Capital Gains and UK Inequality

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Abstract

Aggregate taxable capital gains in UK have tripled in past decade. Using confidential administrative data on the universe of UK taxpayers, we show that including gains changes the picture of UK inequality over the past two decades. These taxable gains are largely repackaged income, so their exclusion biases the picture of inequality. Including them changes who is at the top of the distribution, adding more business owners and older people. The share of income plus gains (both pre- and post-tax) going to the top 1% is 3pp higher than for income only, and this gap has been steadily rising.

1 Introduction

Over the past two decades inequality has attracted increasing attention, with development of international data (Alvaredo et al., 2018a,b), even longer run series (Piketty and Saez, 2003; Moriguchi and Saez, 2008; Bartels, 2017; Garbinti et al., 2018), and the development of Distributional National Accounts (Alvaredo et al., 2016; Piketty et al., 2018). A recent strand of literature has studied measurement of income sources for those at the top (Piketty et al., 2018; Smith et al., 2019). Smith et al. (2019) highlight the role that income-shifting plays in changing the characteristics we associate with those at the top: in particular, top earners largely receive income from human, not financial, capital. This income-shifting is in large part driven by tax incentives to adjust the timing of income receipts (le Maire and Schjerning, 2013; Miller et al., 2019). However, such incentives not only encourage shifting between income forms, but from income into capital gains. The difference in tax rates makes these incentives much larger, and the fungibility between income and gains is precisely why the optimal tax literature regularly calls for common marginal rates between income and gains (Slemrod, 1995; Slemrod and Kopczuk, 2002; Mirrlees et al., 2010; Blundell, 2012, 2016). Since capital gains are not part of fiscal income, they are excluded from standard income inequality measures. Including them can therefore not only change the pattern of receipts among those at the top, but also which individuals are at the top, and what share of total remuneration they receive.

This paper studies the implications of including capital gains for measured inequality in the UK. We combine confidential administrative data on the universe of UK taxpayers over more than two decades to understand where gains come from, who receives them, and the implications for inequality. We show three main results. First, capital gains are largely shifted income: they largely reflect returns to human capital, rather than simply exogenous changes in the value of assets held. This highlights the limitations of focusing on a narrow fiscal income definition when studying inequality, since the line between income and gains is often blurred. Second, particularly at the narrowest top shares, including gains substantially changes *who* is at the top. One in ten individuals in the top 1% when gains are included are not in the top 1% based on fiscal income alone. 'Joiners' to the top 1% are more likely to be business owners, to be older, and to be female than 'stayers' who are at the top on either definition. Third, including gains substantially increases the share of total resources going to those at the top, as well as the observed trend in top shares. Including gains increases the pre-tax share of resources to the top 0.01% by 60% in 2017; their post-tax share almost doubles. Strikingly, including gains also changes the narrative for UK inequality over the past two decades:

while top fiscal income shares have remained largely constant since the late 1990s, once gains are included there has been a large and sustained rise.

Capital gains are taxed at a lower rate than ordinary income. The top tax rate on labour income in the UK is 47%, for dividends it is 38.1%, while on capital gains it is between 10% and 28% depending on the type of underlying asset. In the US the top federal tax rate is 40.8% for income from labour or ordinary dividends, while on capital gains it peaks at 23.8%, and similar patterns hold elsewhere. The patterns we highlight are therefore likely to be of much broader relevance than to the UK alone. They matter for the time series of top income shares, as incentives to shift remuneration into gains vary with policy; for cross-country comparisons as these incentives vary across locations; and for the type of individuals we see in top shares.

To establish where gains come from, we make use of capital gains tax filings. These document not only the amount of gains received by individuals, but the asset classes from which they derive. Around 71% of gains come from unlisted shares and 'other assets'—a category comprising mainly business assets eligible for 'entrepreneurs' relief', which lowers the tax rate to 10%, compared with a 20% standard rate. Such gains are substitutes for returns that could have been taken as capital income, and may in many cases actually be repackaged labour income (Miller et al., 2019). A further 5% of gains are from 'carried interest': payments for fund managers which depend on their investment performance (human capital) rather than equity stake. As in the US, the UK treats these as a return on investment. Three-quarters of all gains therefore come from returns that could just as well have been received as income. Most of this will being missing from national income, as well as from fiscal income, so will not show up in any measure of top share inequality based on income only (Alvaredo et al., 2016; Piketty et al., 2018).[1]

To understand who receives these gains, we link capital gains and income tax records. We first construct a measure of fiscal income using the deidentified administrative income tax data, to match the commonly used 'Survey of Personal Incomes' (Atkinson, 2002, 2007; Jenkins, 2017; Joyce et al., 2019). Combining it with capital gains tax records, we see that gains are extremely concentrated at the top of the existing income distribution.[2] Around 50% of all gains by value go to the top 1% of individuals ranked by income, compared to just 13% of all fiscal income. At the indivdual level, nine out of ten people who are in the top 1% when ranking by income are also at the top when gains are included. However, the one in ten 'joiners' to the top 1% by total remuneration (income plus gains)

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[1]While national accounts will pick up the part of gains that come from disposal of businesses that previously had retained earnings, they will not pick up intangibles like goodwill.

[2]It is also important to note that, conditional on having gains, the average amount of gains is similar across most of the income distribution. Although this has little aggregate effect, exclusion of gains is therefore important for understanding inequality further down the income distribution as well. Tables A1 and A2 provide the full distribution.

look very different in terms of their characteristics. In line with our first result, and with Smith et al. (2019), owners of businesses are much more likely to be at the top. Those at the top are also substantially older, and more likely to be female. This change in ranking matters because, while recent developments in inequality measurement are able to distribute all parts of national accounts, they do this in proportion to components of fiscal income (Piketty et al., 2018). By construction they miss any components of inequality that change when gains are added to that series. If gains were proportional to some income component, most likely dividends, then that might serve as a proxy and receive higher weight when scaling up to the national accounts (even assuming all real gains are captured in national accounts components). However, we see a prevalence among joiners of individuals with majority pension income, as well as of investors, who would not receive such scaling.

While the share of gains going to the top 1% has remained relatively constant over the past twenty years, aggregate gains have risen sharply, tripling in the last decade. The share of total remuneration going to the top has risen in parallel, from 14.1% in 2009 to 16.8% in 2018. By contrast the share of income going to the top has been rising much more slowly: from 12.7% to 13.8% over the same period. Using data on asset holding lengths, we show this pattern holds when gains are considered on an accruals – rather than realisation – basis, while stripping out some of the excess volatility caused by policy changes. Including gains not only changes the nature of inequality trends, but also the apparent effectiveness of policy. Since gains are taxed at lower rates than income, the impact of including gains on post-tax inequality is even larger; the lack of redistribution of gains highlights again why they are a preferred form of remuneration for those that can repackage their income.

Top share series including gains have been considered before (Piketty and Saez, 2003; Moriguchi and Saez, 2008; Alvaredo and Saez, 2009; Roine and Waldenström, 2012; Alvaredo et al., 2013; Bartels, 2017). Authors have largely rejected these series in favour of an income only series, either because adding gains makes little difference (Bartels, 2017) or because adding gains makes a big difference to the volatility of the series (Piketty and Saez, 2003; Moriguchi and Saez, 2008; Alvaredo et al., 2013). We show that excluding gains is problematic even when interest is primarily in *income* inequality, because gains can contain a substantial share of shifted income. International differences in the taxation of gains relative to income – as well as differences over time – will influence how large an issue this is in a particular context, but exclusion of gains may bias down top income shares where shifting into gains is occuring.[3] While the volatility of realised gains series is understandably seen

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[3]These differences also help explain why in some contexts authors found inclusion of gains to add little, while in others they are substantial.

as unappealing, recent work studying estimating these on an accruals basis is likely to be preferred to complete exclusion. Our top share series including accrued gains is no more volatile than the top income series, but does pick out a different trend and level for top share inequality.

Including gains is also essential for understanding the characteristics of those at the top of the distribution. Much of this debate has been about sources of income for those at the top (Piketty and Saez, 2003; Piketty et al., 2018; Smith et al., 2019; Joyce et al., 2019). Including gains changes the ranking of individuals, so changes who is at the top. This is not merely a matter of reshuffling individuals with otherwise similar characteristics: the individuals joining the top are much older, and are more likely to have the majority of their income from investment or pensions. Recent work has highlighted how tax incentives change the apparent characteristics of those at the top, so that for the same individuals more income appears to come from capital though economically it is repackaged labour income (Smith et al., 2019). Our results show that these same types of incentives have effects at the income to capital gains margin. Accounting for remuneration that has been completely shifted out of income changes both how we interpret the economic activity of those at the top, and also their individual characteristics. It also highlights the point made by Piketty and Saez (2006) that '[w]hen using tax data to study top incomes, it is necessary to analyze the tax structure at the same time in order to tell real changes in income concentration from changes due to tax avoidance', using legal means to repackage reported incomes in order to reduce tax liability.

Specifically in the context of understanding UK top share inequality, we provide the first numbers that take into account capital gains, and show that including these changes our understanding of the past twenty years of top share inequality. Public data have previously only been available for income, and on this basis top share inequality has been widely regarded as stable over the past two decades (see Joyce and Xu, 2019, for a summary).[4] We show that over the decade since the financial crisis, the top 1% actually increased their share of total remuneration by almost 20% from a base of 14.1%, whether on a realisation (2.7pp) or accruals (2.5pp) basis. The UK tax system is also believed to be good at redistribution in terms of direct taxes (Bourquin and Waters, 2019). However, we find that the state does very little redistribution of remuneration from gains, so that post-tax inequality is actually higher than we previously thought pre-tax inequality was.

The remainder of the paper is organised as follows. Section 2 outlines the policy context and data sources. Section 3 explains the assets from which our observed capital gains are derived. Section 4

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[4]This conclusion has also been used politically. Citing the latest top income share figures George Osborne, the (then) UK Chancellor of the Exchquer, said in 2015 'Those with the broadest shoulders are bearing the greatest burden...in the last fortnight we've seen independent statistics showing that since 2010 child poverty is down and so is inequality'.

shows how including gains changes the characteristics of those at the top. Section 5 describes the level and trend of inequality once gains are included. Section 6 concludes.

2 Context and Data

2.1 UK institutional environment

A 'capital gain' is an increase in the value of an asset. For as long as an individual still owns the asset, this increase is an 'accrued' gain: it is the gain that could be taken if the asset were to be sold (or otherwise 'disposed of') now. When the asset is sold, the gain is 'realised': the individual now knows for sure the change in value of the asset between acquisition and disposal.

Capital gains are heavily favoured as a form to take remuneration. The top tax rate on labour income in the UK is 47%, including income tax and employee National Insurance Contributions; for dividends it is 38.1%; while on capital gains it can be 10%, 20% or 28%. For gains the rate depends largely on the type of underlying asset rather than the amount: the exception being that the 10% rate is for business assets which qualify for Entrepreneurs' Relief – business assets of owner-managers – and these benefit from the lower rate up to a maximum lifetime value of £10 million. The 28% rate applies to gains from residential property and from carried interest; the remainder is taxed at a 20% rate.[5]

These rates provide a clear motivation for the shifting of remuneration from income into gains. While less empirical evidence is available on this margin than on shifting between income tax bases, there is clear evidence of repackaging labour income as capital income (Smith et al., 2019). Once income is being taken via a corporate structure, in the form of dividends, it can just as well be retained within the company, either to shift income over time (Browne and Phillips, 2017; Miller et al., 2019) or to eventually liquidate the business and receive the value as gains. It also favours low-yield, high growth investments that provide returns in the form of gains, rather than investments that provide a more steady stream of capital income.

Gains are also quantitatively very important. In 2018 aggregate taxable gains were worth £55 billion, similar in magnitude to aggregate dividends paid to individuals (£58 billion). Gains have been growing consistently over the past decade (Figure 1). Although realised gains were actually higher in 2008, accrued gains have never been higher than now. That earlier spike in realisations was partly driven by policy: it was announced during that tax year that in subsequent years indexataion

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[5]In both cases, the rate is 10pp lower for individuals who pay only the basic rate of income tax, on gains that fall between their taxable income and the maximum income within the basic rate band: £45,000 in 2018.

allowance and taper relief – both policies which reduced the tax rate from gains on assets that had been held for a long time – would be scrapped at the end of that tax year (Adam, 2008; Gammie, 2008).[6] The lower level in the subsequent years is clearly a function both of the Financial Crisis and of individuals having brought forward disposals to 2008 to benefit from the lower tax rate before it ended.[7]

2.2   Measuring income inequality

Income inequality is most usually measured using *fiscal income* i.e. income assessable for income tax. We will not here attempt to do justice to the vast literature on whether (or under what conditions) welfare is better measured using income or using consumption/expenditure. We only note that for top-share inequality purposes a clear advantage of income data is the better coverage at the top of the distribution, as well as potential availability going back many years based on tax records.

One risk is that our concept of interest becomes too narrowly shaped by what we happen to be able to measure most easily. Fiscal income excludes, by definition, capital gains, since these are not taxable income. In the context of inequality, this has three major drawbacks. First, to the extent that income and gains are fungible, we may mismeasure income inequality. Since business incomes are concentrated at the top of the income distribution, and incentives to switch (the income-gains tax wedge) are larger at higher incomes, excluding gains is likely to underestimate inequality.

Second, excluding gains makes it harder to study the impact of policy on inequality. For example an increase in capital gains tax might reduce income repackaging, increasing incomes at the top, and making inequality appear to rise (Piketty and Saez, 2003). This will also show up in cross country comparisons, where countries with a larger income-gains tax wedge may appear to have a relatively lower top income share.

Third, if what we are ultimately trying to measure is command of resources (Haig, 1921; Simons, 1938), for a household a dollar from income is the same as a dollar from gains. In many contexts we want to treat these differently – for example when measuring productivity we really want to know what is value-added rather than exogenous shifts in asset prices – but for inequality it is harder to understand why such a distinction should be relevant. It also means that we capture capital returns for an individual who chose to buy high-yield lower-growth shares, so receives most of the return as dividends, but not for someone holding low-yield high-growth shares, whose return will come largely in gains. Completely excluding the financial returns from one but not the other seems perverse.

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[6]See Appendix B.1 for policy details, and how we correct the series to construct figures on a consistent basis.
[7]See Auten and Clotfelter (1982) for more on the timing effects of capital gains taxes.

It is important to note that despite its other advantages, the Distributional National Accounts (DINA) method does not solve these drawbacks (Piketty et al., 2018). The DINA approach begins with measures of fiscal income by income source across the distribution, and then assigns all components of national income to individuals. It thereby produces a measure of inequality that also aggregates up to the national accounts. Since it begins with the fiscal income data, it by construction misses any components of inequality that occur when capital gains are added to that series. And since capital gains are not part of the national accounts, these won't be attributed to any indvidual: this is deliberate for what DINA sets out to acheive – an inequality distribution that aggregates to the national accounts – but means it misses other receipts that households receive.[8]

2.3 Data Sources

Our data are from Her Majesty's Revenue and Customs (HMRC), the UK tax authority. We observe (reported) fiscal income and taxable capital gains for each individual in the population, over the period 1997 to 2018.[9]

Income data come from two sources, which together comprise the universe of UK income tax payers. First, we use UK income tax *filing* data. Around 11 million taxpayers (one-third of all income tax payers) are required to file taxes: this includes all individuals with incomes above £100,000 (£40,000 before 2005), as well as individuals with incomes from sources where withholding is not complete e.g. self-employment, partnership, and property income. The former condition means that in principle filing data contain all individuals who are in the top 1% of the UK adult population. However, individuals with large employment-only income typically still have their tax correctly withheld, so until 2010 – since when filing compliance has been better enforced – there were some individuals who did not file. We therefore supplement these data with records from the 'PAYE' (withholding) scheme, merging in to the filing data and keeping the cases which were not already observed.

Information on capital gains also comes from the income tax filing data, since realised, taxable gains are filed on the same form. These data include a breakdown of total gains into five main asset classes: shares in public (listed) companies; shares in private (unlisted) companies; residential

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[8]To the extent that gains are based on retained earnings, and these earnings are appropriately captured in the national accounts, some of these will be being attributed to individuals. Whether this attribution is appropriate depends on depend on the overlap between investors for income and investors for growth (Feldstein and Green, 1983). If all individuals who invest have portfolios equally balanced between retained earnings and dividends paid, then scaling up individual dividend income will capture these earnings. If instead some individuals own firms that focus on paying dividends while others hold firms whose earnings are largely retained to liquidation, then scaling up will attribute the earnings to the wrong individuals.

[9]UK tax years run from 6 April one year to 5 April the following year. We follow the same convention as the tax authority in describing, for example, the tax year 2005/06 as 2006.

property; the carried interest of fund managers; and a residual category of 'other assets'. This last category includes all assets to which Entrepreneurs' Relief applies, regardless of specific asset type, as well as other miscellaneous tangible and intangible assets such as collectable items (e.g. fine artwork) and intellectual property.

Common to other countries where gains data are available, gains are only observed on realisation. Individuals are asked to record acquisition and disposal dates for assets, but this is done in a free text box, and so these details are not automatically 'captured' by the computer system. However, HMRC manually codes up a sample of these each year to get information on the distribution of asset holding lengths by asset type and disposal value.[10] We make use of this below to provide results also on an (estimated) accruals basis.

It is important to emphasise that our data include only realised, *taxable* capital gains. Quantitatively the biggest exclusion from captial gains tax by far is owner-occupied housing, since main homes are exempted. This is estimated to yield £170 billion in realised gains a year (Corlett et al., 2020).[11] This is much larger than the £55 billion in taxable gains observed in 2018, and is likely to be weighted more towards the middle of the income distribution. There are two points to note about this. First, as we describe below, a large proportion of taxable gains are actually repackaged income, in constrast with gains from main homes. There is therefore a principled reason to want to treat main homes differently. Second, even if we distribute all these gains to the bottom 99% of the distribution, or distribute them equally with income, we still find the same qualitative results in terms of rising inequality once taxable gains are included.

To construct top share series we also need information on control totals: the total number of people in the UK adult population, and the total income/total income plus gains in the UK. For the adult population figures we use the Office for National Statistics (ONS) mid-year population estimates of the number of individuals aged 15 or more, following the standard adult population definition for the UK in the context of top share inequality (Atkinson, 2007). For the total income figures, we use the UK aggregate income series from the World Inequality Database (WID: Alvaredo et al., 2018a). Where the WID denominator is missing – 2009, 2016, 2017, 2018 – we estimate these based on growth rates in net national income over same period, starting from the WID figures for years available. For the total income plus gains figures we add aggregate capital gains from our data to the WID income control total.

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[10]In 2017 a stratified sample of 7,500 cases was produced. See HM Revenue and Customs (2019) for details.

[11]Other exclusions include gains from assets that are held in Individual Savings Accounts (ISAs), and gains that are realised through transfers between spouses, to charities, or on death. Gains below the tax-free allowance (currently £12,000 per year) are also typically excluded. Collectively gains below the tax free allowance, from ISAs, and written off at death are estimated to be around £31 billion Corlett et al. (2020).

3 Where do gains come from?

Capital gains are the profits resulting from the sale of assets. Such profits come from some combination of exogenous changes in the price of existing unimproved assets, and value added produced by providing capital and/or labour inputs. In most cases the latter can be thought of as substitutes for income. For example, an increase in the profitability of an owner-managed business through provision of human capital could be taken as higher pay, higher dividend income, or kept as retained earnings that increase the value of the business on disposal (Slemrod and Kopczuk, 2002). Retained earnings realised as gains will be excluded from fiscal income. Similarly, though harder to measure, labour applied to improving the value of a rental property could be compensated through higher rent receipts or through property sale. The increased value at sale will again not be reflected as part of income.

To understand whether gains are largely substitutes for income, or simply shifts in asset prices, we study the source from which they are derived.[12] As described above, in the UK individuals report not only the aggregate taxable capital gains they receive each year, but also a breakdown by asset class: shares in public (listed) companies; shares in private (unlisted) companies; residential property; the carried interest of fund managers; and a residual category of 'other assets', which includes all assets to which Entrepreneurs' Relief applies.

Figure 2 shows that gains come largely from repackaged income. Amongst those with gains above £100,000 in 2017, half (49.6%) of their gains come from 'other assets'; these are most likely gains to which Entrepreneurs' Relief applies, indicating returns to people who own and run their own business. Almost a quarter (21.8%) of gains come from unlisted shares, and 5.5% come from carried interest—essentially labour income for fund managers which for tax purposes is classified as gains. A clear majority of gains therefore come from business activity rather than from passive investment, and so often reflect a choice to receive remuneration in the form of gains rather than wages or dividends.[13] While such shifting between labour and capital income is well-documented empirically (Miller et al., 2019; Smith et al., 2019), there has been less empirical evidence on shifting between income and gains.

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[12]As noted above, from the standpoint of inequality measurement we may also be interested in gains where an active choice to take receipts as gains was not made.

[13]The composition of gains differs strikingly across the distribution, as shown in Figure A1. Residential property makes up a substantial share of gains for those receiving between £100,000 to £200,000 in total gains; however, gains in this type of asset are not very important in aggregate, because they hardly feature at the top of the distribution, where most gains are concentrated. The carried interest received by fund managers makes up a similar amount, but its distribution is reversed, as 85% of it goes to the top 5,000 individuals.

Another striking feature of Figure 2 is how concentrated capital gains are in the UK. The top 5,000 people (0.01% of the adult population) receive 54% of all gains. Each individual in this group receives at least £1.7 million per year in gains alone. For comparison, the top 5,000 people ranked by taxable income receive just 2% of all fiscal income. To understand the relationship between gains and income, we next describe the location of gains in the income distribution.

4   Who gains?

4.1   Where in the income distribution are gains?

We have already seen that capital gains are extrmely concentrated among a small number of gainers; Figure 3a shows that those gainers are (perhaps unsurprisingly) largely at the top of the income distribution. At the 80th percentile of the income distribution only 1.0% of people had any (taxable) capital gains. By the 95th percentile this had risen to 3.3%, and by the 99th it was 15%. Among those with gains, those who also have high incomes receive much larger gains on average: the mean (median) gains for gain recipients with incomes below the 90th percentile of income was £46,400 (£12,200); for those in the top 1% by income it was £306,800 (£13,600).

This has two key implications. First, since gains are highly concentrated among those with high incomes, we should expect to see higher top shares when gains are included. In 2018, 47% of all capital gains went to the top 1% when ranked by income only; 92% went to the top 1% ranked on total remuneration. Second, as seen from the medians, the gains distribution is heavily skewed. To describe this more clearly, Figure 3b shows some percentiles of the distribution of gains among those with positive gains at different points in the income distribution.[14] From this it can be seen that the tails of the unconditional gains distribution are comprised mainly of individuals at the top of the income distribution: the largest gains go to those who already have the highest incomes.

Figure 3b makes clear that although gains are highly skewed, even further down the income distribution there is a minority of individuals who receive substantial gains: gains that would be large enough to put them into the top 1% even without any income.[15] We next describe characteristics of these individuals, who 'join' the top 1% when individuals are ranked on total remuneration despite

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[14]Tables A1 to A2 give full tabulations of the distribution of gains across the income distribution. These will allow authors working with income data to impute gains conditional on incomes.

[15]Figure A2 shows the distribution of gains among those at the top by total remuneration. There is clear bimodality, with individuals at the top receiving almost all remuneration from gains, or almost all from income. This becomes sharper in the higher top shares.

not being at the top when ranking on fiscal income, comparing to those who remain at the top, and those no longer at the top once gains are included.

4.2 Who are the new additions to the 1%?

One in ten people who are in the top 1% ranked by total remuneration were not in the top 1% by fiscal income. We can compare these 'joiners' to the people they replace: the 'leavers' who were in the top 1% by income but are no longer there once we include gains. The remaining nine in ten people are 'stayers': those who are in the top 1% whether we rank on income only or on income plus gains. Joiners include people who were already at the margins of the top 1% by income, for whom a small amount in gains is enough to push them over the line, but also those who (as we saw above) have minimal incomes but very large gains.

In terms of incomes, Figure 4a shows that joiners are less likely to be employees, and more likely to be pensioners, investors and owner-managers. To classify individuals into types, we identify individuals' largest income-source from the following: employment income; self-employment trading profits; partnership trading profits; income from state and private pensions; and investment income (e.g. interest, rent, dividends). Where an individual's single largest income-source is dividends and they also report being a director of a closely-held company, we reallocate them to a distinct sixth category of 'owner-manager'. Additionally, a small proportion of joiners report no taxable income at all.

The changing pattern of incomes among those at the top is consistent with gains representing repackaged income. If gains were merely based on arms-length investments, employees and owner-managers with the same income should be no more or less likely to benefit from these.[16] Instead owner-managers are almost twice (93%) more likely to be among joiners than leavers, while employees are as third as likely (36%) to be among joiners. This is to be expected, since employees typically have fewer opportunities to receive their remuneration in the form of gains, other than occasionally through participation in employee share schemes. By contrast, owner-managers can keep profits within their business and ultimately realise them as gains.

These results also highlight the limitations of approaches to inequality measurement based solely on attributing national accounts components to individuals based on their fiscal income (Piketty et al., 2018). While investors are 5.7 times as likely to be among joiners than leavers, pensioners are also heavily over-represented being 3.8 times more likely to be among joiners. Even if all repackaged

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[16]This argument is analagous to the Pissarides and Weber (1989) comparison between employees and the self-employed, when trying to measure underreporting of income.

income was observed in the national accounts, for example as retained profits, the DINA approach would allocate these profits to individuals based on their dividend income. Individuals who otherwise mostly have only pension income would not have their income scaled up in the same way, and so would be incorrectly placed in the DINA income distribution. This then also matters for discussions of the kind of people who can be found at the top.

In terms of other characteristics, joiners tend to be older (Figure 4b) and are more likely to be female (Figure 4c). Half of joiners to the top 1% are over sixty, compared with only one in seven leavers. By contrast more than half of stayers and leavers are under 50. A focus on incomes suggests young(er) workers make up most of those at the top; including gains highlights the position of individuals topping up their pensions with investment gains, as well as retiring owner-managers realising large gains on exit from their business.

Joiners are also more likely to be female than leavers, although women still make up less than half of this group. More than one-third (39%) of joiners are female, compared with only one-quarter (23%) of leavers. This finding might be thought to indicate that the top 1% is more gender-equal taking into account gains. However, it would be useful to understand better the mechanisms that lead to this pattern. It might be that women make different investment decisions to men during the lifecycle, so that they are more highly represented among top gainers than top incomes. It could alternatively be that within a household assets are likely to be split so that the capital income received can benefit from the lower marginal tax rate of the lower income partner (usually the woman). In that case the higher prevalence of women only reflects intra-household income shifting, which is then reflected in gains when assets are liquidated. Finally, it could be that women are recipients of capital when partners die. However, the age distributions of male and female joiners are very similar: if this were mostly about inheritance one would expect relatively fewer young female joiners and more older female joiners. To definitively distinguish these mechanisms we would need data linking individuals within a household—something that is not currently available in UK administrative data.

One note of caution in interpreting these results is that gains here are measured on *realisation*. A natural worry is that this means that gains received in a particular year should potentially be attributed to multiple previous years and at the individual level will be volatile. It is worth noting that these problems are not particular only to gains. As Miller et al. (2019) show, dividend income is also responsive to policy and the timing of receipts is endogenous, so that dividend receipts do not only reflect contemporaneous income. And although gains are less persistent than other income sources, those other sources are also typically somwhat volatile. Figure A3 shows that the

probability of remaining in the lowest (highest) quintile of capital gains (among those reporting gains in 2018) was only 14.1% (16.6%). This is certainly lower than for self-employment income, but the comparable numbers for self-employment income are still low, at 43.1% (72.9%). Figure A4 shows that among those with larger gains, there is substantial receipt of persistent large gains: one in three (six) indviduals receiving more than £20,000 (£100,000) in 2017 received at least as much on average over the previous four years.

Despite this, worries about 'lumpiness' are clearly greater in the context of capital gains. Ideally one might circumvent such worries by directly observing the gains accrued each year. In the UK such data are not collected systematically, but for each year HMRC conducts a survey to understand the distribution of acquisition dates by asset type. Using these tabulations, we can attribute gains to previous years.[17] We now discuss the implications of including capital gains on measured inequality, first maintaining our headline (realisation) method for studying gains, but then also using our imputed accruals measure.

5   Implications for measured inequality

We have shown that in many cases capital gains come from repackaged income, and have seen that they are concentrated at the top of the fiscal income distribution. We next study the implications of including gains on top-share income inequality.

5.1   Comparing top shares

Figure 5 shows how including capital gains increases the level of inequality in the UK, as measured by the share of resources that go to individuals at the top. As described previously, 90% of those in the top 1% by total remuneration (fiscal income plus capital gains) are also in the 1% by income alone, indicating that gains are concentrated among those who already have high incomes. Ranking people by their income only, the top 1% (around 500,000 people) received 13.8% of all income in 2018. To be in this group, you needed an income of above £125,000. When we add the capital gains of these same people, their share of all income plus gains increases to 15.2%. This implies that each person on average received an extra £47,000 in gains, in addition to their income.

Next we re-rank individuals, to account for the fact that one in ten individuals with the top 1% by total remuneration are not included in the top 1% by fiscal income. This re-ranking increases

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[17]Since tabulations are provided for time-bands of past years, our main results use the mid-point of each band. Our results are not very sensitive to always using the end of the period, or using earlier in the period.

the share of total remuneration going to the top 1% even further: from 15.2% (ranking on income only) to 16.8% ranking on income plus gains. In 2018, to be in the top 1% you would have needed at least £132,000; this is £8,000 more than if we measure (and rank on) income only.

These differences are much larger when looking towards the very top. Focusing on the top 0.01%, the top share increases 60% from 2.2% when measured and ranked on income, to 3.6% when measured and ranked on total remuneration. This effect is mainly driven by re-ranking: before re-ranking the top share becomes 2.4%. This again highlights the extent to which including gains not only changes top shares, but also affects who is at the top.

For both the top 1% and 0.1%, these effects are not driven by the volatility of gains. As described in Figures A3 and A4, gains are more volatile than other income sources, although at the top these other sources are also volatile. Figure A5 shows that when defining the top share threshold based on five-year-average gains, rather than contemporaneous gains, the nominal threshold for being at the top barely changes (in each case it rises by around 1%). For the top 0.01% our results are more affected by extremely high one-off realisations: the nominal threshold for being in the top 0.01% share is 13% lower when using income plus five-year-averaged gains compared with current gains. Motivated by this we next show the impact of gains on inequality trends, first on a realisations basis, but subsequently on an accruals basis.

5.2 Inequality trend including realised gains

Including capital gains not only changes the level of inequality, but also the trend. Figure 1 showed that realised capital gains have grown substantially over time, rising over the late 1990s and 2000s to a peak in 2008, before falling away and then rising again up to the present. Since we know that gains are concentrated at the top of the income distribution, this immediately suggests that adding gains will change the time trend of inequality in the UK, as well as the level.

Figure 6a shows the share of income, and of total remuneration, going to the top 1%, as ranked by income and by total remuneration respectively. Looking first at the pattern for income only, we see the familiar result that the top 1% share has hovered consistently at around 14% for the past decade, rising slightly between 1997 and the 2008 Financial Crisis, but hardly increasing since.

When gains are included, the share going to the top 1% is both higher and has been rising. The difference between the two measures mirrors the pattern of aggregate gains over the same period. Inequality, measured by the top 1% share of remuneration, was actually rising substantially in the run-up to the Financial Crisis, peaking at 19.0% in 2008, compared with 14% on income only. Despite

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a subsequent decline shortly after this, inequality has again been rising over the past decade.[18] Over the full period the average annual rise in the 1% share of total remuneration is .08pp, compared with .02pp for income only.

This pattern is exacerbated when we look at the top 0.1% and 0.01% shares over time (Figures 6b and 6c). Since the Financial Crisis, the share of total remuneration going to the top 1% rose by two and a half percentage points from 14.1% (in 2009) to 16.8% (in 2018), a rise of 19%. Over the same period, the shares going to the top 0.1% and 0.01% both rose by around one third: from 6.1% to 8.1% for the top 0.1% (around 50,000 people) and from 2.7% to 3.6% for the top 0.01% (around 5,000 people). Again these sharp rises stand in contrast to the much flatter increases seen in top shares measured by fiscal income.

5.3   Inequality trends using accrued gains

One obvious limitation of the previous results is that they include capital gains at *realisation*. This is when gains are directly observed, so is clearly most straightforward to implement. If there were no correlation across individuals in the timing of realisation, then for aggregate purposes this may not be problematic for our measure of the top shares even if at the individual level it suggests more inequality within those top shares than we actually observe. But as Figure 1 showed, there are correlated shocks in realisation: both policy and responses to aggregate asset prices are likely to create correlations in when realisations occur, and both matter in 2008 which aggregate realised gains peaked.

To overcome this, we estimate the capital gains on an accruals basis (Armour et al., 2013; Alstadsæter et al., 2016; López et al., 2016; Larrimore et al., 2017). This attempts to capture the 'flow' increase in the value of the assets over time. Ideally one would have a measure, at disposal, of the length of holding. This would allow us to assign the realised gains to the appropriate time period. UK tax microdata do not contain the information necessary to do this directly: individuals *are* asked for this information, but they are asked to put it into a free text box on the form which is not 'captured' by the computer system. However, HMRC do produce an annual survey to understand the length time for which assets were held (see Section 2.3 for details). We use this information to distribute realised gains over the time period for which the assets were held.

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[18]It is important to note two features of this series. First, as noted before, the peak in 2008 is in part driven by realisations of capital gains ahead of a policy change that reduced relief on long-held assets. In the next subsection we show results on an accruals basis instead. Second, the dip in both the income and the total remuneration series in the early-2010s is due to income-shifting behaviour, again driven by policy. The introduction of a higher top tax rate, and subsequent announcement that it would be cut, led to substantial shifting in the timing of income receipts among those with high incomes (Browne and Phillips, 2017).

To distribute gains, we follow a six-step process (see Appendix B.2 for full details):

1. For gains realised in a particular year, we use the HMRC tabulations on length of holdings to distribute them across acquistion years.

2. We then split the realised gains from each acquisition year equally over the time between acquisition and disposal.[19]

3. We deflate these values from realisation year £ to acquisition year £, so it is on the same basis as the income values.

4. We sum across acquisition years to get gains accrued in each year.

5. We then adjust recent years (2012 and later) to account for gains that have been accrued for these years but have not yet been realised.

6. Finally we impute accrued gains to the top shares according to the shares of realised gains that they received that year.

On an accruals basis the time path of gains is much smoother, 'only' doubling between 1997 and the peak in 2006, before falling back and then increasing more smoothly up to the present. Figure A6 shows graphically the time path of aggregate capital gains on our estimated accruals basis, compared with gains on the realisation basis. As well as being smoother overall, gains are higher and rising more slowly in the early part of our data. The 2007 and 2008 peak is no longer present, and subsequently the level of gains is then similar on both measures.

Top share inequality based on income plus accrued gains is on average slightly higher, has been increasing slightly more slowly, and is much less volatile than with realised gains. Figure 7 shows the time path of top shares based and ranked on income plus accrued gains, compared with the usual income only series. In each case the most obvious difference relative to realised gains is that the volatility in the series is now almost entirely driven by changes in top incomes. Accounting for accrued gains also increases the top share of total remuneration by an average of 0.3pp relative to the realised gains series. Most of these additional gains come earlier in the series—consequently the average annual increase in the top 1% share is .06pp rather than the previous .08pp. However, the rise in inequality is still substantially faster than when income only is considered (.02pp per year), and the level of inequality is almost 2pp higher.

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[19]An alternative approach would be to use data on asset prices to create an accruals series that was more responsive to macro shocks.

5.4 Post-tax inequality

Post-tax resources are likely to be more relevant for individual experiences of inequality than pre-tax. It is therefore useful to consider the implications of including gains on post-tax, as well as pre-tax inequality. This is of particular relevance in the context of gains because the motivation for repackaging income into gains is precisely driven by their lower tax rate.

Among those within the top 1% by total remuneration, the mean share of total remuneration that comes from gains is rising. Figure 8 shows, for deciles of the top 1% by total remuneration in 2017, that gains are heavily concentrated in the top decile: 38.8% of remuneration in the top decile (effectively top 0.1%) is from gains compared with only 13.6% in the next decile, and 4.8% for the lowest decile. Further, taxpayers at the very top are more likely to receive gains that are taxed at lower rates. More than half (52.8%) of gains for those in the top decile of the 1% are taxed at 10%, compared with only 39.5% in the next decile, and 18.7% in the lowest decile of the top 1%.

Access to these low tax rates reduces the ability of the tax system to effectively redistribute income. The share of total income going to the top 1% after tax is 9.3% in 2017, compared to 13.3% before tax (Figure 9), a reduction of 30%. As already noted, the share of total remuneration going to individuals at the top (16.0% for the top 1%) is larger than the share of total income going to the top. Low tax rates on capital gains also mean that for total remuneration the tax system is less progressive than for total income. Taxes only reduce the top share of total remuneration by 23%, so that they receive 12.3% of the aggregate. This is similar to the share of income they receive pre-tax.

This pattern is even more pronounced among the extremely rich. The top 0.01% of individuals by income receive 2.0% of income pre-tax, but only 1.3% post-tax. Based on total remuneration the top 0.01% receive 3.3% of aggregate remuneration pre-tax, and still keep 2.8% post-tax.

6 Conclusion

These findings change the story of top income inequality in the 2010s. Although top incomes as measured in official statistics did not increase significantly, this masks an important shift in the way that the richest received their remuneration. Inequality had not abated, just taken a different form. In contrast with publicly available microdata on fiscal income, using the complete personal tax records for the population of taxpayers which are available via secure access allows a study of the role of capital gains. Capital gains are not available in any other administrative data source, and

their concentration (and lack of questions on gains) means they are difficult to effectively measure in household surveys.

Our results speak to the growing research agenda on inequality measurement. Recent work has focused on capturing resources not measured by fiscal income (Piketty et al., 2018) and on understanding the economic sources behind reported incomes (Smith et al., 2019). In taking this agenda further, it will be important to further study shifting across tax bases. This is particularly important when comparing internationally, across countries with very different incentives for such shifting.

This work also has implications for tax policy. The typical case for low taxes on capital gains is to avoid distorting investment decisions. However, this comes at a price. First, it creates strong incentives to repackage income as gains. Second, to the extent that gains are received unequally, the tax system is less able to redistribute out of gains. We see both that income repackaging is occuring, and that the tax system is ineffective in redistributing these resources. There are therefore both efficiency and equity reasons for taxing gains more similarly to income.

Finally, unless a wider definition of income is adopted in official statistics, we are liable to continue to miss important trends in inequality. Focusing narrowly on the fiscal income definition of income excludes both non-taxable income and remuneration not treated as income. While our focus has been on the latter, there is clearly scope for work studying the implications of non-taxable income for measured inequality. These are typically a combination of non-taxable state transfers, which are concentrated at the bottom of the distribution, and types of investment income (for example, ISAs in the UK) which are likely concentrated at the top. Getting a comprehensive picture of inequality requires taking a more holistic approach to income measurement.

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Tables and Figures

Figure 1: Aggregate capital gains, 1997-2018
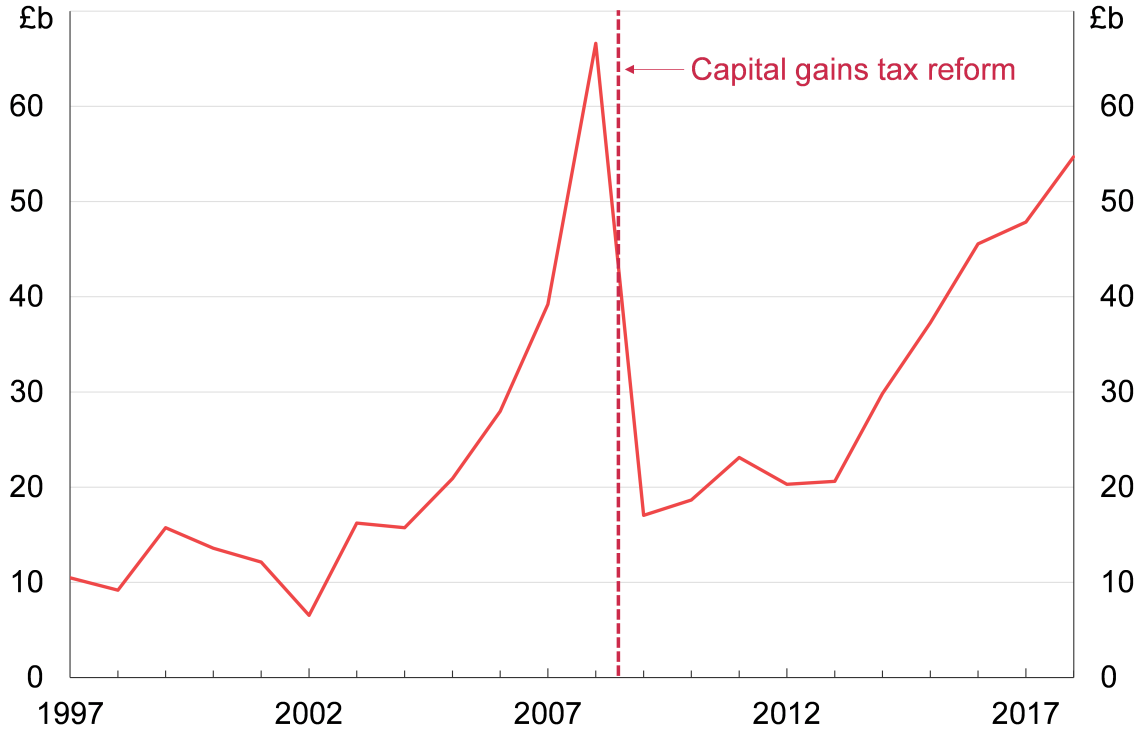
Notes: Constructed using data on all reported taxable capital gains going to individuals. Prior to 2009, our measure of gains differs from HMRC aggregates. Our series describes the full nominal gains realised by taxpayers, whereas the main series provided by HMRC shows gains after taper relief and indexation allowances—policies which reduce the amount of gains on which tax was due. These policies were removed from 2008, as noted in the figure. See Appendix B.1 for details.
Source: Authors' calculations based on HMRC administrative datasets.

Figure 2: Distribution of gains among those with ≥£100,000 in gains, and breakdown by source
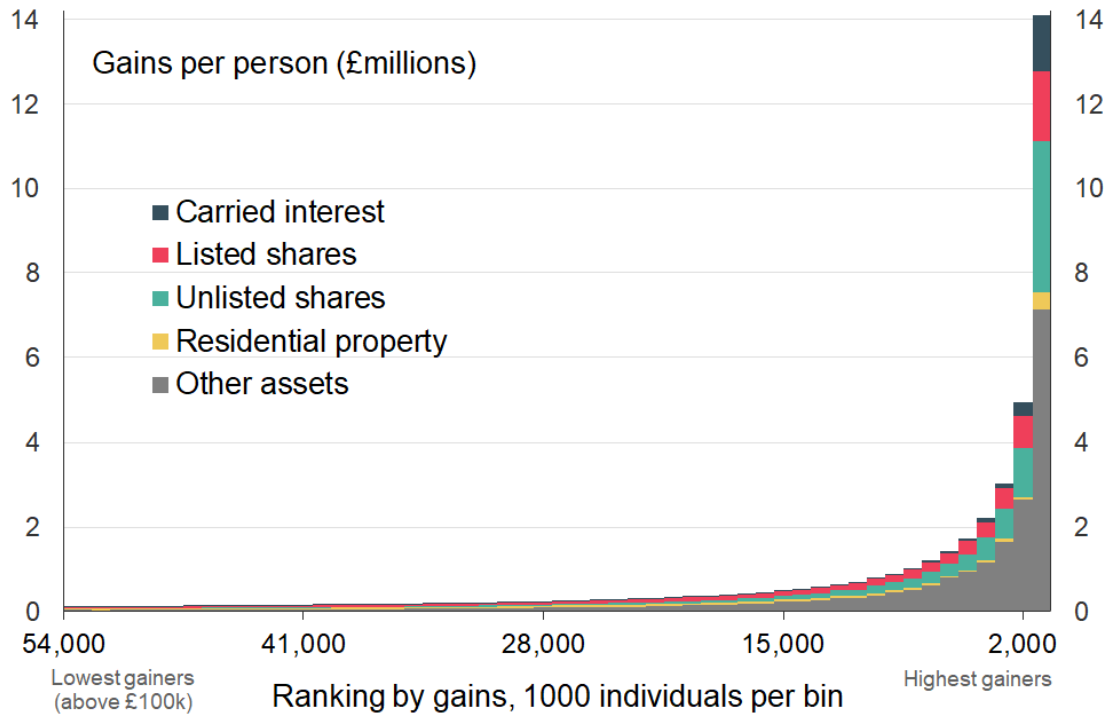
Notes: *Constructed using data on all reported taxable capital gains going to individuals in 2017. Individuals are ranked by reported capital gains and grouped into bins of 1000. Only individuals with gains over £100,000 shown here. Bars show democratic mean gains within each bin, and breakdown of these by asset type. 'Carried interest' is remuneration for fund managers, which is reported and taxed as a capital gain. 'Other assets' is predominantly composed of assets eligible for 'entrepreneurs' relief' – a 10% tax rate for owner-managers on disposals relating to their business – though it also contains miscellaneous tangible and intangible assets including fine artwork and intellectual property.*
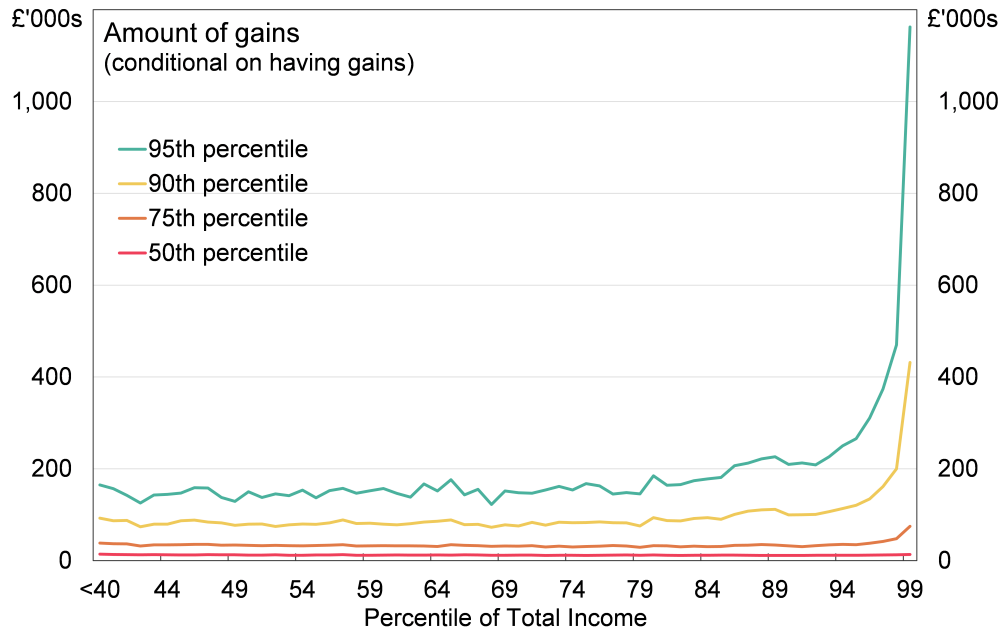**Source:** *Authors' calculations based on HMRC administrative datasets.*

Figure 3: Gains across the income distribution

**(a)** *Share of individuals with gains, and mean conditional on any gains*

Share of people
with capital gains
(LHS, log scale)

Mean gains conditional on any gains
(RHS)

Percentile of Total Income
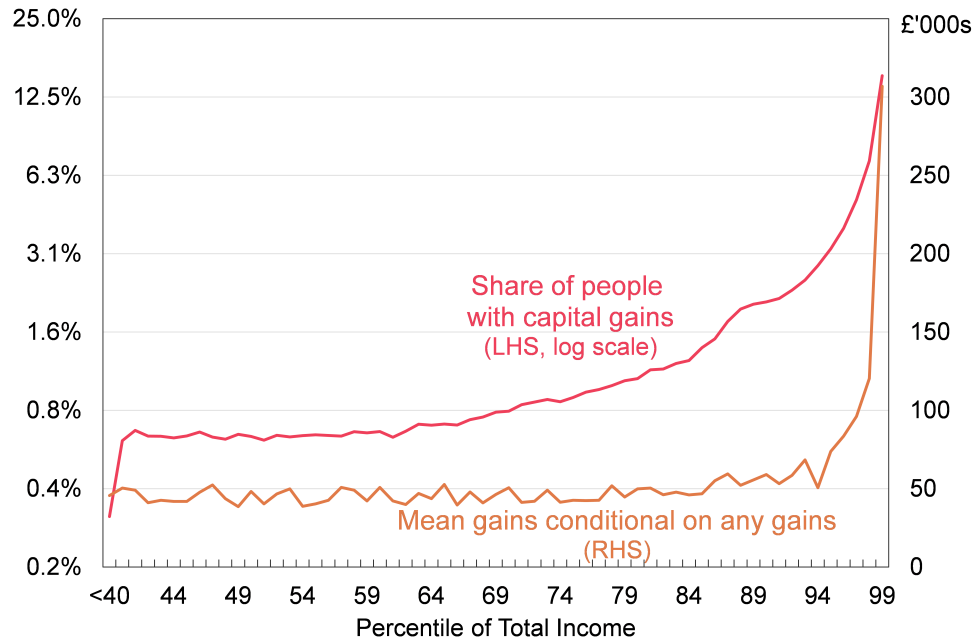
(b) *Percentiles of gains, conditional on any gains*

Amount of gains
(conditional on having gains)

— 95th percentile
— 90th percentile
— 75th percentile
— 50th percentile

Percentile of Total Income

Notes: *Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. Individuals are ranked by fiscal income (constructed as 'total income' from the* Survey of Personal Incomes*), and then grouped into percentiles of the 15+ population using the ONS mid-year population estimates to give the population control total. Since individuals below the 40th percentile are not necessarily in the income tax data – either because they have no income, or because their income is below the 'personal allowance' so may not be reported – we group these individuals into a single '< 40' category. In Panel (a), the share of individuals with any gains is shown on a log scale on the left-hand axis; mean gains among those receiving gains at each percentile is shown on the righ-hand axis. In Panel (b), lines show percentiles of the capital gains distribution at each percentile of the total income distribution.*

**Source:** *Authors' calculations based on HMRC administrative datasets.*

Figure 4: Who remains in, leaves, or joins the top 1% when capital gains are taken into account?
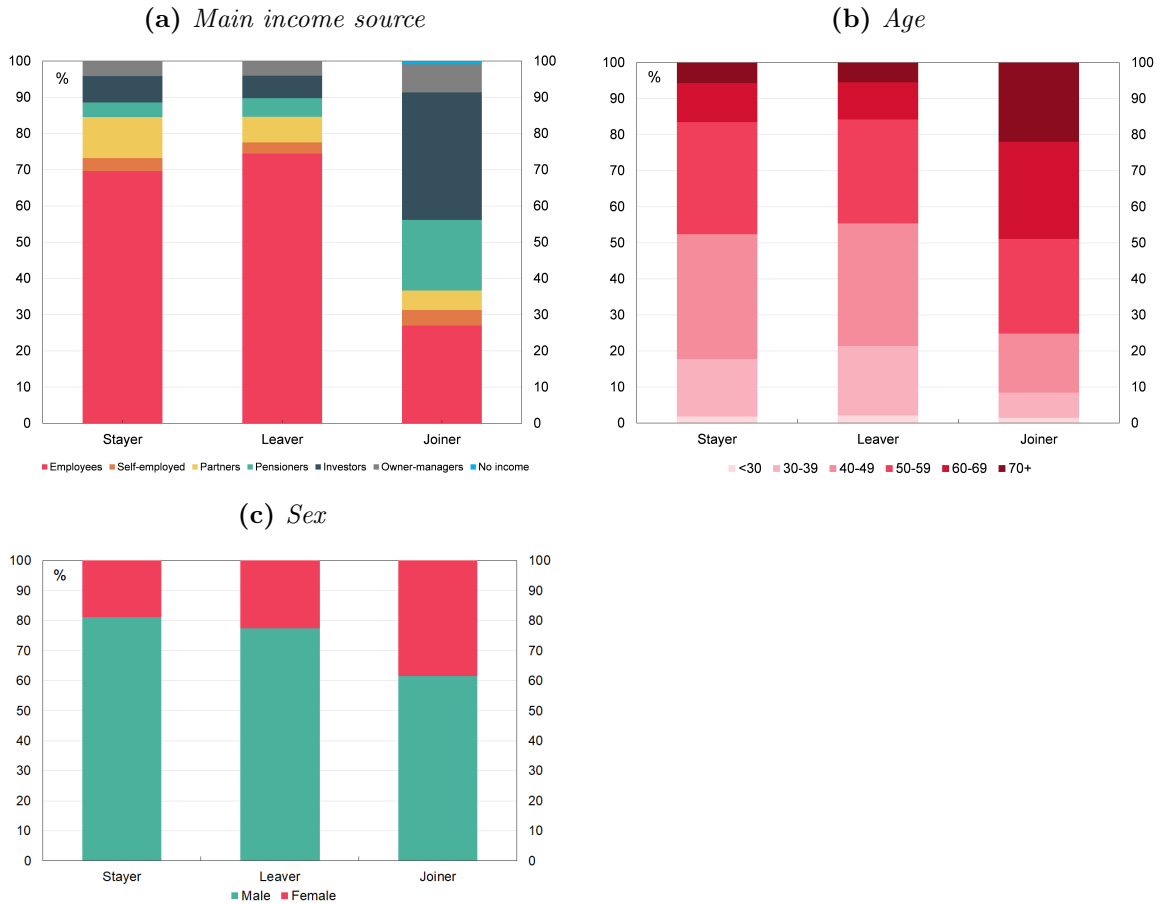
(a) *Main income source*

(b) *Age*

(c) *Sex*

Notes: Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. 'Stayer' includes all individuals who are in the top 1% of the 15+ population when ranked by fiscal income and when ranked by total remuneration (the sum of fiscal income and capital gains). 'Leaver' includes all individuals who are in the top 1% of the 15+ population when ranked by fiscal income, and are not in the top 1% when ranked total remuneration. 'Joiner' includes all individuals who are in the top 1% of the 15+ population when ranked by total remuneration, and are not in the top 1% when ranked fiscal income. The 15+ population control total is from the ONS mid-year population estimates. In Panel (a), the bars are divided into shares of individuals whose main source income is from employment, self-employment, partnerships, pensions, or investment. There is also a category for 'owner-managers': individuals who are directors of closely held companies and report investment as their main source. Among joiners, the 'no income' category comprises individuals with no reported income but whose gains are large enough to bring them into the top 1%.

Source: Authors' calculations based on HMRC administrative datasets.

Figure 5: Top shares of income and total remuneration, 2017
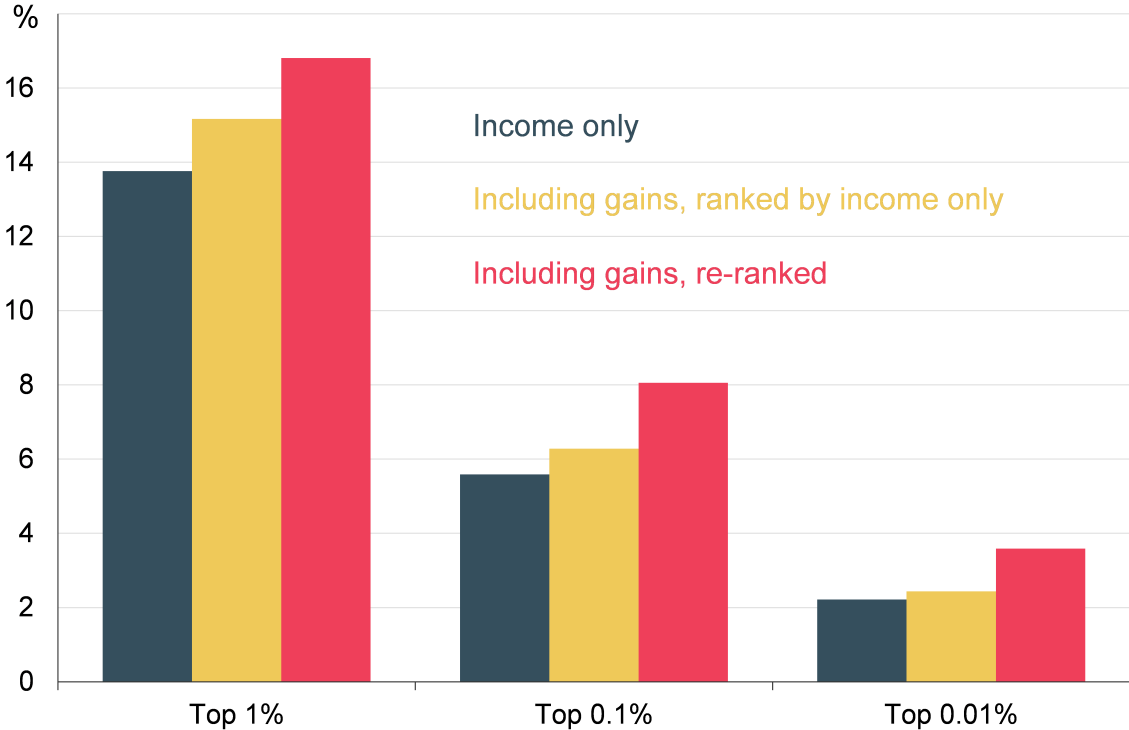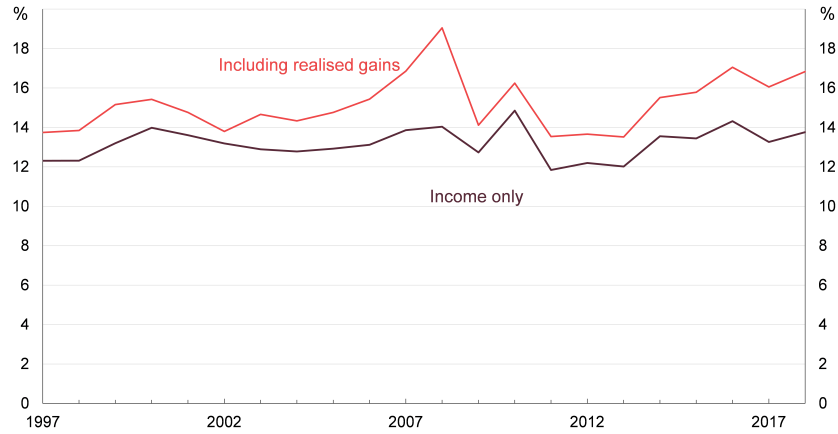

Notes: *Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. 'Income only' shows the proportion of all fiscal income going to the top 1%, 0.1%, 0.01% of the 15+ population. 'Including gains, ranked by income only' shows the proportion of total remuneration (fiscal income and realised gains) going to the top 1%, 0.1%, 0.01% of the 15+ population ranked by fiscal income. 'Including gains, re-ranked' shows the proportion of total remuneration (fiscal income and realised gains) going to the top 1%, 0.1%, 0.01% of the 15+ population ranked by total remuneration. The 15+ population control total is from the ONS mid-year population estimates.*
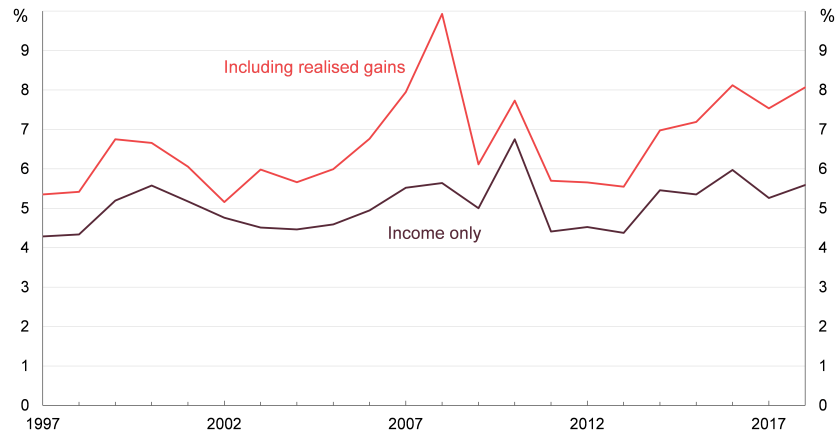**Source:** *Authors' calculations based on HMRC administrative datasets.*

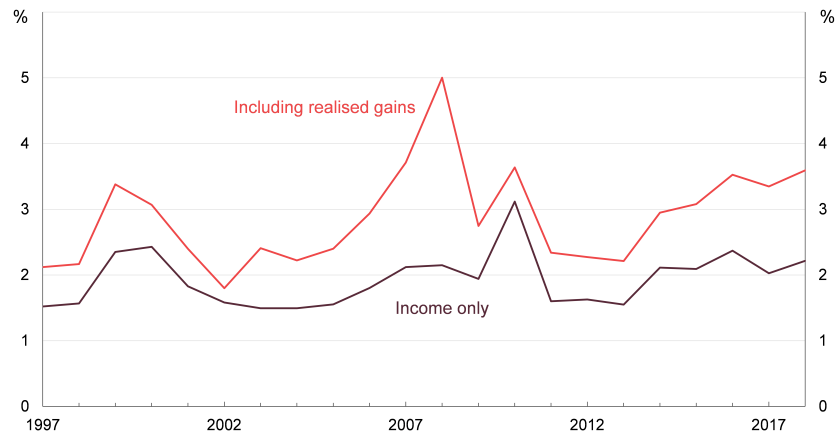**Figure 6: Share of income or income+gains going to the top, 1997-2018**

(a) *Top 1%*

(b) *Top 0.1%*

(c) *Top 0.01%*

Notes: Constructed using data on all reported taxable capital gains and reported fiscal income. 'Income only' shows the proportion of all fiscal income going to the top 1%, 0.1%, 0.01% of the 15+ population ranked by fiscal income. 'Including gains' shows the proportion of total remuneration (fiscal income and realised gains) going to the top 1%, 0.1%, 0.01% of the 15+ population ranked by total remuneration. The 15+ population control total is from the ONS mid-year population estimates.
*Source: Authors' calculations based on HMRC administrative datasets.*

Figure 7: Share of income or income+accrued gains going to the top, 1997-2018

(a) *Top 1%*

(b) *Top 0.1%*

(c) *Top 0.01%*

Notes: Constructed using data on all reported taxable capital gains and reported fiscal income. 'Income only' shows the proportion of all fiscal income going to the top 1%, 0.1%, 0.01% of the 15+ population ranked by fiscal income. 'Including accrued gains' shows the proportion of fiscal income and accrued gains going to the top 1%, 0.1%, 0.01% of the 15+ population ranked by income plus accrued gains. The 15+ population control total is from the ONS mid-year population estimates. See Appendix B.2 for details on how accruals are estimated.
*Source: Authors' calculations based on HMRC administrative datasets.*

Figure 8: Share of total remuneration from income and from gains at different tax rates
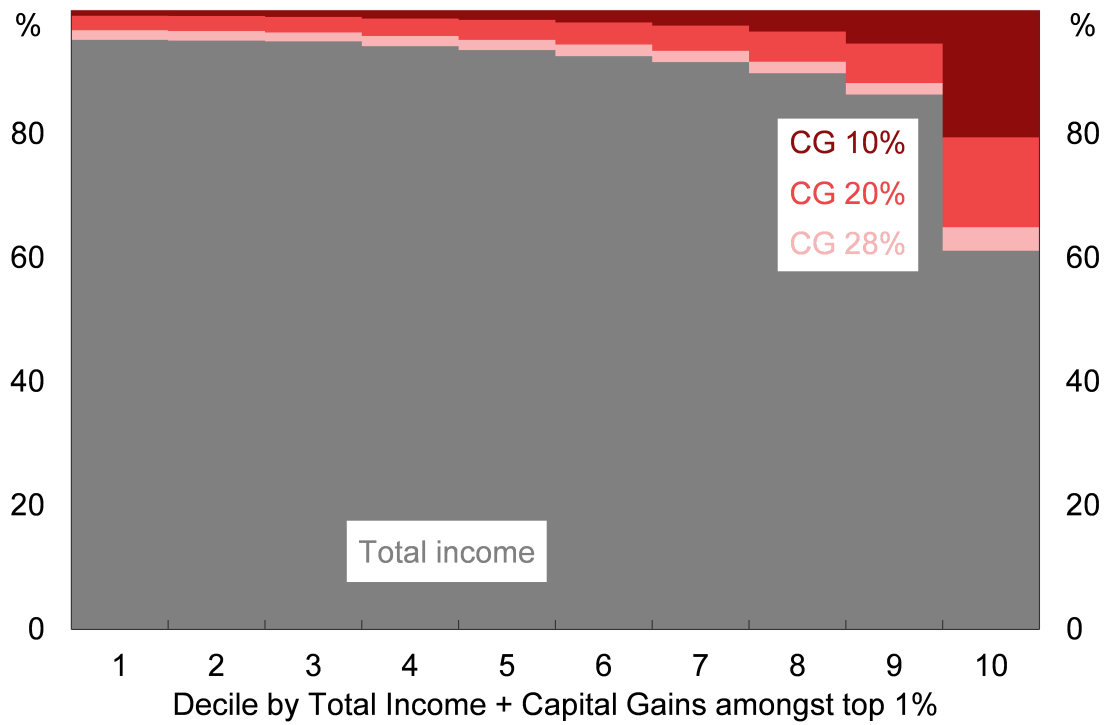
Notes: Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. Shows, among those already in the top 1% by total remuneration, the breakdown of that remuneration by decile into total income, and capital gains taxed at different rates.
Source: Authors' calculations based on HMRC administrative datasets.

**Figure 9: Top shares of income and total remuneration before and after tax, 2017**
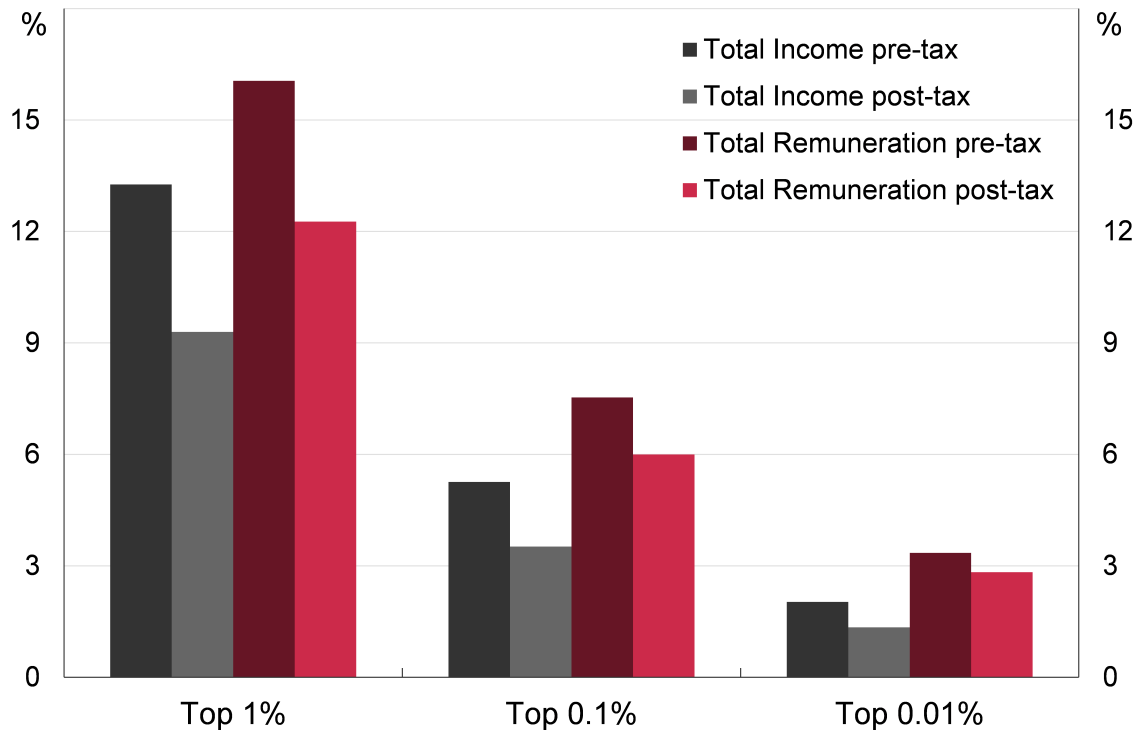
Notes: *Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. 'Total Income, pre-tax' shows the proportion of all fiscal income going to the top 1%, 0.1%, 0.01% of the 15+ population pre-tax. 'Total Income, post-tax' shows the proportion of all fiscal income going to the top 1%, 0.1%, 0.01% of the 15+ population after income tax and national insurance contributions are subtracted. 'Total Remuneration, pre-tax' shows the proportion of all fiscal income plus gains going to the top 1%, 0.1%, 0.01% of the 15+ population pre-tax. 'Total Remuneration, post-tax' shows the proportion of all fiscal income plus gains going to the top 1%, 0.1%, 0.01% of the 15+ population after income tax, capital gains tax, and national insurance contributions are subtracted. The 15+ population control total is from the ONS mid-year population estimates.* **Source:** *Authors' calculations based on HMRC administrative datasets.*

Appendices

## Appendix A   Additional Tables and Figures

Figure A1: Share of gains by source among those with ≥£100,000 in gains
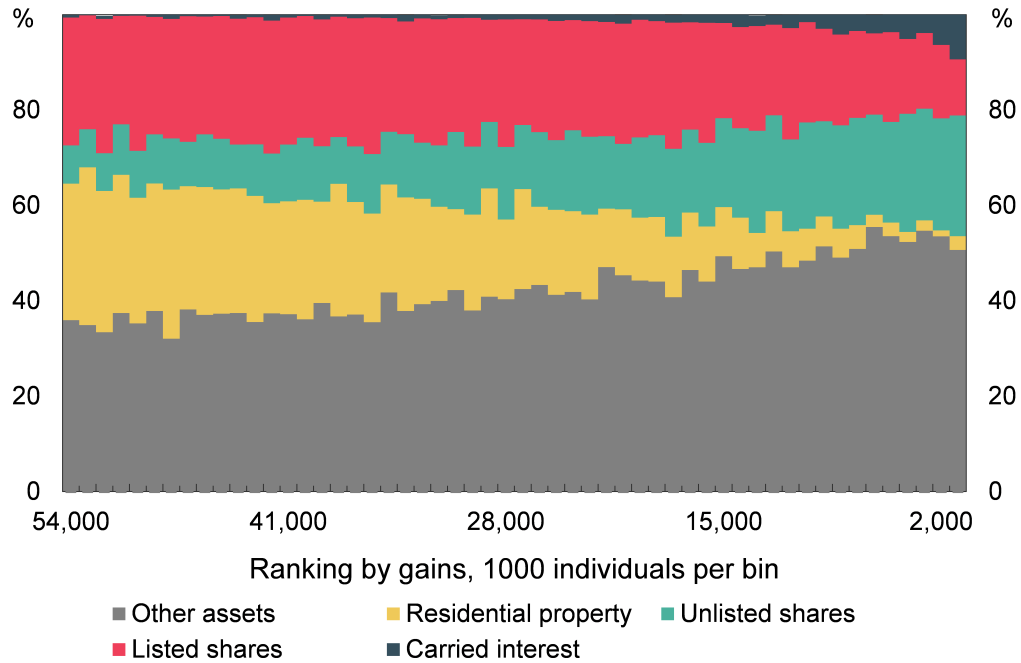
Notes: *Constructed using data on all reported taxable capital gains going to individuals in 2017. Individuals are ranked by reported capital gains and grouped into bins of 1000. Only individuals with gains over £100,000 shown here. Bars are scaled to 100, and show within each bin the breakdown of gains by asset type. 'Carried interest' is remuneration for fund managers, which is reported and taxed as a capital gain. 'Other assets' is predominantly composed of assets eligible for 'entrepreneurs' relief' – a 10% tax rate for owner-managers on disposals relating to their business – though it also contains miscellaneous tangible and intangible assets including fine artwork and intellectual property.*
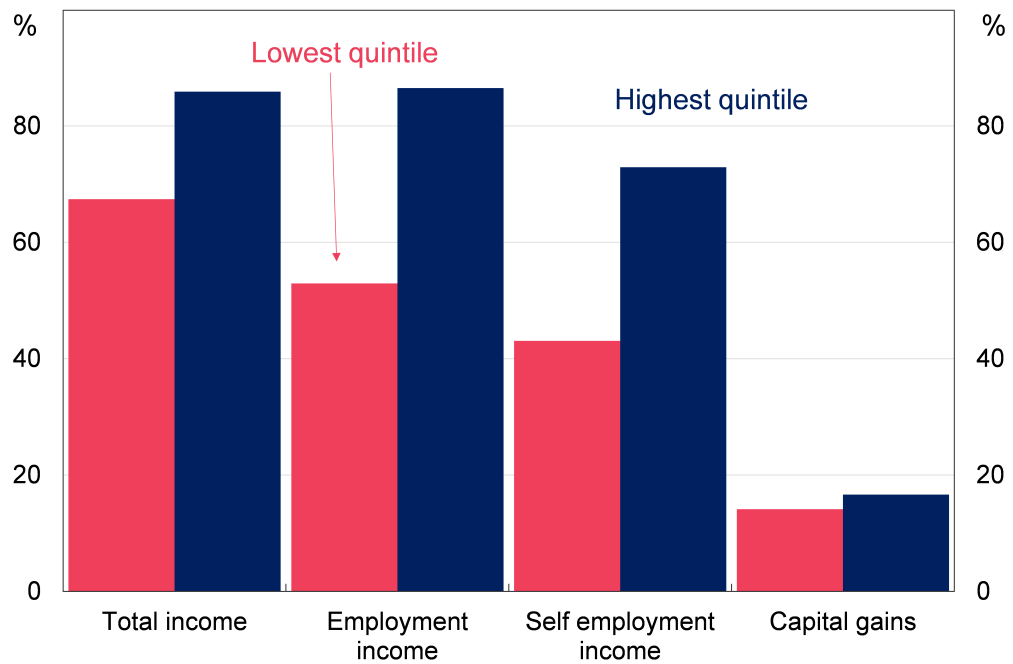**Source:** *Authors' calculations based on HMRC administrative datasets.*

Figure A2: Share of remuneration from gains, among those with high total remuneration
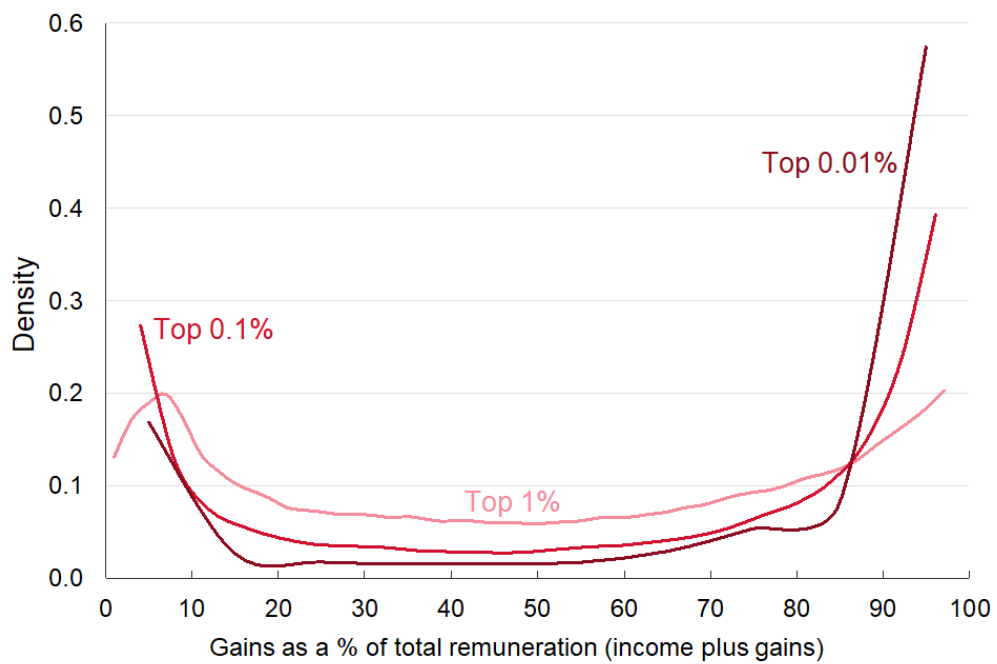
Notes: Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. Lines show, for individuals in the top 1%, 0.1%, 0.01% ranked on total remuneration (the sum of fiscal income and capital gains), the distribution of individuals with different shares of total remuneration coming from capital gains.
Source: Authors' calculations based on HMRC administrative datasets.

Figure A3: Probability of remaining in same quintile, by remuneration source
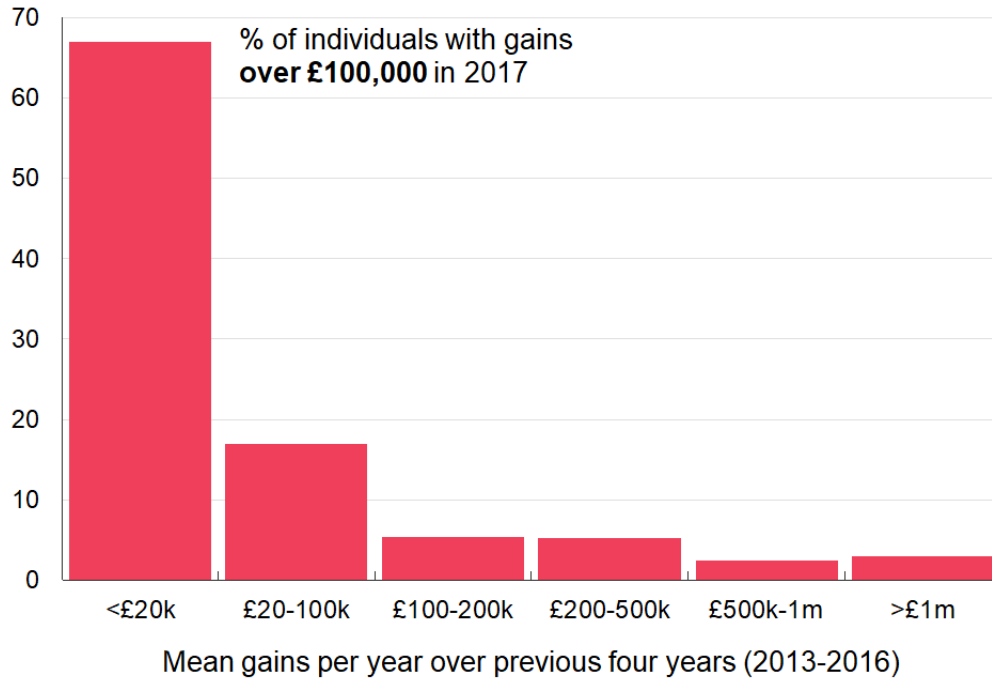
Figure A4: Mean gains over previous four years for individuals with 2017 gains of:

(a) *More than £100,000*
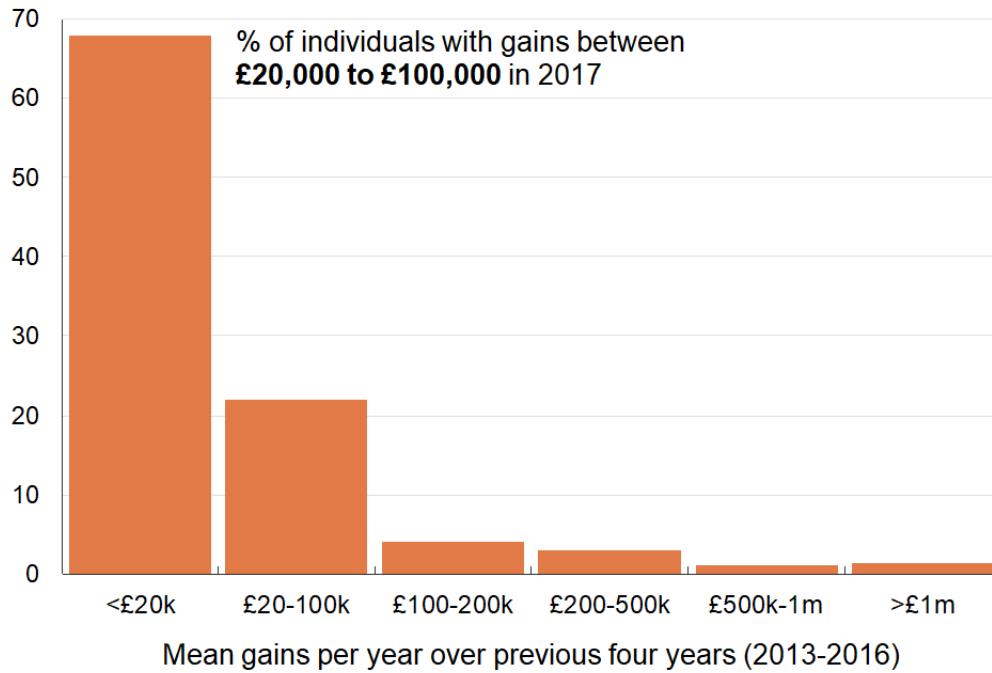
% of individuals with gains
over £100,000 in 2017

Mean gains per year over previous four years (2013-2016)

(b) *Between £20-100,000*

% of individuals with gains between
£20,000 to £100,000 in 2017

Mean gains per year over previous four years (2013-2016)

Notes: Constructed using data on all reported taxable capital gains going to individuals in 2017. Bars show the share of individuals receiving different mean amounts of gains between 2013 and 2016, given that they received more than £100,000 in 2017 (Panel a) or £20-100,000 in 2017 (Panel b).
Source: *Authors' calculations based on HMRC administrative datasets.*

Figure A5: Level of income or remuneration needed to be in top shares

Figure A6: Aggregate capital gains on an accruals basis, 1997-2018
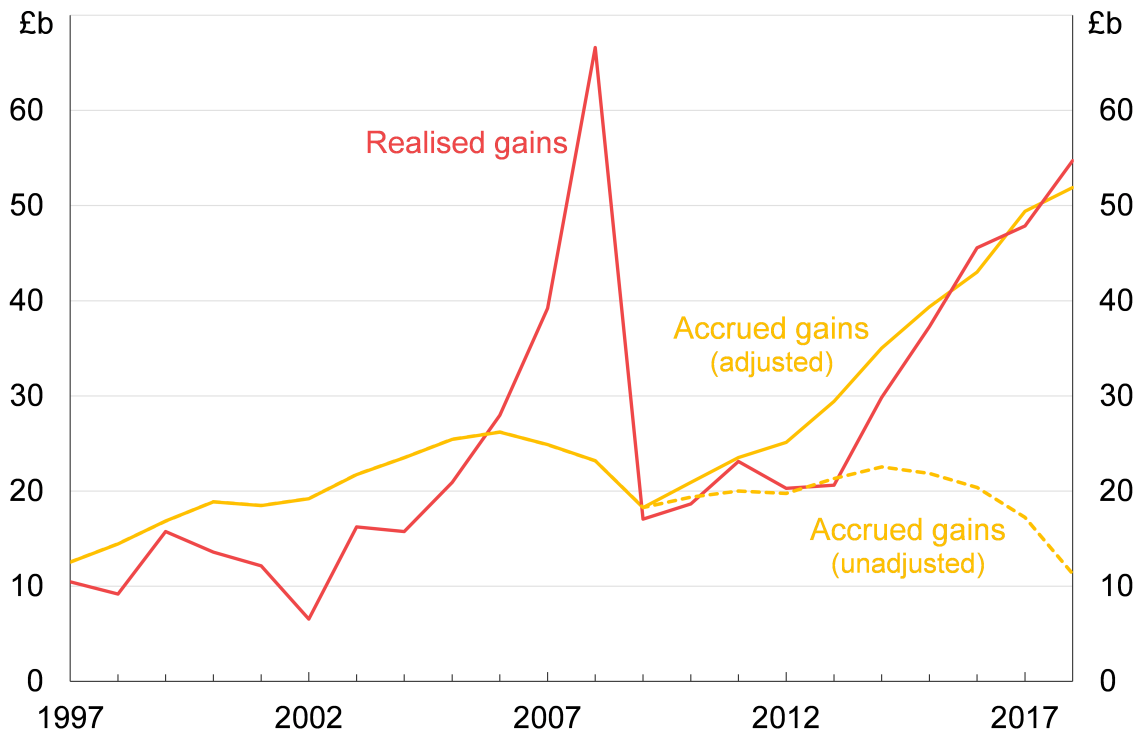
Notes: *Constructed using data on all reported taxable capital gains going to individuals. 'Realised gains' contains reported taxable capital gains at realisation, as in Figure 1. 'Accrued gains (unadjusted)' distributes realisations over previous years, using holding length data. 'Accrued gains (adjusted)' scales up the unadjusted distribution to account for gains accrued that will be realised in the future. See Section 5.3 for details on how accrued gains are estimated from realised gains.*
Source: *Authors' calculations based on HMRC administrative and survey datasets.*

Table A1: Distribution of gains across the income distribution

Centiles of income dist.	Minimum Income	Proportion with any gains	Mean gains if any gains	Percentiles of gains among those with any gains						
				5th	10th	25th	50th	75th	90th	95th
<40	0	.0031	45,600	-16,400	-4,400	3,800	14,400	38,400	92,500	165,000
40	10,000	.0060	50,300	-12,600	-3,100	4,000	13,500	37,100	86,900	156,800
41	10,300	.0065	49,000	-17,900	-6,600	3,200	13,300	36,700	87,700	142,500
42	10,600	.0062	41,100	-16,200	-5,500	3,300	13,000	31,900	74,000	125,700
43	11,000	.0062	42,600	-15,100	-4,700	3,700	13,200	34,400	79,500	143,000
44	11,400	.0061	41,900	-15,900	-4,100	2,800	12,800	34,500	79,400	144,500
45	11,800	.0062	41,800	-14,500	-4,000	3,500	12,500	34,700	86,900	147,300
46	12,100	.0065	47,700	-13,800	-3,800	3,300	12,500	35,500	88,400	158,800
47	12,500	.0062	52,400	-13,500	-3,800	3,100	13,200	35,400	84,100	158,400
48	12,900	.0061	43,600	-14,200	-4,000	3,800	12,800	33,800	82,200	137,800
49	13,300	.0063	38,600	-13,700	-3,700	3,200	12,800	34,200	77,000	129,000
50	13,700	.0062	48,200	-14,100	-4,300	2,900	12,300	33,300	79,400	150,200
51	14,100	.0060	40,300	-14,700	-4,300	3,100	12,300	32,900	79,800	137,700
52	14,500	.0063	46,700	-10,700	-3,300	3,600	12,900	33,500	74,400	145,500
53	14,900	.0062	49,900	-15,300	-5,000	2,400	11,700	32,800	78,300	141,700
54	15,300	.0062	38,700	-15,800	-4,800	2,800	11,900	32,400	80,000	153,800
55	15,700	.0063	40,300	-12,100	-4,200	3,000	12,500	33,000	79,100	137,000
56	16,100	.0063	42,600	-13,400	-3,900	3,400	12,300	33,800	82,200	152,800
57	16,600	.0062	50,800	-12,700	-3,500	3,700	13,300	34,900	88,900	157,600
58	17,000	.0065	49,100	-16,100	-4,700	3,100	11,900	31,900	80,900	146,800
59	17,400	.0064	42,100	-15,700	-4,300	3,100	11,900	32,500	81,700	152,100
60	17,900	.0065	50,800	-13,100	-4,300	3,100	12,300	32,600	79,400	157,000
61	18,300	.0062	42,200	-13,800	-4,100	3,300	12,400	32,300	78,100	146,700
62	18,800	.0065	39,900	-13,400	-4,600	3,200	12,200	32,500	80,700	138,500
63	19,200	.0069	46,900	-12,700	-3,400	3,500	12,100	32,100	84,000	167,000
64	19,700	.0069	43,600	-13,800	-4,000	3,200	12,400	31,000	85,700	152,000
65	20,200	.0069	52,600	-14,200	-4,200	3,600	12,100	34,800	88,900	176,400
66	20,700	.0069	39,500	-11,800	-3,800	4,000	12,700	33,300	78,500	143,300
67	21,200	.0072	47,900	-11,000	-3,300	3,900	12,500	32,700	79,200	155,400
68	21,800	.0074	40,900	-12,800	-4,200	3,300	11,800	31,200	72,700	122,300
69	22,300	.0077	46,300	-13,700	-4,100	2,900	11,800	32,100	78,200	151,900

Table A1: Distribution of gains across the income distribution (cont.)

Centiles of income dist.	Minimum Income	Proportion with any gains	Mean gains if any gains	Percentiles of gains among those with any gains						
				5th	10th	25th	50th	75th	90th	95th
70	22,900	.0077	50,600	-10,600	-3,400	3,400	12,200	31,700	75,800	148,000
71	23,500	.0082	41,200	-11,600	-3,500	3,500	12,100	32,600	83,400	146,800
72	24,100	.0084	42,000	-12,400	-4,600	2,900	11,300	29,900	77,400	154,000
73	24,800	.0086	49,000	-15,300	-5,100	3,100	11,900	31,700	83,800	161,800
74	25,400	.0084	41,400	-14,700	-4,000	3,300	11,800	30,000	82,600	154,200
75	26,100	.0087	42,600	-16,400	-5,000	2,900	11,500	30,900	83,200	167,800
76	26,800	.0092	42,400	-13,800	-3,900	3,300	11,800	31,500	84,500	162,700
77	27,500	.0094	42,600	-13,200	-3,800	3,800	12,300	33,200	82,600	145,000
78	28,300	.0097	51,900	-14,900	-3,800	4,100	12,500	31,900	82,400	148,500
79	29,100	.0102	44,700	-12,600	-4,000	3,000	11,700	29,200	75,700	145,400
80	30,000	.0103	49,800	-15,400	-4,200	4,000	12,500	32,700	93,600	184,700
81	30,900	.0112	50,400	-11,900	-3,300	3,200	11,900	32,300	87,500	164,400
82	31,800	.0113	46,200	-13,900	-4,300	3,100	11,500	30,100	86,700	165,700
83	32,800	.0118	47,800	-12,800	-3,600	3,300	11,700	31,700	91,900	174,100
84	33,900	.0121	46,000	-13,700	-4,400	3,600	11,800	30,700	93,800	178,300
85	35,000	.0136	46,800	-14,300	-4,100	3,700	12,200	30,800	90,000	181,200
86	36,200	.0147	55,100	-13,200	-4,200	3,500	12,000	33,300	100,800	206,800
87	37,400	.0172	59,400	-14,500	-4,500	3,600	11,800	33,800	108,100	212,600
88	38,700	.0191	52,100	-15,000	-5,300	2,300	11,400	35,100	110,800	221,600
89	39,900	.0200	55,600	-16,700	-4,900	2,900	11,500	34,000	111,700	226,300
90	41,500	.0204	59,000	-17,200	-5,500	2,400	11,400	32,500	99,800	209,800
91	43,300	.0210	53,200	-16,500	-5,100	2,800	11,400	30,700	99,900	213,000
92	45,500	.0226	58,500	-16,100	-5,000	3,200	11,600	32,700	100,900	208,600
93	48,300	.0247	68,300	-14,900	-4,700	3,800	11,700	34,600	106,800	226,200
94	51,900	.0281	50,600	-15,500	-4,800	3,400	11,700	35,500	113,500	250,000
95	56,700	.0326	73,800	-17,800	-5,800	3,300	11,700	35,000	120,500	265,700
96	63,400	.0391	83,600	-18,300	-5,600	3,600	12,000	38,100	134,400	310,900
97	73,400	.0503	96,100	-20,200	-5,900	3,600	12,500	41,900	161,500	373,900
98	90,100	.0710	120,400	-24,100	-7,500	2,900	12,700	48,000	200,000	470,000
99	128,200	.1508	306,800	-42,800	-12,400	200	13,600	74,900	431,600	1,162,400

Notes: Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. Individuals are ranked by fiscal income (constructed as 'total income' from the Survey of Personal Incomes), and then grouped into percentiles of the 15+ population using the ONS mid-year population estimates to give the population control total. Since individuals below the 40th percentile are not necessarily in the income tax data – either because they have no income, or because their income is below the 'personal allowance' so may not be reported – we group these individuals into a single '<40' category. Columns show the minimum income needed to be in a given percentile, the share of individuals with any gains, the mean gains conditional on having any gains, and percentiles of the distribution of gains given any gains.
Source: Authors' calculations based on HMRC administrative datasets.

Table A2: Distribution of gains at the top of the income distribution

Centiles of income dist.	Percentiles of gains among those with any gains											
	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th
90	-17,200	-5,500	-1,400	0	2,400	5,200	8,100	9,900	10,800	11,400	12,900	15,600
91	-16,500	-5,100	-1,200	300	2,800	5,500	8,100	9,900	10,900	11,400	12,800	15,300
92	-16,100	-5,000	-1,200	300	3,200	6,100	8,700	10,200	11,000	11,600	13,200	15,700
93	-14,900	-4,700	-800	800	3,800	6,600	9,100	10,400	11,000	11,700	13,700	16,700
94	-15,500	-4,800	-1,000	600	3,400	6,600	9,100	10,500	11,000	11,700	13,700	16,600
95	-17,800	-5,800	-1,300	300	3,300	6,300	8,800	10,400	11,000	11,700	13,500	16,500
96	-18,300	-5,600	-1,200	500	3,600	6,800	9,200	10,500	11,100	12,000	14,000	17,200
97	-20,200	-5,900	-1,400	300	3,600	7,000	9,500	10,700	11,200	12,500	15,000	18,800
98	-24,100	-7,500	-1,800	0	2,900	6,500	9,400	10,700	11,200	12,700	15,500	19,800
99	-42,800	-12,400	-4,400	-1,100	200	3,700	7,600	10,400	11,200	13,600	18,000	24,300

Centiles of income dist.	Percentiles of gains among those with any gains										
	65th	70th	75th	80th	85th	90th	95th	96th	97th	98th	99th
90	19,300	24,600	32,500	44,400	62,400	99,800	209,800	249,900	339,700	522,300	975,000
91	18,800	23,500	30,700	42,500	61,700	99,900	213,000	257,400	352,800	500,600	891,500
92	19,900	24,700	32,700	44,400	62,700	100,900	208,600	255,400	358,400	524,100	919,400
93	20,700	26,100	34,600	46,500	66,800	106,800	226,200	291,200	403,000	590,900	1,246,900
94	20,600	26,100	35,500	47,500	69,100	113,500	250,000	316,700	411,800	570,600	1,081,900
95	20,800	26,000	35,000	49,000	70,300	120,500	265,700	329,000	464,100	692,100	1,281,300
96	22,000	28,000	38,100	54,300	80,000	134,400	310,900	391,200	542,100	847,200	1,529,400
97	23,800	30,900	41,900	60,400	91,000	161,500	373,900	480,000	640,100	988,500	1,810,300
98	25,400	34,700	48,000	69,700	110,100	200,000	470,000	605,300	840,700	1,213,400	2,218,000
99	34,300	49,800	74,900	119,600	210,400	431,600	1,162,400	1,517,200	2,130,700	3,250,100	6,192,200

Notes: Constructed using data on all reported taxable capital gains and reported fiscal income going to individuals in 2017. Individuals are ranked by fiscal income (constructed as 'total income' from the Survey of Personal Incomes), and then grouped into percentiles of the 15+ population using the ONS mid-year population estimates to give the population control total. Columns show percentiles of the distribution of gains given any gains.
Source: Authors' calculations based on HMRC administrative datasets.

Appendix B   Data Construction

B.1   Calculating realised gains

We measure taxable capital gains using microdata collected from tax form SA108 ('Capital Gains Summary'). Our population for gains covers all individuals who reported gains. We do not include gains on assets held in trust, which are reported by trustees (trust gains totalled £3.3 billion in 2018).

From 2009 onwards, our measure is the full nominal gain liable to Capital Gains Tax, net of any in-year losses. We exclude any losses brought forward from previous years, since these are captured in the year in which the losses were realised.

Until 2008 the reported gains are complicated by two policies: taper relief and indexation allowance. Taxpayers reported their net gains after adjusting for the benefits provided by these gains. Taper relief applied on disposals between 1999 and 2008 to reduce the proportion of the reported gain liable to capital gains tax. The relief was larger the longer an asset had been held. A faster taper rate applied to business than to non-business assets, and the taper structure for business assets was adjusted on several occasions during this period. Our measure of gains is not directly impacted by this relief because our microdata allows us to observe the amount of gain before the relief was applied. However, the policy can be expected to have had a significant impact on taxpayer behaviours, in particular by strongly favouring business assets held for at least two years, for disposals made between 2003 to 2008.

Indexation allowance also applied on disposals until 2008. From 1988, gains accruing before 1982 were in effect free of tax, as the value of the asset was rebased to its market value March 1982. Nominal gains accruing since 1982 were reduced by a factor equal to the increase in the Retail Price Index over the period for which the asset had been held, such that only the real gain was taxable. From 1999 until 2008, indexation allowance was frozen (having been replaced by taper relief), such that the part of the gain that accrued between March 1982 to March 1998 continued to be reduced by indexation allowance, but the full nominal gain after March 1998 was taxable, although eligible for taper relief. The microdata do not enable us to observe directly the full amount of the nominal gain prior to indexation allowance at the individual level. However, we are able to make an aggregate adjustment to our results that recovers the full nominal gain, to achieve a measure that is consistent with the definition of gains applying to disposals from 2009 onwards, when indexation allowance was completely abolished.

To do this, we use tables published by HMRC on the breakdown of assets liable to CGT by holding period—the length of time for which the asset had been held prior to disposal (see Section 2.3). These tables are compiled by HMRC based on a stratified sample of SA108 returns: for this sample HMRC manually codes the dates of acquisition and disposal based on information provided by the taxpayer on the form. The length of period of ownership information is presented in bins of one or more years, including open-ended bins (e.g. 10yrs+). For 1997-2008 this information was reported in specific boxes on the SA108 return. From 2009 onwards, this information was included as free text in the 'additional information' box, leading to an increase in the proportion of assets of 'unknown' holding duration after 2008.

To undo the effect of indexation allowance, we take the following steps for each tax year:

1. Use HMRC holdings length table to construct aggregate gains and disposals by 'year of acquisition' as follows:

   (a) For each holding length we sum across all asset types, to construct an all-asset holding length distribution.

   (b) For assets of unknown holding length, we assign disposal value to the known bins in proportion to disposal value in each bin, and assign gains to the known bins in proportion to gains in each bin

   (c) Within each holding-length bin, we distribute disposals/gains evenly to each tax year within bin, based on mid-point within tax years.

   (d) For upper unbounded bin: we distribute unallocated disposal values and gains beyond the period covered by bounded bins by reducing the yearly allocation of disposed assets/gains by 30% every 5 years until the full amount is reached.[20]

   (e) For years 1997 and 1999 where HMRC holdings tables are unavailable, we assume the same distribution of holding lengths as in 1998; for 2018 where they are not yet released, we use 2017.

   (f) Finally, we scale gains in HMRC tables to match aggregate gains based on SA108 microdata.

2. For each 'year of acquisition' bin, we subtract aggregate gains from aggregate disposal value to give aggregate acquisition value.

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[20]Bounded bins in the HMRC tables go back only 10 years in some year, and up to 25 years in others. The years with a longer span of bins indicate roughly a 30% reduction in asset age between 5-10 and 10-15 year bins, and another 30% between 10-15 and 15-20 year bins.

Figure B1: Aggregate capital gains once indexation allowance is removed, 1997-2008
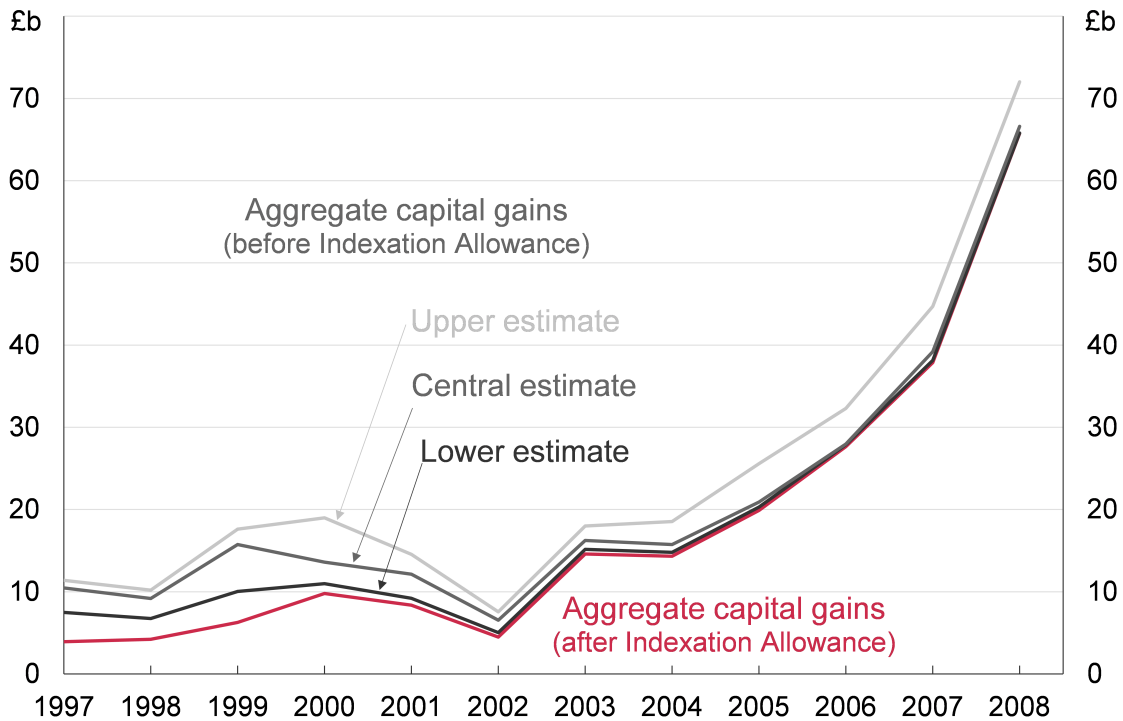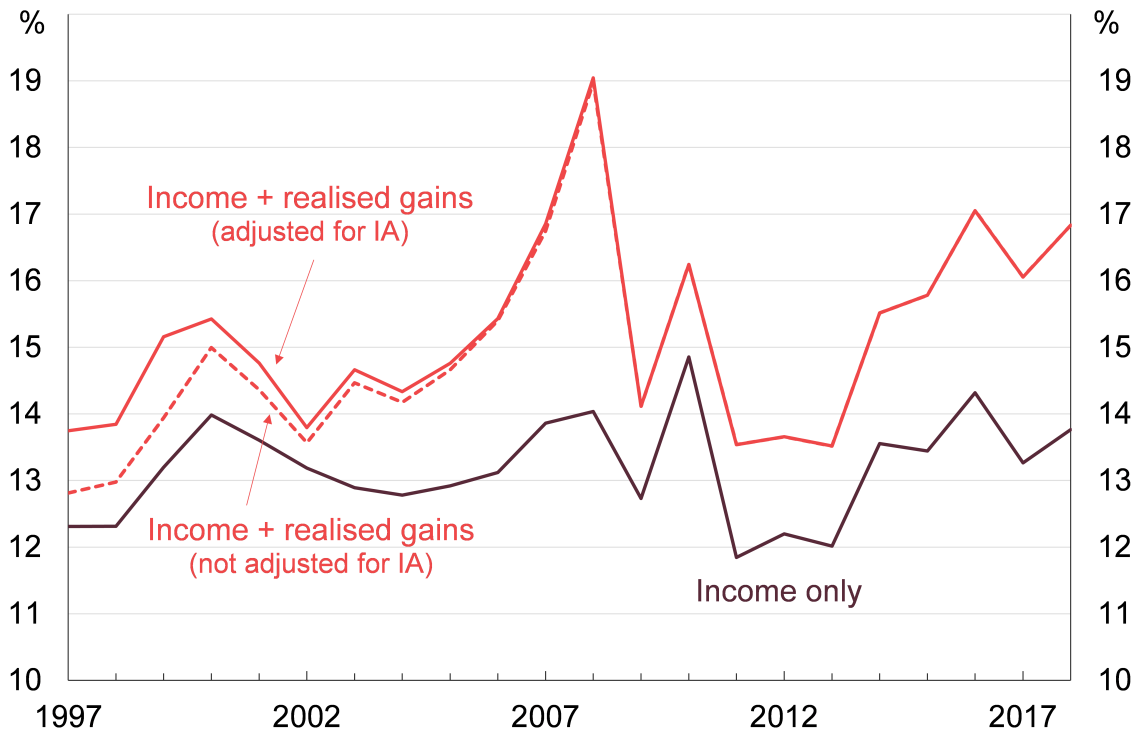
Notes: *Constructed using data on all reported taxable capital gains going to individuals. See Section B.1 for details on how indexation allowance is removed. Upper, central, and lower estimates refer to different assumptions about the holding length period for gains where holding length is recorded as unknown. Series only runs to 2008, as indexation allowance then abolished so microdata are already without indexation allowance.*
Source: *Authors' calculations based on HMRC administrative and survey datasets.*

3. For tax year bins between 1982-1998, we multiply the aggregate acquisition value by the appropriate indexation factor, taking the mid-point in the tax year (October), to give the aggregate amount of Indexation Allowance. Assets acquired in 1982 or earlier are indexed as at March 1982, since the policy treated this as the earliest possible effective acquisition date. We take indexation factors from the Indexation Factor table in Inland Revenue (1999). These factors are based on the change in Retail Price Index over the period until March 1998.

4. To recover the full nominal gain before indexation allowance for each realisation year, we sum gains based on SA108 microdata (before taper relief but after indexation allowance) with the indexation allowance for that realisation year aggregating across acquisition years.

These steps produce our 'central estimate' of gains before indexation allowance. For the 'lower estimate', we assume that all of the assets in the 'unknown' bin were acquired in the current year and that all of the assets in the unbounded upper bin were acquired in the most recent possible year. For the 'upper estimate', we assume that all of the assets in both the 'unknown' bin and the upper

Figure B2: Impact of indexation allowance on estimates of top shares, 1997-2018

Notes: *Constructed using data on all reported taxable capital gains and fiscal income going to individuals. See Section B.1 for details on how indexation allowance is removed. The solid red series shows our main series, as elsewhere in the paper, after indexation allowance is removed, using the 'central' assumption on how this is done. The dashed red series shows the series without making adjustments for indexation allowance.*
Source: *Authors' calculations based on HMRC administrative and survey datasets.*

unbounded bin were acquired in 1982 (the earliest possible year, after rebasing). Figure B1 shows how our estimates of aggregate gains before indexation allowance (and taper relief) vary with these assumptions about the distribution of unknowns. The pattern since 2002 is similar across all cases, although the level is higher when we assume all unknowns were acquired at the earliest possible period. Prior to 2002 there is a bit more variation in the size of the effect, both in terms of the difference from the unadjusted series, and across the different cases. Henceforth we focus on the central estimate

Figure B2 shows how accounting for indexation allowance, as we do in our primary specification, changes our top 1% series. Not accounting for this adjustment would lead nominal realised taxable gains to have been lower in the early part of our series, and have no effect subsequently. Hence without adjustment inequality would appear to be rising even faster.

B.2 Estimating Accruals

To estimate gains on an accruals basis, we need to distribute realised gains back over the period in which they were held. We follow a seven-step process:

1. For gains realised in a particular year, we use the HMRC tabulations on length of holdings to distribute them across acquistion years. To do this we follow the approach described in Appendix B.1.

2. We add in the value of indexation allowance, again as in Appendix B.1. We take the central estimate of Indexation Allowance.

3. We split the realised gains from each acquisition year equally over the time between acquisition and disposal.[21]

4. We deflate these values from realisation year £ to acquisition year £, so it is on the same basis as the income values.

5. We sum across acquisition years to get gains accrued in each year.

6. We then adjust recent years (2012 and later) to account for gains that have been accrued for these years but have not yet been realised. To do this:

   - We estimate the share of accrued gains that are based on acquisitions within the current year, between one and two years ago, and so on. We do this between 2009 and 2011.[22]

   - We then assume those shares remain constant in more recent years, and scale up the observed accruals to account for unrealised gains. For example, the data suggest assets held for less than one year account for 20% of gains from assets acquired in the last ten years, suggesting gains in the most recent year should be scaled by a factor of five.

7. Finally we impute accrued gains to the top shares according to the shares of realised gains that they received that year.

Figure B4 shows the effect of doing this procedure on the total value of accrued gains, scaling up only the last observed year in any series. The solid blue line is the unadjusted accruals series. The

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[21]An alternative approach would be to use data on asset prices to create an accruals series that was more responsive to macro shocks.

[22]Figure B3 shows how the share of assets from different holding lengths has changed over time. Clearly there is a change in behaviour between the recent past and the period up to 2008 when a different policy regime was in place. That regime explicitly encouraged slightly longer holding durations. Hence we do not use that period for estimating current durations, as it would likely lead to a vast overestimate of the amount of currently accruing gains.

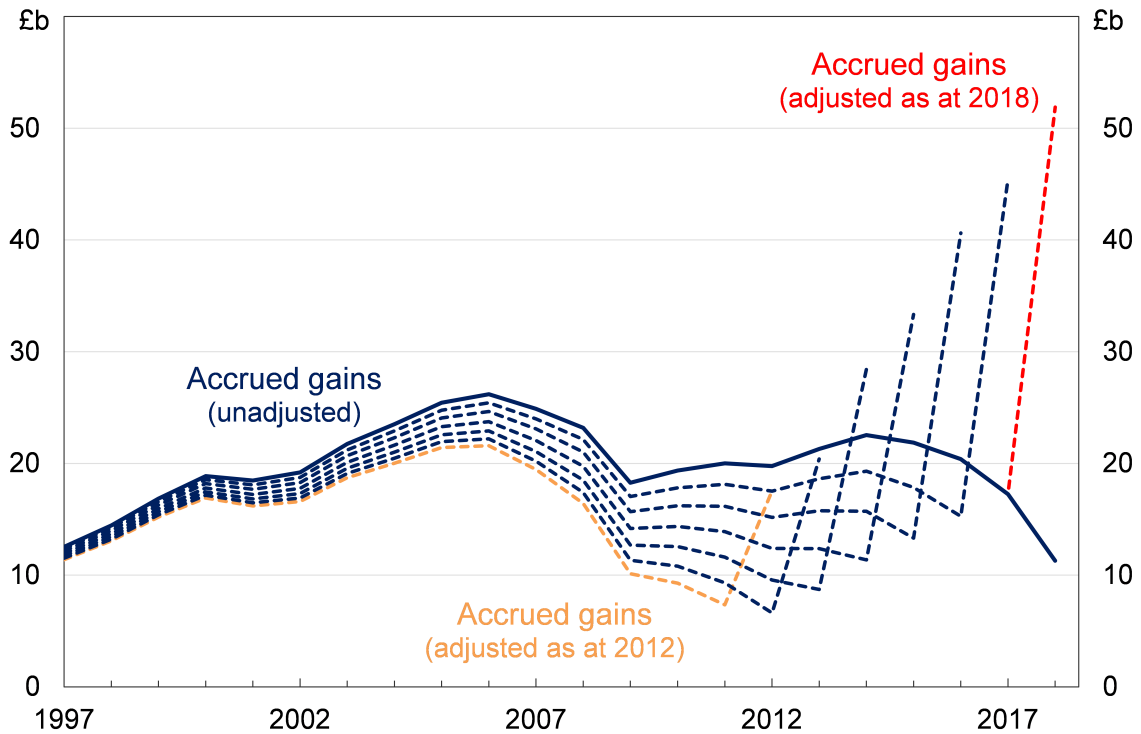**Figure B3: Share of realised gains (by value) held for different holding lengths, 1997-2018**
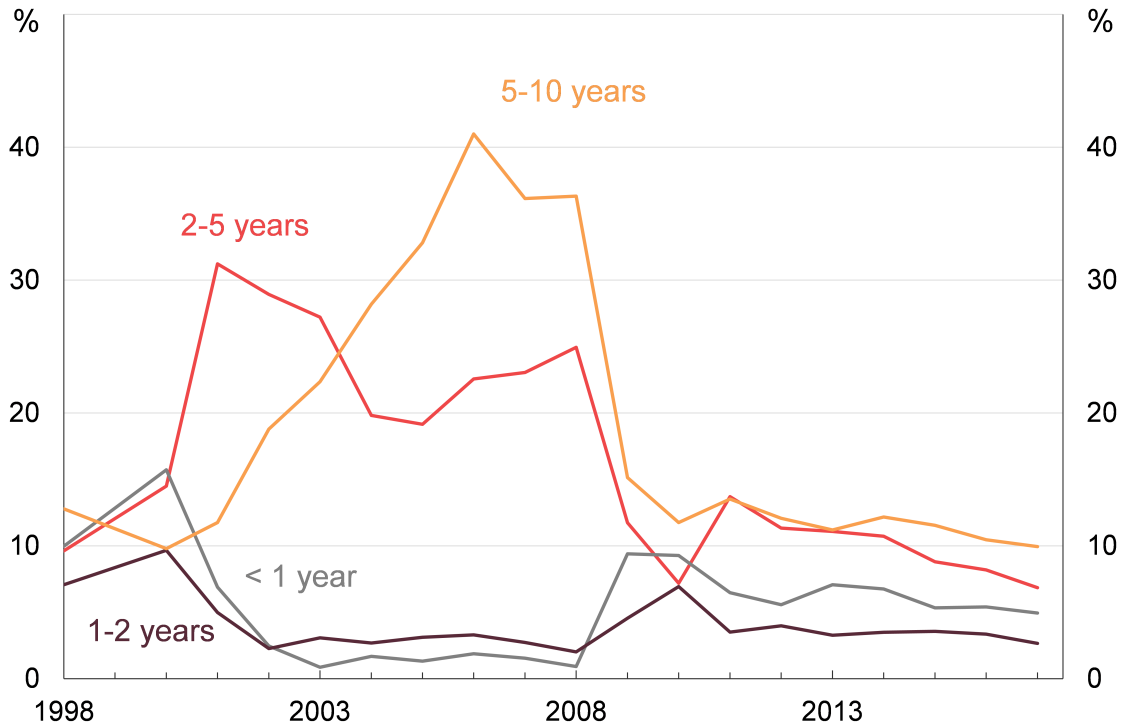
dotted red line shows the effect of scaling up just the 2018 realisation (within year) to account for gains that would – on past performance – be expected to be realised in the subsequent ten years. The dashed blue lines show the effect of using only data up to some earlier year and only scaling the latest year that we assume we have, to give a sense for how sensible this approach is. Clearly with fewer years of data we underestimate the unadjusted accruals series by more, but we also see that the scaling approach looks relatively conservative. Only from 2014 do we estimate that there will ultimately be more accrued gains than we have currently observed.

Figure B5 repeats the exercise, but now for any given 'final' year, scaling up all of the last ten years to account for any gains expected over the subsequent ten years. Now the adjusted series looks closer to the unadjusted series up until 2009, after which it begins to diverge substantially from the unadjusted series, with ultimately the same 2018 end point. This is the approach we take to produce our capital gains on an accruals basis series in Figures 7 and A6

Figure B4: Estimating aggregate capital gains on an accruals basis, adjusting only the final year to account for future realisations, 1997-2018

Notes: Constructed using data on all reported taxable capital gains going to individuals. See Section B.2 for details on how accrued gains are estimated from realised gains. The solid blue line is the unadjusted accruals series. The dotted red line shows the affect of scaling up just the 2018 realisation (within year) to account for gains that would – on past performance – be expected to be realised in the subsequent ten years. The dashed blue lines show the effect of using only data up to some earlier year and only scaling the latest year that we assume we have. The orange dashed line picks this out for 2012, for ease of reading.
Source: Authors' calculations based on HMRC administrative and survey datasets.

Figure B5: Estimating aggregate capital gains on an accruals basis, adjusting the final ten years to account for future realisations, 1997-2018
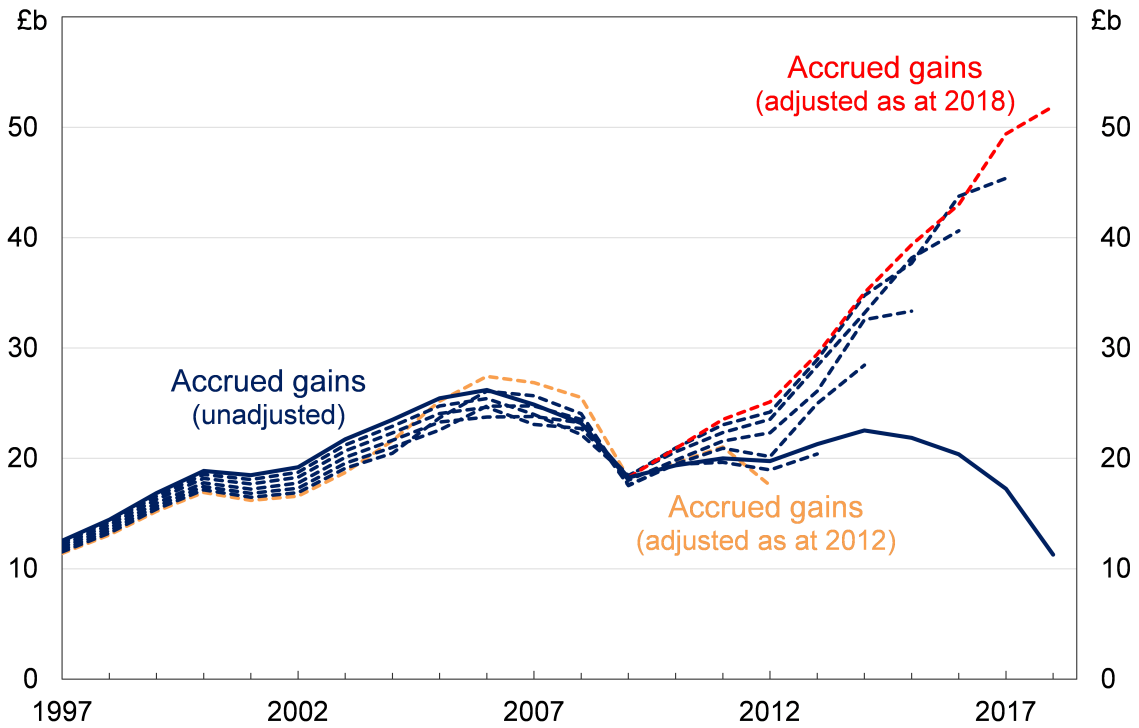
Notes: *Constructed using data on all reported taxable capital gains going to individuals. See Section B.2 for details on how accrued gains are estimated from realised gains. The solid blue line is the unadjusted accruals series. The dotted red line shows the affect of scaling up in 2018 the past ten years for accruals that are expected to have happened but not been realised by 2018, but expected within ten years of that point in time. The dashed blue lines repeat this to show the effect of this procedure assuming we have data only to some earlier date, for comparison with the outturns. The orange dashed line picks this out for 2012, for ease of reading.*
Source: *Authors' calculations based on HMRC administrative and survey datasets.*