in 2006–08, rising to £4.3tn (43%) in 2016–18.[7] The largest gaps in absolute terms are in pensions and (net) housing, which are £2.7 trillion and £1.3 trillion higher in the WAS, respectively (Fig. 1).

[7] This excludes physical assets (consumer durables) from the WAS, for which there is no counterpart in the National Accounts.

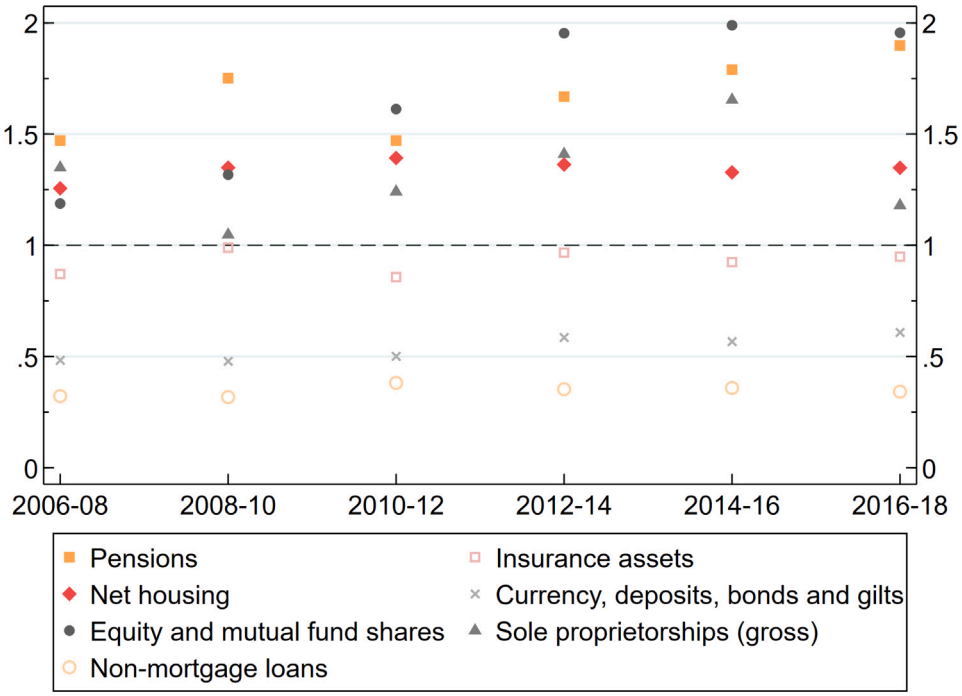

Fig. 2. Ratio of aggregate asset value in survey data to aggregate asset value in the National Accounts.
Notes: Ratio is calculated by dividing aggregate wealth in the WAS by aggregate wealth in the National Accounts, for each asset class.
Source: Authors' calculations based on the National Accounts and the Wealth and Assets Survey.

Relative differences by asset class. If all asset classes were equally under-represented, the choice of aggregates would have no impact on the estimated wealth distribution. However, there is substantial variation across asset classes (Fig. 2). Aggregate pension and equity wealth are twice as large in survey data as in the National Accounts, and housing wealth is 40% larger. By contrast, non-mortgage loans and currency are both much smaller in the survey, at around half the size measured in the National Accounts. In the next subsections we describe some of the reasons for these differences for the largest asset classes.

4.1. Aggregate pension wealth

There are at least two factors that make the NA aggregate problematic as a measure of the pension wealth held by individuals. First, there are conceptual differences in what is being targeted: the National Accounts main tables target the liabilities of private sector schemes, rather than the market cost of individuals' repurchasing their current entitlements. The low conceptual comparability between the National Accounts measure of pension wealth, and survey data, is an issue that affects countries across Europe (EG-LMM, 2020). Second, international guidelines for the production of National Accounts impose differences in discount rates across pension types that affect the relative value of different schemes.

4.1.1. Conceptual differences

Types of pension. Private pensions in the UK can be defined contribution (DC) or defined benefit (DB), and DB pensions may be 'funded' or 'unfunded'. DC pensions are comprised of savings made by the individual (and potentially their employers), and the returns on those savings. On retirement, that pot of cash is available to the individual, with some restrictions over speed of withdrawal.

A DB pension is instead an entitlement to a certain stream of income on retirement, with the annual income usually related to the individual's average or final salary, and tenure in the pension scheme. A funded DB scheme has a pot of assets within the scheme that can be used to discharge the liabilities, and this includes all private sector DB schemes. By contrast, in unfunded – or 'pay-as-you-go' – schemes, there are no underlying assets. These schemes include pensions paid to most public sector workers.

Target concept. In determining the value of pension wealth to an individual, the appropriate benchmark is the (market) replacement value of the pension. For a DC pension, this is just the value of the fund. For a DB pension, it is the cash value needed to purchase an annuity with the same features as the original entitlement. Whether there is an underlying pension fund does not influence this

value. Indeed, in the UK DB pensions have a 'cash equivalent transfer value' which individuals can use to convert their entitlement into a fixed pot.[8]

Social security. We note that there is a clear distinction between DB schemes (funded and unfunded) and Social Security payments (the 'state pension' in the UK). Individuals have no contractual right to a future flow of social security payments, or any other form of government transfer. Social security payments are just one form of government transfer that an individual may receive, and they are continually subject to change. This is not true for DB pension entitlements provided to public sector employees. It is for this reason that social security payments were excluded from the tax base advocated by the UK Wealth Tax Commission (Advani et al., 2020). In contrast to Saez and Zucman (2016), we argue that this conceptual distinction provides a clear rationale for including unfunded DB schemes provided by government while excluding social security payments from our measure of personal wealth.

National accounts. In the UK, as elsewhere, the National Accounts includes both DC and funded DB pensions. The inclusion of *unfunded* DB pensions in the core National Accounts varies across countries. Whereas the overarching international framework (SNA 2008) recommends their inclusion in the core accounts, they are explicitly excluded in the framework used by European countries (ESA 2010).[9] In practice, countries have flexibility over whether to include unfunded DB schemes. The framework is designed to accommodate the diversity of pension schemes that exist across countries, but this flexibility complicates international comparisons based on the core National Accounts. All countries are, however, advised to include them in supplementary tables, to facilitate analysis and aid cross-country comparisons. In the UK unfunded DB schemes are excluded from the core accounts, but are available in supplementary tables.

Unfunded DB pensions are quantitatively important: adding them to the pension wealth recorded in the core National Accounts increases aggregate pension wealth by 21% in 2016–18. Ignoring unfunded DB pensions not only misses a significant share of aggregate wealth, it also distorts its distribution by under-valuing the pension wealth of public sector workers relative to their private sector counterparts. In Appendix F.2, we show that including unfunded DB pensions decreases the top 1% share of total wealth by 1pp (around 5%–6%) in recent years, relative to using only the core National Accounts.

4.1.2. Measurement choices

Conditional on wanting to include DB pensions, both funded and unfunded, there is then a practical question of how to obtain a value.

National accounts. In the National Accounts, DB pensions are valued from the perspective of the provider and are based on actuarial assessments of pension providers' liabilities.[10] They ask the question: "how much would the fund need to be worth today to fund the future income stream we have promised, given the long-term return on our current asset portfolio"? Annuities – guaranteed income streams purchased by those who have already reached retirement, usually out of DC pension savings – are valued in a similar fashion. These liabilities are calculated as the present value of future payments to current scheme members and involve a number of modelling assumptions, including on the rate of return and life expectancy.

The discount rate adopted varies across different types of scheme. In particular, for private sector DB pensions, the NA aggregate assumes a nominal discount rate based on yields on 15-year fixed interest gilts, which was 1.6% in 2018 (Office for National Statistics, 2021b). For public sector DB pensions, a nominal discount rate of 4% is applied. This discrepancy is not based on any conceptual justification. Rather, the rate for public sector pensions is stipulated by Eurostat, while the discount rate used for private sector pensions is chosen by each country's statistical authority. Even if statistical authorities deem an alternative discount rate to be more appropriate, they do not have the flexibility to treat all types of pension scheme in the same way. As a result, estimates of the share of wealth held across different types of pension scheme becomes distorted. From the perspective of valuing individual wealth, it makes little sense to apply different discount rates depending on the sector in which the individual works. Doing so would imply different levels of wealth for individuals who are guaranteed the same income stream in retirement. The quantitative effects of choosing an alternative discount rate is non-trivial: a 1 percentage point reduction in the discount rate increases the value of public sector funded DB pensions by around 20% (Office for National Statistics, 2021b).

This difference in discount rate depending on whether the pension provider is general government or the private sector is not specific to the UK: other countries, such as Sweden and Portugal, also apply different discount rates in their core national accounts across private and general government pension schemes.[11] Both Portugal and Belgium additionally allow the discount rate to vary across individual private sector providers, meaning the value of an individual's pension entitlements can vary depending on who their provider is. This variation exists because it is the actuaries of individual pension providers who value pension entitlements,

[8] See section 94 of the Pension Schemes Act 1993.

[9] As a general principle, the SNA 2008 guidelines exclude pension schemes and other forms of government transfer that operate on a pay-as-you-go basis, where there is no saving involved. Unfunded DB schemes are often excluded on the same basis, and are more likely to be excluded the "closer a government employer pension scheme is to the prevailing social security scheme" (SNA 2008, para 17.194). For further information, see paragraphs SNA 2008, paras 17.191–17.195 and ESA 2010, paras 17.127–17.128.

[10] The value of DB pensions and annuities is the value of scheme members' entitlements, regardless of whether the pension scheme is fully funded i.e. it is not equal to the value of assets held by pension providers. This means that for funded DB schemes, the National Accounts include value that will need to come from future contributions for under-funded schemes, as well as excluding some assets that exceed fund liabilities for schemes that are over-funded. It is difficult to understand the rationale for this treatment of private sector schemes alongside the exclusion from the main accounts of the liabilities of public sector schemes.

[11] For further details on the approach in other countries, see https://ec.europa.eu/eurostat/web/pensions/information-member-states.

choosing whichever discount rate they see fit. The variation therefore bears no relation to the reliability of the counterparty to the future income stream, variation which could – in the absence of state guarantees – justify some pension promises being valued more highly than others even when the nominal promised income stream is the same.

WAS. In the WAS, DB pensions and annuities are valued from the perspective of the individual: "how much in pension savings would the individual need in order to purchase the income stream they are guaranteed, if they were to purchase it today at current annuity prices?" The discount rate used to estimate the value of DB pensions in the WAS is similar to that used for public sector (funded) DB pensions, though as we note above this differs from the treatment of private sector pensions in the National Accounts.

In terms of explaining the discrepancy between the WAS and the National Accounts, including unfunded DB pensions – which are not distinguished from other pension schemes in the WAS – reduces the gap by 40% (see Appendix E.1 for details). The remainder of the gap could feasibly be explained by the choice of annuity and discount rates (see Appendix A.2).

4.2. Aggregate net housing

Two aspects of how property wealth is measured in the National Accounts make it difficult to obtain our target measure of net housing wealth — defined as all (UK and overseas) residential property held by UK households, net of mortgages. First, the National Accounts estimates of dwellings include foreign-owned property, and exclude the value of overseas property held by UK residents. Second, the value of land is reported separately from the value of residential property ('dwellings'), and is combined with the value of land underlying non-residential structures. Moreover, there is some uncertainty over the accuracy of these aggregate estimates.

4.2.1. Conceptual differences

Target concept. The target measure is the value of all housing wealth, net of any associated mortgage debts, owned by UK adults.

National accounts. The National Accounts concept of dwellings includes all dwellings situated within a country's national borders, regardless of ownership.[12] A balancing adjustment is then added to 'equities issued by the rest of the world', such that the National Balance Sheet only records, in aggregate, assets held by UK households rather than UK-sited assets owned by foreign individuals or institutions. 'Other equities' includes a liability representing UK property that is owned by foreign investors; and an asset representing overseas property held by UK residents. It is not possible to separately identify these items, hence we cannot construct a measure of property wealth in line with our target. This is a problem not just for our current exercise, but for anyone trying to construct DINA series using NA aggregates for property.[13]

4.2.2. Measurement choices

National accounts. From the perspective of measuring the market value of an individual's assets we care only about the combined value of land and property. Constructing this target measure from NA aggregates requires us to attribute land to dwellings and other structures, based on assumptions regarding the ratio of land values to the fixed assets that sit upon them. We split the value of land into land underlying dwellings and land underlying other buildings and structures using land-to-asset ratios derived from breakdowns of the value of land held in the economy as a whole (not just by private individuals). Further details can be found in Appendix D. There, we show that estimates of the value of UK residential property are reasonably robust to how one attributes land, though this may not be true in all contexts. In relative terms the choice makes a significant difference to the value of business assets, to which the value of non-residential property is assigned when one follows the classification set out in the DINA guidelines (Alvaredo et al., 2020).

Estimates of the combined value of dwellings and underlying land – which are constructed by the ONS in order to obtain the value of land via the residual method but are not reported in the core accounts – are often deemed to be superior in their accuracy owing to the fact that they are derived from objective measures of property values. However, a deeper investigation of the methodology casts doubt over the accuracy of these estimates in the UK. The approach draws on objective estimates of property values calculated for Council Tax purposes, which have not been updated since 1991. A 'quantity × price' method is used, which consists of three steps.[14] First, multiply the mid-point of each tax band (the 1991 price) in each region by the number of properties in the tax band.[15] Second, estimate the 'quantity × price' of houses in the highest and lowest bands (which have no mid-point) using a conversion factor. Third, uprate to current house prices using a flow-weighted, region-specific house price index.

This approach has three main deficiencies. First, it applies the same scaling to all properties in a given region and tax band, ignoring differences in property characteristics which may influence house price growth. Second, the approach to estimating the value of properties in the top tax band is unlikely to accurately capture the most valuable properties, which given the skewed distribution of property values could have a significant effect on the aggregate. Third, by using a flow-weighted house price index it will tend to over-state property wealth estimates, as more expensive properties are found to transact more frequently.[16] The ONS are in the process of developing a new methodology which addresses some of these deficiencies (Office for National Statistics, 2022a). However, for the time being, we believe these estimates should be treated with a degree of caution.

[12] See ESA 2010, para 18.15 and para 7.76; also Office for National Statistics (2017).

[13] The lack of separation of between households and Non-Profit Institutions Serving Households (NPISH) under the ESA guidelines will also lead housing wealth in the National Accounts to overestimate aggregate individual housing wealth in most countries (EG-LMM, 2020; European Central Bank, 2024).

[14] For further details on the methodology, see Office for National Statistics (2022a).

[15] There are currently 8 Council Tax Bands in England and Scotland; 9 in Wales.

[16] This means that flow-weighted estimates tend to over-state house price growth relative to stock-weighted estimates. For further information see Office for National Statistics (2018).

WAS. The measurement of property wealth in the WAS also suffers from limitations. In particular, property values are based on the subjective beliefs of the home-owner. Subjective valuations are often found to differ from the true market value of the property, with individuals tending to be over-optimistic about the value of their home (Naidin et al., 2024; Hillyard et al., 2014; Henriques, 2013; DiPasquale and Somerville, 1995). Under-estimation of property wealth at the top is also a common cause for concern. Notwithstanding these issues, the WAS estimate is much better aligned conceptually with what it is we are trying to measure. It captures, directly, the property wealth held by UK residents both domestically and overseas.

In aggregate, gross UK housing wealth in the WAS is £1 trillion (21%) higher than in the National Accounts in 2016–18, after deducting the value of overseas property to make the comparison more consistent with the National Accounts. This WAS estimate excludes foreign-owned UK property, which it is not possible to exclude from the National Accounts. That survey-based measures of housing wealth exceed the National Accounts is not a phenomenon specific to the UK: Batty et al. (2019) find that housing wealth in the US was 29% higher in the Survey of Consumer Finances than in the National Accounts in 2016.

Verification exercise. To get a sense for which aggregate seems most reasonable, we derive our own method for valuing the stock of properties in England and Wales using administrative data on transactions. This method can be summarised as follows. First, we extract the sale price of all residential transactions in England and Wales since 1995 using the 'Price Paid' dataset held by HM Land Registry (HM Land Registry, 2022a). Second, we identify unique properties based on the address string, so that for properties that transacted more than once we include only the transaction closest to April 2018 — our reference month for house prices.[17] Each sale price is uprated to April 2018 using the property type and local-area-specific House Price Index (HM Land Registry, 2022b). For each property type in each local area, we assign weights based on the total stock of such properties, taking the latter from Council Tax Statistics (Valuation Office Agency, 2018). Finally, we aggregate the 2018 prices for each property multiplied by their respective weights to estimate the aggregate gross value of all residential property situated in England and Wales. Further details on our methodology can be found in Appendix H.

Using the method described above, we estimate that residential property in England and Wales was worth £7.4 trillion in 2018. This is similar to UK property company Zoopla's estimates of roughly £7.2 trillion in 2016 and £8.3 trillion in 2020.[18] Our estimate is £1.3 trillion higher than our WAS aggregate for 2016–18, and £2.3 trillion higher than the NA. The WAS only captures property held directly by UK resident individuals. This excludes both foreign-owned property, corporate-owned property, and social housing, all of which are represented in our transaction-based estimates, suggesting we should expect our transaction-based estimates to be higher than the WAS aggregate. If the combined value of these properties is large, it is possible that our WAS-based estimate is still too high, though it is reassuring that our transaction-based estimate is much higher than our WAS-based measure.

4.3. Aggregate business assets

Although 'business assets' represents a much smaller share of aggregate wealth than pensions and housing – accounting for 2% in the National Accounts and 4% in the WAS – its distribution is highly skewed. It is therefore an important asset class for understanding the distribution of personal wealth, and particularly for concentration measures of wealth inequality.

4.3.1. Conceptual differences

In the DINA literature, "business assets" refers collectively to all non-financial fixed assets belonging to households, other than dwellings (Alvaredo et al., 2020). These assets – which include cultivated biological resources (e.g. crops, livestock), machinery and equipment, computer software, Intellectual Property products, inventories, contracts, leases and licences, as well as non-residential buildings and structures and their underlying land – provide a measure of the business wealth held by households.

Conceptually, this aligns poorly with our target definition: what a business is worth if it were sold in its entirety at current market value. The summed value of these assets will often underestimate the amount for which a business could be sold, sometimes very substantially. Intangible assets such as good-will, which are not measured, will also be important factors in determining business value.

By contrast, business wealth in the WAS is much more conceptually aligned with our target. Individuals who are self-employed are asked "If you sold your business today, including any debts or liabilities, about how much would you get? Please include the value of financial assets, accounts receivable, inventories, land, property, machinery, equipment, customer lists and intangible assets". Though this business value is recorded net of debts, respondents are asked to separately report the value of any outstanding debts. We add these back to obtain the gross value of sole proprietorships, to be more consistent with the National Accounts.

[17] Specifically, we use the transaction closest to 5th April, which corresponds to the last day of the 2017–18 tax year.

[18] For comparability we deduct the value of property in Scotland from their aggregate estimate to get an estimate for England and Wales alone, since the Land Registry data does not cover Scotland.

4.3.2. Measurement choices

Private businesses are notoriously difficult to value, and the uncertainty around subjective valuations should be kept in mind when interpreting results based on these. Early rounds of the survey, particularly 2006–08 and 2008–10, appear to suffer from under-coverage of the number of sole proprietorships, likely resulting in some under-coverage in the aggregate. However, subsequent improvements to the structure of the survey have improved coverage in later rounds.[19]

Notwithstanding the uncertainty accompanying business wealth measurement in the WAS, it is not clear that the estimates of fixed assets reported in the National Accounts get us closer to what we are trying to measure.

Quantitatively, aggregate business assets are valued at 18% higher (£0.04tn) in the WAS than in the National Accounts in 2016–18, though both the sign and magnitude of the gap varies over time.

4.4. Aggregate equities and mutual fund shares

In principle the National Accounts target the (market) value of household shares in incorporated businesses and partnerships, the same conceptual definition of equity wealth as in WAS. However, measurement choices made in practice deviate considerably from this ideal.

4.4.1. Measurement choices

'Equities' in the National Accounts can be decomposed into listed and unlisted UK shares, other equity, equity issued by the rest of the world, and UK and overseas mutual fund shares.[20] However, while listed shares can be readily valued, valuing unlisted shares can be much more difficult. The ONS first estimate total issuance of unlisted shares using data from the ONS Financial Assets and Liabilities Survey (Office for National Statistics, 2019). They then attribute a portion of holdings in these shares to the household sector, though there is a much higher degree of uncertainty over this attribution than for listed shares.

The issuance value of shares is not suitable for measuring individual wealth as it does not align with the target concept. Issue value is effectively the acquisition cost of the asset, not its current market value, which is often significantly higher (though is occasionally lower). When a company is first incorporated, shares are issued at a 'nominal' value, for example 1p or £1 per share. The total nominal value these shares reflects the total amount initially invested in the company. However, over time, the market value of these initially issued shares will depart from their nominal value, as the amount that a buyer would be willing to pay to acquire the existing shares changes. New shares may subsequently be issued at the prevailing market value of the existing shares: the amount by which their price on issuance exceeds the nominal share value is known as the share 'premium'. However, again, subsequent changes in the amount that buyers would be willing to pay for shares will mean that the issue value of these new shares (including any premium) will differ from their current market value.

This differs from the approach taken in the Financial Accounts of countries including the United States, France and Spain, where estimates of the current market value of corporate equity are constructed (Ogden et al., 2016; Banque de France, 2018; Banco de España, 2017). This discrepancy in the approach taken to valuing equity across countries illustrates why international comparisons of wealth and its distribution based on NA aggregates can be problematic.

Our WAS-based measure of equities reflects the current market value of the shares, companies, and partnerships owned by the individual, in line with the target concept. UK equities (excluding foreign equities and mutual fund shares) are £1tn (297%) higher in the WAS than the National Accounts. This is perhaps unsurprising; the current market value of shares is typically much higher than the issue value, assuming that the company is successful and so increases in value over time. As well as including the self-reported value of arms-length shares (including shares held in ISAs), our WAS-based measure includes the estimated sale value of companies of which the respondent is a director, and partnerships in which they are a partner. The question of how much these businesses are worth is framed in the same way as the question on the value of sole proprietorships (Section 4.3).

Aggregate foreign equity aligns closely across the two sources, which is unsurprising given that the National Accounts derives its aggregate estimate for this asset class from the WAS. Meanwhile, the aggregate value of mutual fund shares is twice as large in the National Accounts as in the survey data.

4.5. Aggregate deposits

Valuing deposits held in financial institutions or in national savings instruments is conceptually straightforward. The National Accounts estimate is based on objective information supplied by financial institutions.

[19] Comparisons for 2016–18 suggest that the WAS captures 96% of the sole proprietorships recorded in the Business Population Estimates (Department for Business, Energy & Industrial Strategy, 2017).

[20] As discussed in Section 4.2, there is also a balancing adjustment for foreign-owned UK property as well as overseas property held by UK residents.

4.5.1. Measurement choices

Deposits are the only quantitatively important asset class for which the NA aggregate is noticeably higher than the WAS – £0.6tn (61%) higher in 2016–18. Lower coverage for deposits in surveys is common across many countries (European Central Bank, 2024). One possible explanation is that deposits recorded under the household sector of the National Accounts includes the value of deposits owned through sole proprietorships. In contrast, business owners in the survey are asked to record deposits as part of the value of the business in the WAS. However, it is possible that some individuals whose business income is paid directly into their personal account record this under personal savings instead. Where individuals do report business deposits as part of their business wealth, this cannot be separated from the other business assets discussed in Section 4.3, meaning these deposits will be missing from the survey aggregate for deposits we estimate here. This could also partly explain why the value of business assets is higher in the WAS than in the National Accounts.

Under-reporting may also contribute to the discrepancy, though the extent of this appears to be limited. Comparing the aggregate value of cash ISAs – which account for 26% of deposits in the WAS – with administrative totals from the UK tax authority, supports the under-reporting hypothesis to a degree. Deposits held in cash ISAs in the WAS total £246 billion in 2016–18, compared to the £264 billion reported by the tax authority (HM Revenue and Customs, 2021).

Where survey data align conceptually with our target definition but estimates suffer from survey under-coverage, there is a clear argument for using other data sources to 'correct' for this under-coverage. This could be achieved by using NA aggregates in contexts where these are conceptually consistent with the survey data. In settings where administrative totals provide objective measures of both the aggregate and its distribution, such as with cash ISAs in the UK, a replacement method more similar to recent 'top income adjustment' methodologies may provide more accurate estimates.[21]

5. Top wealth shares

5.1. Impact of aggregates choice

The choice of aggregates is quantitatively important for our estimates of top wealth shares (Fig. 3). The top 1% share is 2.1 percentage points higher in 2016–18 – rising from 14.4% to 16.5% – when we switch from survey to NA aggregates. Over the sample period, back to 2006, the top 1% share has varied between 12% and 18% (2.1–3.3pp) higher when using NA aggregates than when using survey aggregates.

Two factors influence the impact of a switch from survey to NA aggregates. First, the aggregate value of a particular asset class may go up or down. This directly affects the wealth of individuals who are measured as holding those assets, moving them up or down the ranking of total wealth. Second, the relative importance of a particular asset class in aggregate wealth may go up or down as the aggregates for other asset classes also change. This affects the share of total wealth held by those holding that particular asset, by changing the denominator – aggregate wealth – in the top share calculation.

To better understand the underlying mechanisms at play here, let us consider the impact of changing the aggregate value of a single asset class, c, through the lens of our top share decomposition. Using Eq. (3), we can write the share of total wealth held by the top $x\%$ as

$$S_w(x) = S_c(x) \cdot \left[\frac{W^c}{W^c + W^{\neg c}}\right] + S_{\neg c}(x) \cdot \left[\frac{W^{\neg c}}{W^c + W^{\neg c}}\right] \tag{4}$$

where $\neg c$ denotes all asset classes other than c. The effect of an increase in the aggregate value of asset c on the share of total wealth held by the *current* top $x\%$ – i.e. prior to reranking based on the new measure of total wealth – can be found by differentiating Eq. (4). Note that if we scale the amount of asset c held by all individuals proportionally, then $\frac{\partial S_c(x)}{\partial W^c} = 0$. It follows that

$$\frac{\partial S_w(x)}{\partial W^c} = \left(S_c(x) - S_{\neg c}(x)\right) \cdot \left[\frac{W^{\neg c}}{(W^c + W^{\neg c})^2}\right] > 0 \tag{5}$$

$$\iff S_c(x) > S_{\neg c}(x) \tag{6}$$

Eq. (5) tells us that an increase in the aggregate value of c leads to an increase in the share of total wealth held by those already in the top $x\%$ if and only if the share of asset c held by this group exceeds their share of all assets other than c. It is also the case that the effect of a marginal change in the aggregate value of asset c will be smaller the larger the aggregate value of c is to begin with, relative to other assets. This is because the larger the value of the asset, the closer our original distribution of total wealth is to the distribution of asset c, and therefore scaling c proportionally makes little difference. In practice, we are scaling different asset classes by very different amounts, and it is the assets for which we increase/reduce the aggregate value the most that have the biggest impact on our overall top shares. After scaling asset c to its new aggregate, reranking based on the updated measure of total wealth then leads to an increase in the top $x\%$ share. This is a mechanical effect that can only be positive, as reranking replaces individuals who were previously in the top $x\%$ with those who now have higher total wealth than those they replace.

Switching to NA aggregates increases the share of wealth held by those who were already in the top 1%, by 0.5 percentage points in 2016–18 (Fig. 3). When we allow for changes in who is at the top, this increases by a further 1.6 percentage points. In earlier years, the effect of changing aggregates before reranking is often larger, but reranking always adds between 1.6 and 1.8pp.

[21] For a review of the recent literature on top income adjustments, see Jenkins (2022).

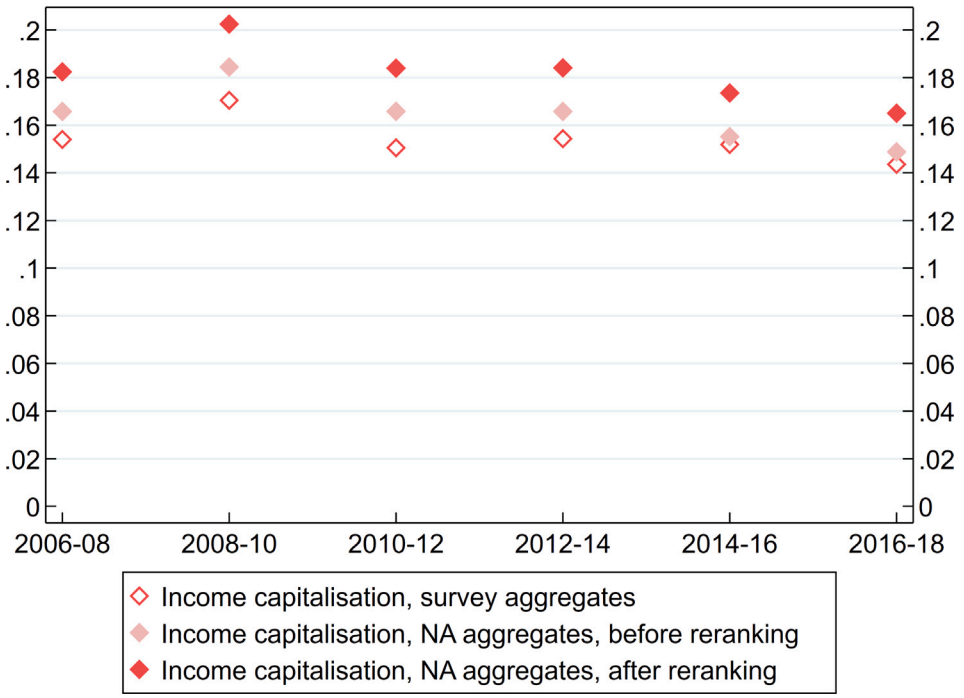

Fig. 3. Top 1% share of total wealth using National Accounts versus survey aggregates.
Notes: 'Income capitalisation, survey aggregates' shows the share of wealth held by the top 1%, where individuals are ranked on total wealth defined using the 'Income capitalisation, survey aggregates' method (see Section 3). 'Income capitalisation, NA aggregates, before reranking' shows the share of wealth when we switch to defining wealth using the 'Income capitalisation, NA aggregates' method, but still rank individuals based on total wealth defined using the 'Income capitalisation, survey aggregates' method. 'Income capitalisation, NA aggregates, after reranking' shows the share of wealth held by the top 1% after reranking individuals based on total wealth defined using the 'Income capitalisation, NA aggregates' method. We define top shares relative to the total number of individuals aged 20 or older in the population living in the UK.
Source: Authors' calculations based on HMRC administrative tax data, the National Accounts, and the Wealth and Assets Survey.

5.2. Impact by asset class

The effect of switching aggregates will depend very much on the distribution of the asset class we are scaling, as described by Eq. (5). The net effect of switching *all* aggregates will depend on the extent to which the effects of scaling individual asset classes offset each other.

To show the role of individual asset classes in explaining the patterns observed in Fig. 3, we document the effect of using survey aggregates for all assets except one: in turn DB pensions + annuities, net housing, and UK equity (Fig. 4). These are the three asset classes for which the aggregate discrepancy between the WAS and the NA is largest (Fig. 1), and which therefore make the biggest difference to the overall top share. For each of these assets, the survey aggregate is higher.

There are two points to note. First, a lower aggregate value for assets that make up a relatively smaller component of wealth for the top 1% – true for both pensions and housing – increases the measured top 1% share (Fig. 4(a) and 4(b)). By switching from survey to the (lower) NA value for each of these asset classes, more weight in the top share calculation is put on other assets, which are more concentrated at the top. By contrast, lowering the aggregate value of UK equity, which is highly concentrated at the top, reduces the top 1% share.

Second, reranking has little effect on the top 1% share of total wealth when scaling assets that are relatively equally distributed to begin with (pensions and housing). By contrast, it is somewhat more important in the context of UK equity, which is highly concentrated, resulting in a small but noticeable upward shift in the top 1% share. The more unequally distributed a particular asset class, the more likely it is that scaling that asset will result in moving people up and down the ranking.

5.3. Decomposing the top shares

The effect of aggregate choice on the top $x\%$ share can be decomposed, following Eq. (3), into the effect of changing the aggregate for each individual asset class on the share of that asset held by the top $x\%$, and the effect of changing all aggregates on the relative weights used in our top share decomposition. This can be seen in Table 3, which shows the decomposition of top shares by the components stemming from the distribution of income-yielding and non-income-yielding wealth.

When we switch all aggregates to their NA values, the relative weight on income-yielding wealth $\left(\frac{W^A}{W}\right)$ increases from 0.21 to 0.28, because the decline in (non-income-yielding) pensions and housing more than offsets the decline in UK equities. The top 1%

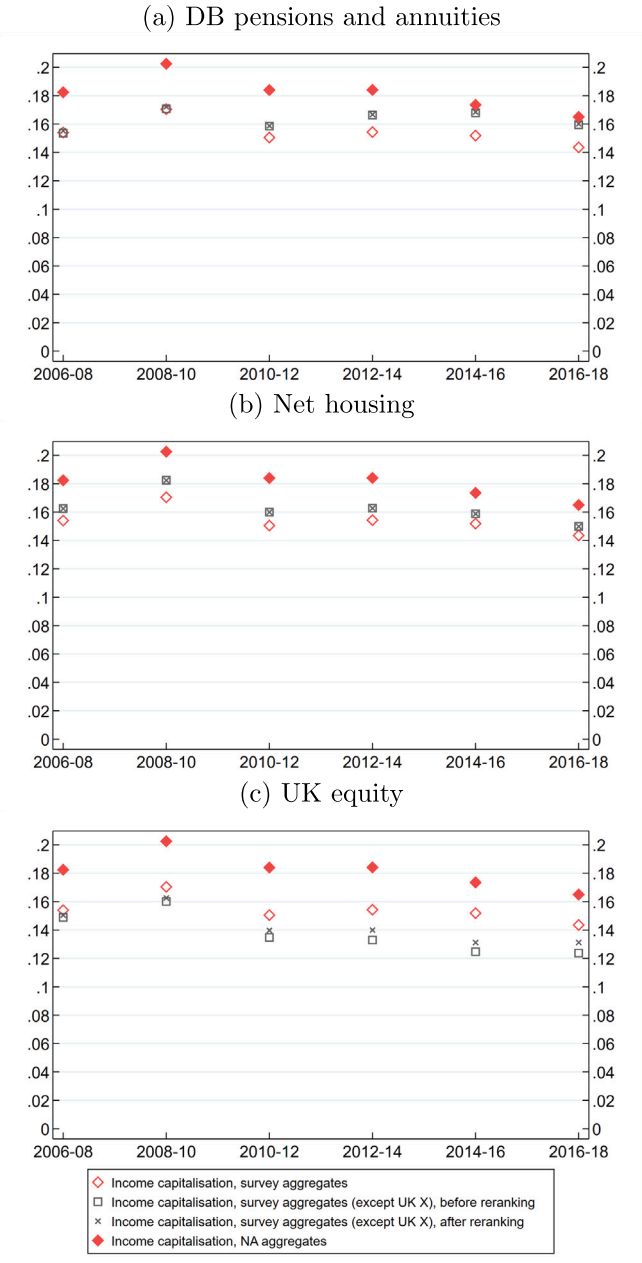

Fig. 4. Share of wealth held by the top 1% after scaling individual asset, with and without reranking.
Notes: 'Income capitalisation, survey aggregates' shows the share of wealth held by the top 1%, with individuals ranked on total wealth defined using the 'Income capitalisation, survey aggregates' method (see Section 3). 'Income capitalisation, survey aggregates (except X)' shows the share of wealth held by the top 1%, with individuals ranked on total wealth defined using the 'Income capitalisation, survey aggregates' method except that asset class X is scaled to the National Accounts, rather than survey, aggregate. This is shown both with and without reranking individuals. 'Income capitalisation, NA aggregates' shows the share of wealth held by the top 1%, with individuals ranked on total wealth defined using the 'Income capitalisation, NA aggregates' method. We define top shares relative to the total number of individuals aged 20 or older in the population living in the UK.
Source: Authors' calculations based on HMRC administrative tax data, the National Accounts, and the Wealth and Assets Survey.

share of both income-yielding and non-income-yielding wealth is unchanged across the two sets of aggregates. Consequently the difference in top share comes entirely from the difference in the relative weight put on income-yielding wealth.

It is not tautological that the top share by (non-)income-yielding wealth should be unchanged. Looking instead at the top 10% to illustrate this point, the share of income-yielding wealth using NA aggregates is 5pp lower than with survey aggregates. Under NA aggregates, UK equities are smaller and deposits and bonds larger; since the latter are more equally distributed, this reduces the

Table 3
Decomposition of the top 1% share (2016–18)

	$S_A(x)$	$\frac{W^A}{W}$	$S_N(x)$	$\frac{W^N}{W}$	$S_w(x)$
$x = 1\%$					
Income capitalisation, NA aggregates	0.37	0.28	0.08	0.72	0.165
Income capitalisation, Survey aggregates	0.37	0.21	0.08	0.79	0.144
Survey distribution, NA aggregates	0.27	0.28	0.11	0.72	0.159
Survey distribution, Survey aggregates	0.39	0.21	0.10	0.79	0.164
$x = 10\%$					
Income capitalisation, NA aggregates	0.68	0.28	0.46	0.72	0.524
Income capitalisation, Survey aggregates	0.73	0.21	0.46	0.79	0.525

Notes: $S_A(x)$ ($S_N(x)$) is the share of income-yielding (non-income-yielding) wealth held by the top $x\%$, ranked on total wealth. $\frac{W^A}{W}$ ($\frac{W^N}{W}$) is the share of income-yielding (non-income-yielding) wealth in aggregate wealth. $S_w(x)$ is the share of total wealth held by the top $x\%$, which can be decomposed as $S_w(x) = S_A(x) \cdot \left[\frac{W^A}{W}\right] + S_N(x) \cdot \left[\frac{W^N}{W}\right]$ as shown in Eq. (3).

top 10% share. Changes in shares and weights for the top 10% turn out to almost exactly offset, giving a top 10% share close to 52.4% under both measures.

5.4. Impact of alternative distributional information

Since the impact of changing aggregates depends crucially on the marginal and joint distributions of individual asset classes, it is perhaps unsurprising that the effect of changing aggregates varies depending on our source of distributional information. Survey data and tax data measure two different things: survey data aim to capture a direct measure of the stock, whereas the tax data measure the flow of income from which we can try to infer the stock. The distribution of assets obtained from survey data differs from the distribution of income flows multiplied by the capitalisation rate.

Table 3 shows that whereas top shares increase when we switch from survey to NA aggregates using the income capitalisation approach, the same change in aggregates yields the opposite effect when we use survey distributions for all asset classes.

This happens because UK equity is much more concentrated at the very top in survey data than it is in the tax data. Ranked on total wealth, the top 1% share of UK equity (measured using survey aggregates) is 61% in the survey data and 37% in the tax data. As a result, the negative effect of scaling down UK equity on the top 1% share of total wealth is larger using the distributions implied by survey data, compared to Fig. 4(c). As Table 3 shows, this larger decline in the share of income-yielding wealth held at the top is enough to offset the positive effect of increasing the weight placed on income-yielding wealth. Overall, the survey distribution-based top share decreases when we switch from survey to NA aggregates.

This relationship between the choice of aggregates and the source of distributional information highlights the need to think carefully about the choice of both components, including the interaction between the two.

5.5. Characteristics of the top 1%

Since reranking is an important contributor to changes in top shares, the choice of aggregate also affects our understanding of *who* is at the top of the wealth distribution. Two in five (40% of) individuals in the top 1% under the survey aggregates are not in the top 1% under the NA aggregates. The new entrants to the top 1% are also different in terms of their characteristics.

Age. We see that the age profile of the top 1% shifts to older age groups when we switch from survey to NA aggregates (Fig. 5(a)). This is perhaps surprising given that we have scaled down pension wealth, which is concentrated among older adults. To understand this shift, recall from Section 5 that it is the scaling of more unequally distributed assets – and UK equity in particular – that results in reranking. Very few individuals moved in or out of the top 1% as a result of scaling pensions. Since among the top 1% equity makes up a larger share of wealth for younger adults than older ones, by scaling this asset class down we move younger individuals out of the top 1%, replacing them with older individuals.

Sex. Switching to NA aggregates reduces the share of males who make up the 1% (Fig. 5(b)). 68% of those who leave the top 1% are male, compared to 46% of joiners. This is again driven by the lower aggregate value of UK equities, which men are more likely to hold.

In these results, as elsewhere in the paper, we have focused on the income capitalisation approach for distributional information.[22] The income capitalisation approach requires imputation of non-income-yielding wealth into the tax data. We note that a fuller treatment of wealth inequality by individual characteristics, if using the capitalisation approach should differentiate by these characteristics in imputation. As our primary objective in this paper is to accurately measure the wealth distribution, we opt for imputing based on cells of income-yielding wealth that are as granular as possible, sacrificing the use of other characteristics that may be informative of an individual's asset holdings. If the relationship between income-yielding and non-income-yielding wealth differs for men and women, or between age groups, this will not be reflected in our wealth imputation. Advani et al. (2021a) provide a deeper analysis of variation in wealth holdings by individual characteristics for the UK.

[22] See Appendix G for results using distributional information from the survey instead.

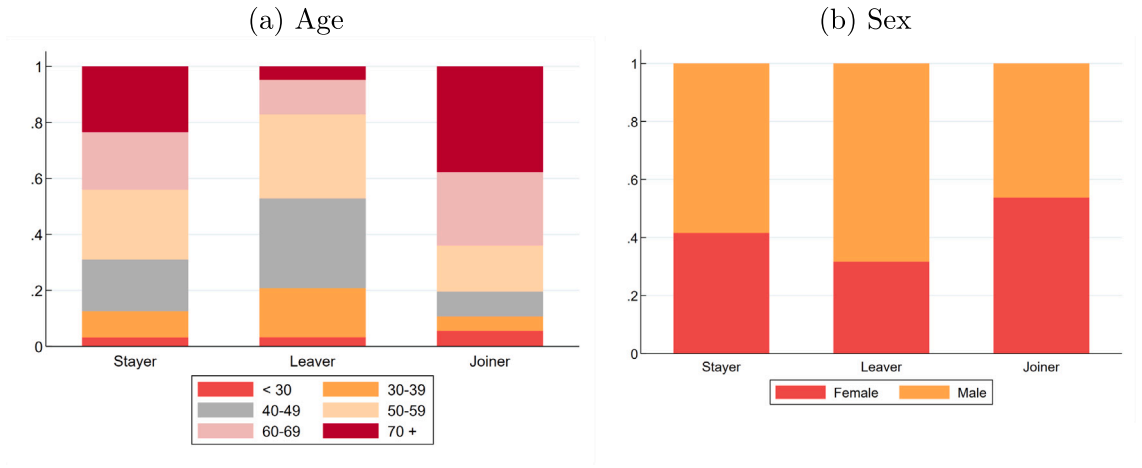

Fig. 5. Characteristics of stayers, leavers and joiners in the top 1% when aggregates are switched, 2016–18.
Notes: 'Joiners' are those who enter the top 1% when we switch from defining wealth using the 'Income capitalisation, survey aggregates' method to the 'Income capitalisation, NA aggregates' method, ranking individuals on total wealth. 'Leavers' are those who leave the top 1% when we switch definition. 'Stayers' are those who remain in the top 1% regardless of which definition we use. We define top shares relative to the total number of individuals aged 20 or older in the population living in the UK.
Source: Authors' calculations based on HMRC administrative tax data, the National Accounts, and the Wealth and Assets Survey.

6. Conclusion

Estimates of wealth inequality are known to be sensitive to the definition of wealth used (Saez and Zucman, 2016; Batty et al., 2019), assumptions about rates of return across the wealth distribution (Saez and Zucman, 2020, 2022; Smith et al., 2023), and the treatment of under-reporting (Alstadsaeter et al., 2019; Johannesen et al., 2020, 2024). In this paper we additionally highlight the importance of estimates of aggregate wealth.

We show that changes in the aggregate value of an asset class affect wealth inequality in two ways. First, they change the relative importance of that asset class in total wealth. An increase in the aggregate for one asset class makes overall wealth inequality more like the inequality of that asset class. Second, to the extent that the rank ordering of individuals varies across asset classes, changes in an aggregate will lead to a reranking of which individuals are at the top.

We find that overall concentration estimates in the UK depend somewhat on the choice of aggregate, with the top 1% share both lower – averaging 15.4% rather than 18.2% over the decade to 2018 – and more stable using survey aggregates relative to a more-usual National Accounts based alternative. We argue that in the UK the survey aggregates are preferable, because their definition of wealth aligns more closely with the target definition of personal wealth, and their measurement is more consistent with the measurement of wealth in the numerator of the top share.

Since the ratio between National Accounts and survey aggregates varies substantially by asset class, the choice of aggregates also has implications for *who* is measured as being at the top of the wealth distribution. Using National Accounts aggregates implies that more older people (aged > 60) and more women (although still a minority) are in the top 1%, relative to survey aggregates, with 40% of individuals in the top 1% being different across the two measures.

The main contribution of our work is methodological, demonstrating that the choice of aggregates affects both top shares and who is where in the wealth distribution. *Ex ante* it is not straightforward to know how these quantities are affected by the choice of aggregates: the direction of change depends on relative changes in different asset classes and how they are distributed across wealthy people. We provide estimates under some alternative assumptions for the numerator of the top share, but a fuller treatment should account for under-reporting, variation in returns to wealth, and the use of trusts, which allow people to benefit without legally owning wealth.

Looking beyond the UK, our findings have implications for the wider study of wealth inequality. Recent work has focused on estimating top wealth, taking as given the choice of aggregates for each wealth category. Our findings highlight that this choice is not innocuous. Though the relative merits of different potential data sources will vary by country, the choice of which to use should be made consciously and with an understanding of the implications for inequality measurement.

We also draw attention to measurement issues relevant to the construction of National Accounts generally. Differences in discount rates across defined benefit pension providers create comparability issues across countries, even after accounting for pension wealth reported in supplementary tables. In the UK, housing wealth continues to be estimated by region-tax band specific uprating of 1991 values; an approach which gives values below all external benchmarks. The UK choice to value unlisted shares based on value at issuance – in contrast with the United States, France and Spain, where estimates of the current market value of corporate equity are constructed – means equity wealth in the National Accounts is underestimated. For researchers we emphasise the need to understand how National Accounts data are constructed in practice, rather than taking them at face value or relying on the high-level guidelines on which they are based.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: The authors declare that they have no known competing interests.

Acknowledgments

This research was supported by the Nuffield Foundation 'Broad Shoulders' grant (WEL/FR-000023787) and the ERC Synergy Grant 'Towards a System of Distributional National Accounts' (DINA).

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.euroecorev.2025.105076.

Data availability

The authors do not have permission to share data.

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