

Top Wealth Shares in the UK over more than a Century

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Abstract

Recent research highlighted controversy about the evolution of concentration of personal wealth. In this paper we provide new evidence about the long-run evolution of top wealth shares for the United Kingdom. The new series covers a long period - from 1895 to the present - and has a different point of departure from the previous literature: the distribution of estates left at death. We find that the application to the estate data of mortality multipliers to yield estimates of wealth among the living does not substantially change the degree of concentration over much of the period both, in the UK and US, allowing inferences to be made for years when this method cannot be applied. The results show that wealth concentration in the UK remained relatively constant during the first wave of globalization, but then decreased dramatically in the period from 1914 to 1979. The UK went from being more unequal in terms of wealth than the US to being less unequal. However, the decline in UK wealth concentration came to an end around 1980, and since then there is evidence of an increase in top shares, notably in the distribution of wealth excluding housing in recent years. We investigate the triangulating evidence provided by data on capital income concentration and on reported super fortunes.

JEL Codes: D3, H2, N3

Keywords: *wealth inequality, estates, mortality multipliers, United Kingdom, United States*

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1. Introduction: The distribution of personal wealth

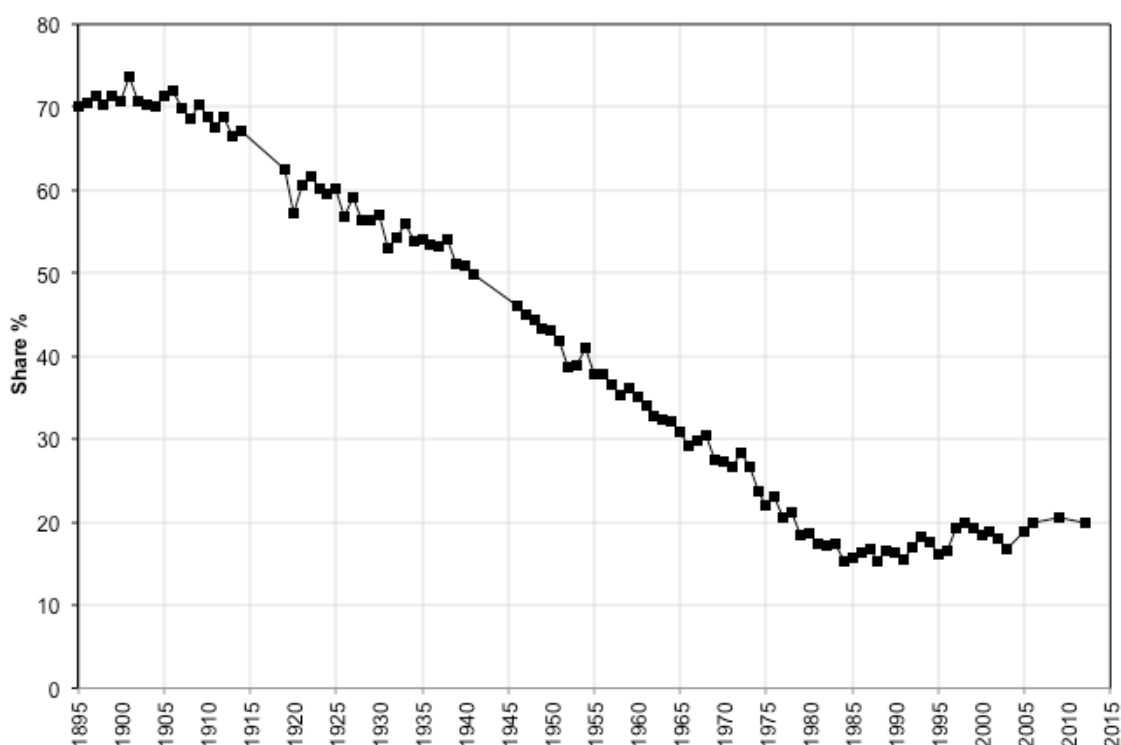
Economists have recently focused on the distribution of personal wealth. There have been two main sources of impetus. One is the recognition of the importance in macro-economics of assets and liabilities, as demonstrated by the investments being made in launching household financial surveys, and by the renewed interest in balance sheets in national accounts. Another impetus has come from Thomas Piketty's *Capital in the Twenty-First Century*, in which he warned that the main driver of inequality - the tendency of returns on capital to exceed the rate of economic growth - today threatens to generate extreme inequalities. The debate generated by this book has turned the spotlight on the empirical evidence concerning the upper tail of the wealth distribution, and the importance of historical time series. As Kopczuk has underlined, "estimates of the top wealth shares are much less settled than those of the top income shares, and there is substantial controversy about how they have evolved in recent years" (2016, page 2).

This paper presents new long-run evidence about top wealth shares - which we believe to be essential in understanding the evolution of the modern economy - for the United Kingdom (UK). It builds on the earlier line of research, summarized in Atkinson and Harrison (1978), and on the work of the official statisticians in Her Majesty's Revenue and Customs (HMRC), but has a different point of departure: the distribution of estates left at death, recorded in the administrative data required for estate taxation and the administration of estates. The evidence covers an extensive period, starting in the "Gilded Age" before the First World War. The long-run results since 1895 highlight the enormous transformation of the distribution of wealth within the UK over more than a century. Figure 1, previewing the main estimates, shows that in the wake of the first modern globalization the share of personal wealth going to the wealthiest 1 per cent of UK individuals remained relatively stable at around 70 per cent. The share began to fall after 1914 and the decline continued until around 1980, when the share had decreased to some 16 per cent. This is still 16 times their proportionate share, but represents a dramatic reduction. The fall, however, came to an end around 1980, and since the mid-1980s the share of the top 1 per cent - representing approximately half a million individuals today - has moved in the opposite direction.

What lies behind the long-run estimates for the UK presented in Figure 1? The paper describes the three main methodological steps. Our investigation begins in Section 2 with the estimation of the distribution of estates from the administrative tax data, which covers the longest period of time under investigation (1895 to 2013). As a second step, in Section 3, we estimate wealth concentration applying the mortality multiplier method to the estate data. In the UK, this involves piecing together data for the different years when sufficient information exists on the demographic structure of estates to implement such method. It also means confronting the discontinuity introduced from 2005 when the HMRC ceased publication of the previous official series and adopted a new methodology. In Section 4, we link the different estimates of wealth concentration over time in order to provide a continuous time series from 1895 to 2013. The results cover, in addition to the evolution of top wealth shares, the shape of the upper tail, which builds a bridge with the theoretical literature on thick tails of the wealth distribution (see Benhabib and Bisin, 2016, for a recent review). We pay

particular attention to the role of housing in understanding the dynamics of wealth concentration. The new estimates represent, we believe, an advance on those available to date, but they should be viewed in the context of a variety of potential sources of error, arising both from the underlying method and from the reliance on tax data. In Section 5, we consider the internal validity of the estimates presented here by addressing the main problems with the methods used in their construction, and in Section 6 we apply checks on their external validity through an examination as to how far they can be triangulated with evidence from other sources.

Figure 1. Wealth share of top 1% in the UK 1895-2013



Source: Table G1.

The new evidence about top wealth shares for the UK is compared in Section 7 with the evidence for top wealth shares in the United States (US). There has long been interest in contrasting wealth distributions in the UK and the US (for example, Lydall and Lansing, 1959, and Lampman, 1962). The juxtaposition of the two countries is of particular relevance given the recent critical reviews of the long-run US evidence (Kopczuk, 2015 and 2016, and Sutch, 2015), and the publication of alternative estimates by Bricker et al, 2016, and Saez and Zucman, 2016, the latter finding a particularly sharp rise in the very top wealth shares. Comparisons made half a century ago found wealth to be more concentrated in England, but today the US is seen as the home of major concentrations. If so, when did the countries change position? There are significant differences in the nature of the estate data - in coverage and in the process of assembly - but the sources are sufficiently similar to make the comparison a meaningful one.

In the final Section 8, we summarize the main findings and discuss the implications for the future measurement of the distribution of wealth (see also Alvaredo, Atkinson and Morelli, 2016).

Measuring the distribution of wealth

The paper is concerned with the distribution of personal wealth, or net worth: the value of the assets owned by individuals, net of their debts. Assets include financial assets, such as cash, bank accounts or bonds or company shares, and real assets, such as houses and farmland, consumer durables, and household business assets.

The total wealth considered here differs in important respects from total national wealth, as measured in the national accounts balance sheets. To begin with, we are concerned only with one sector of the economy: the household sector (sector S14 in the national accounts), where this excludes non-profit institutions serving households (sector S15). Secondly, there are differences in the method of valuation, a subject that is often neglected. The balance sheets are in principle based on values observed in the market, but it is necessary to distinguish between “realization” and “going concern” valuations (Atkinson and Harrison, 1978, page 5). Here the nature of the data on individual wealth-holdings at our disposal means that we focus on the former: what a person could realize by the sale of all assets, net of liabilities. The going concern valuation could well be higher than that recorded in the statistics.¹ In the case of household contents (durables, furniture, etc.), for instance, the price obtained on sale is likely to fall considerably short of the value to a continuing household (or the replacement cost). A less common, but quantitatively important, example is that of business assets, where the realization value is likely to be less than the valuation on “going concern” basis. As these examples illustrate, the move to a going concern basis would add to wealth at different points on the wealth scale. On balance, moving to a going concern basis is likely to reduce top wealth shares (see Atkinson and Harrison, 1978, pages 112-113), and this should be borne in mind in what follows

In adopting a realization basis, we are open to the charge of departing from national accounting practice. However, it should be noted that the official UK statement about the basis for the balance sheet valuation states that

“market value is an estimate of how much these assets would sell for, if sold on the market” (Office for National Statistics, 2016, Section 2).

This sounds more like a realization basis than a going concern basis. What is more, once we depart from observed market transactions, any estimate of what assets “would sell for” involves a number of speculative assumptions. This applies to a number of classes of assets, but is particularly the case with defined benefit pension rights, both private and

¹ Although this is not invariably the case. In the estate statistics, life assurance policies on the life of the deceased are valued at the sum assured, whereas in the hands of the living their value is less than this amount, whether valued on a going concern or a realization basis. It would be possible to make adjustments to the recorded amounts (see Atkinson and Harrison, 1978, pages 95-99), but this has not been done here. In the same context, no account has been taken of the cash withdrawal/surrender value of defined contribution pensions.

state, where there have been a series of official UK estimates, but these have been subject to substantial revisions (see, for example, *Inland Revenue Statistics 1995*, pages 124-125).

It has also to be remembered that we are concerned about the distribution of wealth not only on account of the potential consumption. Wealth conveys power. The realization basis may be seen as capturing the degree of direct personal control over resources that is one of the major reasons for interest in the concentration of wealth. If, as it has been expressed by Abraham, there is concern that “a growing share of income and wealth is controlled by households in the top 1 percent or top 0.1 percent” (2016, page 313), then it is reasonable to omit assets, such as pension rights, over which the individual has only limited or no control.²

There are five main potential sources of evidence about the distribution of personal wealth:

1. Household surveys of personal wealth, such as the UK Wealth and Assets Survey, conducted by the Office for National Statistics, or the Survey of Consumer Finance conducted by the Flow of Funds Unit of the US Federal Reserve, or the Household Finance and Consumption Surveys co-ordinated by the European Central Bank;
2. Administrative data on individual estates at death, multiplied-up to yield estimates of the wealth of the living, as utilised in the UK by Her Majesty’s Revenue and Customs (HMRC, previously the Inland Revenue);
3. Administrative data on the wealth of the living derived from annual wealth taxes;
4. Administrative data on investment income, capitalized to yield estimates of the underlying wealth;
5. Lists of large wealth-holders, such as the annual Forbes Richest People in America List, or the Sunday Times “Rich List” for the UK, which has been compiled by Beresford (1990, 1991 and 2006).³

For the UK and the US, the third source does not exist: there is no annual wealth tax. Sample surveys are relatively recent: the earliest in the UK and the US were carried out in the 1950s. The Rich Lists are even more recent: the UK Sunday Times list dates from 1989; the US Forbes list started in 1982. This means that long-run historical evidence has to make primary use of sources (2) and (4). The latter, the capitalization of investment income, has recently been revived in the US by Saez and Zucman (2016), and was the subject of research in the UK in the 1970s (Atkinson and Harrison, 1974 and 1978). However, as explained by Alvaredo, Atkinson and Morelli (2016), the data necessary to satisfactorily apply this approach in the UK are unfortunately less readily available than in the US.⁴

The main focus of the paper is therefore on the use of estate data. Estates are not the same as the wealth among the living, but it turns out that the estate distribution provides a valuable point of reference.

² Our estimates equally exclude “human capital” (the capitalized value of future earnings) and the value of rights to state benefits in kind such as health care, education, etc.

³ In some particular cases, population census also provide evidence about the distribution of personal wealth.

⁴ The application of the capitalization method in the UK, as well as a re-evaluation of its limitations, is part of a related, but separate, project.

2. The distribution of estates

The distribution of estates (the net value of property of a deceased person) has commonly served as a starting point for the estimation of the distribution of wealth among the living via the mortality multiplier method, but has never been under extensive scrutiny in and of itself. There are nonetheless reasons to consider the distribution of estates a good starting point, at least in the UK. First, there are tabulated data on the distribution of estates for almost all years from 1895 to 2013 (the missing years are 1915-1918, 1942-1945, 1995 and 2004). The sources of the estate data are listed in Appendix Table A1.⁵ The estimates relate to Great Britain (excluding Ireland) from 1895 to 1973, and the UK (including Northern Ireland) from 1974 onwards. This geographical definition reduces the extent to which the distribution is affected by the division of Ireland in 1921. The estates are taken to refer to adult deaths, where we take adult to mean throughout the period the population aged 18 and over (even though the age of majority changed from 21 to 18 in 1970).⁶ The second main reason for beginning with estates is that the underlying concept is relatively straightforward: it is the wealth left at death, and there is inherent interest in the concentration of inheritances. Thirdly, the estate distribution does not involve the multiplying-up process described in Section 3, and where the choice of mortality multipliers has been the subject of intensive debate.

Figure 2 shows the upper tail of the distribution of estates over the period from 1895 to 2013 (the underlying estimates are given in Appendix Table E1; the top shares in total estates are interpolated from the published tabulations classified by ranges of estate size).⁷ The changes in top shares may be summarized in terms of the three periods marked by vertical lines in Figure 2. The first of these is the twenty-year period leading up to the First World War. There was a scarcely perceptible decline in the top shares: that for the top 1 per cent went from 69.2 per cent in 1895 to 67.3 per cent in 1914. The groups at the very top saw an actual increase in their share: that of the top 0.1 per cent rose from 31.8 per cent to 33.1 per cent, and that of the top 0.05 per cent from 23.9 to 25.4 per cent. The last of these figures means that the top 0.05 had more than 500 times their proportionate share of total estates. At the other end of the scale, the bottom 90 per cent had very little wealth at death. In short, estates were highly concentrated at the top, and there was overall little sign of change.

The second period covers more than half the twentieth century: from 1914 to 1980. This encompassed two world wars, and much attention has been paid to the loss of capital during the periods 1914 to 1918 and 1939 to 1945. Top shares certainly fell in the UK during the war years, but these only accounted for a part of the large reduction that took place over the period as a whole. The share of the top 1 per cent in total UK

⁵ The data are based on a sample, as described in Appendix I.

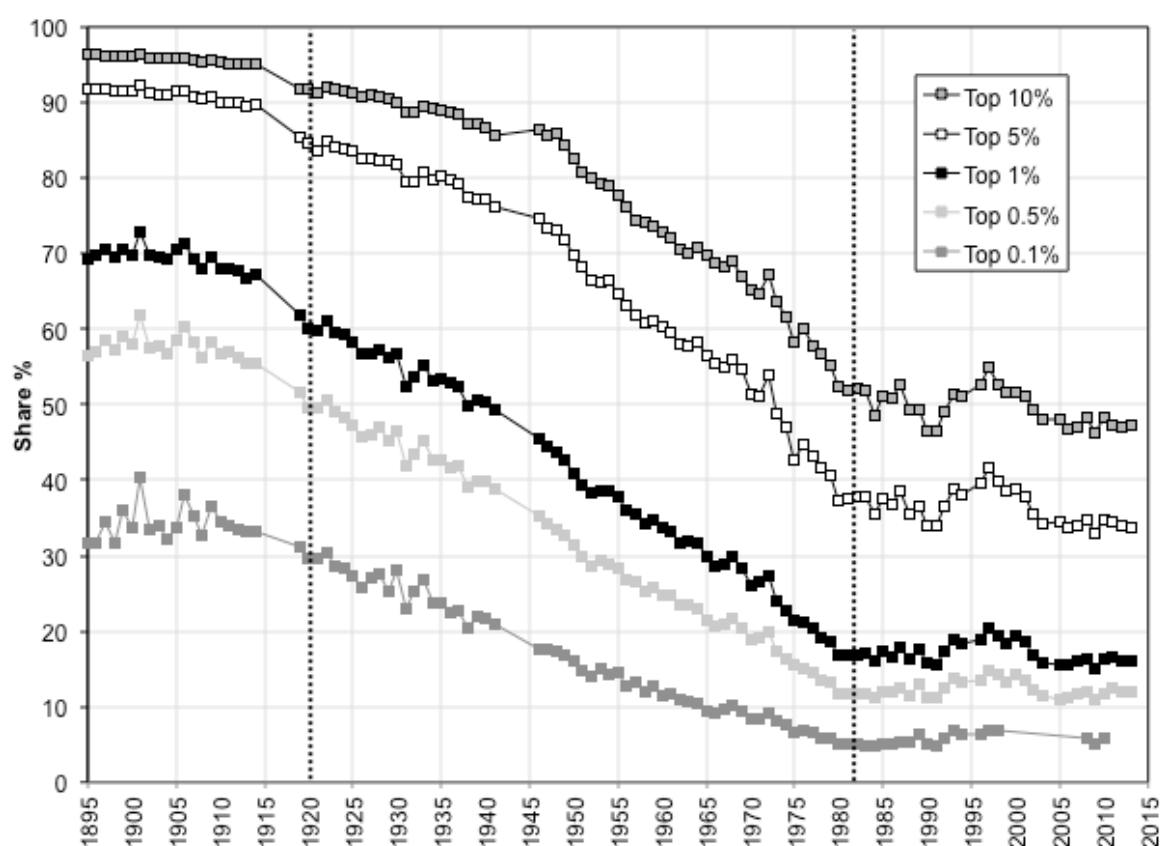
⁶ This definition follows that in the official Inland Revenue (IR)/Her Majesty's Revenue and Customs (HMRC) estimates of the distribution of wealth. At one point, the IR defined the adult population as those aged 15 and over (see, for example, *Inland Revenue Statistics* (IRS) 1976, Table 108), but with effect from IRS (1978) this was changed to 18 and over (see IRS 1978, page 79). Earlier studies of the distribution of wealth took those aged 20 and over (Lydall and Tipping, 1961) or even 25 and over (Daniels and Campion, 1936). On the grounds that there had been a downward trend in the age of economic independence, Atkinson and Harrison (1978) took a cut-off that began at 23 in 1923 and then fell by 1/10th of a year until reaching 18 in 1972.

⁷ The interpolation makes use of the mean split histogram; see Atkinson (2005).

estates fell by 48.7 percentage points between 1914 and 1979, but the war years only contributed 10.5 percentage points. The share of the top 0.1 per cent fell by 27.2 percentage points, but again only a quarter (6.2 percentage points) took place during the war years. The large decline in top shares was very much a peacetime phenomenon.

The third period is from 1980 to the present. There have been year-to-year variations, but over the thirty years as a whole little change in top estate shares. The share of the top 1 per cent ended in 2013 at virtually the same figure as in 1980. The share of the top 0.5 per cent was higher by 1 percentage point, but that of the top 5 per cent was lower by 1.5 percentage points.

Figure 2. Distribution of estates in the UK 1895-2013



Source: Table E1.

The nature of estate data

The estate data are important both in their own right and because they provide the basis for the estimation, using the mortality multiplier method, of the wealth of the living discussed in the next section. The existence of the data reflects the institution of a single Estate Duty in 1894, substituted in 1975 by the Capital Transfer Tax, which was in turn replaced by the Inheritance Tax (IHT) in 1986, currently in place. The data derive from the legal process of administering the estate of a deceased person, which is a complex business. All claims need to be resolved, and the deceased persons's property

distributed according to the will or according to the legal provisions in the case of the person dying intestate. Before allowing an executor (usually indicated within the will) to administer the estate, a Court has to validate and prove the will (granting probate). This legal process of probate defines the true definitive testament of the deceased person and, in doing so, provides (often professional) assessments of estate valuation.⁸ The latter are then used to submit the IHT form in order to work out if any tax needs to be paid. After submitting the form (required within one year from the death), the executor or the administrator of the estate needs to swear an oath stating that the information given is true and accurate. It is after this process that usually the court issues a Grant of Representation (known as confirmation in Scotland and probate in the rest of the UK).⁹

Not every estate needs a Grant of Representation by the Probate Registry. In particular, a grant is not required for assets below the probate limits (currently £5,000), or for assets above the probate limit held jointly and therefore passing automatically to the other joint owner (e.g. a surviving spouse or civil partner). However, assets for which a grant of representation is not required are still recorded in our data to the extent that the estate of the deceased also includes assets for which a grant of representation is needed.

As a result, the estates identified in our data, referred to as the “identified” estates, cover only a fraction of all deaths in a year (see Appendix Figure C1), currently around a half. Therefore, an estimate of the total value of estates including those not covered by the estate returns, referred to here as the “excluded estates”, is required to derive top estate shares. The need to estimate the amount of “excluded wealth” is an important limitation of the estate method. At the same time, on the plus side, it is evident from the description given above that the valuation of the identified estates is the result of a much more thorough process than is likely to be carried out when collecting wealth data in other forms.

The derivation of the estate total

The total of estates is taken as the sum of the identified total in the estate returns plus an estimate of the total of excluded estates. The latter is in turn calculated from the estimated total wealth excluded from the wealth estimates described in the next section, by making the assumption that the amount of excluded estates passing in a year is given by the mortality rate of the excluded population (the ratio of deaths among the excluded population to the total number of living persons in that population) times the excluded wealth. In other words, it is assumed that the average wealth of the dying among the excluded population is equal to the average for the living in that population. Such an assumption would not be appropriate if applied to estates as a whole - as we

⁸ According to the National Audit Office Report on Inheritance Tax (2004), professionals are engaged in around 70 per cent of cases of probate.

⁹ The linkage with the probate system significantly reduces the risk of the non-filing of tax returns in the UK (see National Audit Office, 2004, page 25). On the contrary, probate is obtained before paying the Federal Taxes in the United States.

discuss in the next parts of the paper - but may not be unreasonable as a first approximation when applied to a group whose wealth is by definition limited.¹⁰

Beyond the estimation of the value of the excluded estates, there are a number of criticalities with the use of the estates statistics, which are discussed in later sections.

3. The distribution of wealth based on the estate multiplier method

The distribution of wealth of the living is conceptually different from that of the decedents. Death does not “sample” randomly the population. Older individuals, as well as males and people from poorer backgrounds, have, other things being equal, higher mortality risk. Differential mortality multipliers can however be used to transform the estate data into estimates of wealth-holding. Under the assumption that death is random within specific cells of observed demographic and social strata, one can view death occurrence as an effective sampling of the living population.

The inverse of the death rate, and hence the mortality multiplier, varies considerably with age: for example, in 1968 the general mortality multiplier for men varied from 3.74 for those aged 85 and over to 1102.18 for those aged under 25. Applying such differentials could be expected to lead to a distribution of wealth that differs a great deal from the distribution of estates. The impact could be expected to be further affected by the use of multipliers that reflect the lower mortality of the wealthy. In the UK, the assumption was initially made that wealth was correlated with social class as defined by occupational categories, and later refined by the introduction of variables such as marital status, home ownership and housing wealth. In what follows, we make use of the official (IR/HMRC) estimates of identified wealth for the period from 1960 and hence accept their choice of multipliers. For much of the period, the official multipliers have been differentiated according to gender, age group, country (England and Wales, and Scotland, in the case of Great Britain), and estate size class. For the period before 1960, we apply the social class mortality multipliers employed in Atkinson and Harrison (1978, Chapter 6) based on occupational classes, where these vary by decade.

The application of the available mortality multipliers to the pre-1960 estates data, and the use of available multiplied tabulations by wealth ranges since 1960, yields estimates of the distribution of *identified wealth* covering 1911 to 2012:

a) for the years 1923 to 1930, 1936, 1938, and 1950 to 1959, tabulations of estates by ranges broken down by age and gender are available, and we apply mortality multipliers and social class adjustment factors to make estimates of identified wealth by ranges (the sources and coverage are listed in Atkinson and Harrison, 1978, Table 6.3); there are in addition tabulations by age and estate size, but not gender, for the years 1911-1914,

¹⁰ A check on the assumption is provided by calculating the implications for the overall ratio for the whole population (included and excluded) of the average wealth of decedents to the average wealth of the living. The values in the early part of the period are around 2, falling to 1.5 in the 1950s. These do not seem unreasonable. Moreover, the fact that, until 1975, the values are considerably above those found by Piketty (2011) in the case of France suggests that the allowance should not be increased (see Appendix Figure C4).

and 1920, and we have also made use of these.¹¹ Estimates derived for the years 1938-1959 refer to Great Britain whereas the pre-1938 period refers to England and Wales.

b) for the period 1960 to 2005, we rely on the published tabulations (IR/HMRC) of identified wealth-holdings by ranges (see Appendix Table A2 for sources); the IR/HMRC applied social class multipliers, varying by age, sex and country; in the course of the period, the IR/HMRC switched from using statistics for the valuation of the estate on a year-of-account basis (the date at which the estate was administered) to using statistics on the more appropriate year-of-death basis.^{12 13} The data for the period between 1960 and 1973 refer to Great Britain, whereas the data from 1974 refer to the UK. These wealth tabulations were used by the IR/HMRC to derive their first “official” estimates of the distribution of wealth in Great Britain from 1960, later referred to as Series A (not covering the excluded population, and therefore of little utility), and Series B (covering the excluded population but with no allowance for the wealth of the excluded population). These estimates were the subject of detailed examination by the Royal Commission on the Distribution of Income and Wealth (1975 and subsequent reports) and by Atkinson and Harrison (1978). Subsequently, the Inland Revenue introduced a Series C that makes adjustments for the wealth of excluded population. This Series C was revised in 1984 (Inland Revenue Statistics 1984, page 43) and continued to be published on an annual basis for years up to 2005 (see Table K1). In addition, the IR/HMRC Series C corrected for under reporting of the wealth of the included population and made adjustments to its valuation. In the research presented here, we are unable to make these additional adjustments, as the underlying data cannot be made available to us.

c) for the grouped years 2001-03, 2005-07, 2008-10, and 2011-2013, we use the new version of the tabulations of identified personal wealth-holdings published by the HMRC; these differ in that, in addition to the grouping of years, the HMRC uses a revised methodology to capture the negative correlation of mortality with (housing) wealth and to apply lower mortality to smaller estates; the results for 2001-03 provide an overlapping observation that is used to link the series (and, in Section 5, to investigate the implications of the change in methodology).

d) differently from other years, for the three years 2008, 2009 and 2010, we have made use of microdata available from the HMRC Datalab, where the data set has been designed so as to ensure anonymity and protect taxpayer confidentiality.

The derivation of the wealth total

The wealth holdings identified by the multiplier process have to be compared with the control total for the population as a whole. The control totals for wealth (and for total

¹¹ For years when estates are not broken down by gender, the social class differential is taken as 2/3 of the male plus 1/3 of the female.

¹² The distributions by range of wealth from 1960 onwards were collected for a number of years in the first edition of Inland Revenue Statistics in 1970, the numbers in earlier years being revised from the previous publications. These numbers have been used for the years 1960 to 1968.

¹³ The IR continued for a number of years to publish the distribution of estates by age and sex of the deceased (for example, Table 112 in Inland Revenue Statistics 1970), but these contain less detail than was available to the IR in making their estimates, and we have therefore relied on their multiplier process.

population) are given in Table D1. To arrive at the wealth control totals, we employ the national balance sheets, but it should be stressed that the control totals are not necessarily equal to the balance sheet totals for the personal sector. It is not simply a matter of replacing the total by one drawn from the published national accounts. Among the major reasons for the difference is the inclusion in the official UK balance sheets of the value of private pensions, which do not fall within the definition of personal wealth adopted here.¹⁴ A further example is provided by the issue of timing. The balance sheet figures refer to a point in time (31st December); the estate data refer (now) to the date of death. The latter seems appropriate, and there is no reason to make the “end-year adjustment” incorporated in the balance sheets.¹⁵

As part of the research carried out by the IR/HMRC, they have, beginning with IRS 1980, published tables on the “Reconciliation of estate multiplier and balance sheet estimates”. The aim is to explain the relationship between *Total Identified Wealth*, obtained by multiplying up the estate data by mortality multipliers, and the information available from external sources, drawing on the national balance sheets. Such a reconciliation exercise was a major development with regard to estimates of the distribution of wealth since it allows for

- i) the wealth of the excluded population;
- ii) differences in coverage/valuation (including under-recording) for which we would like to adjust the totals employed when calculating the shares of top wealth groups;
- iii) differences in coverage/valuation for which adjustments should be made to the ranges of wealth identified in the estate-based estimates.

In 2005, the last year for which the exercise has been published, the total identified wealth is £3,432 billion, to which is added £908 billion (26 per cent) for the wealth of the excluded population (including in this case omitted wealth held in trusts). A similar amount (£826 billion) is added for under recording, and £161 billion is subtracted to allow for differences in the valuation (such as in life policies). The end result of these adjustments - stages i), ii) and iii) - is total marketable wealth (this is the so called Series C total), which is £5,005 billion, or 46 per cent higher than total identified wealth - see Figure 3. The Series C total is considerably less than the total national balance

¹⁴ A further element is that the balance sheet total for the personal sector includes Non-Profit Institutions Serving Households (NPISH), such as sports clubs, churches, universities, and trade unions. In recent years, they have accounted for some 2 per cent of the balance sheet total (HMRC website 2005, Table 13.4) and this should be deducted. The national accounts definition of total personal net worth does not include consumer durables. It also differs in adding an end-of-year adjustment. In earlier years, the national accounts included the value of non-marketable tenancy rights (intangible assets including housing and agricultural tenancy rights), but from the 2012 edition of the national accounts and to be aligned to the European System of Accounts 1995, “non-marketable tenancy rights” have been excluded, reducing net worth in 2005 by £487 billion.

¹⁵ On the other hand, in earlier years the IR data referred to the date at which the estate was administered (“year of account”). Since the period of administration varied considerably, the deaths in question could have occurred in another calendar year: IRS 1980 says of the 1976 year of account data that “while the figures related in the main to deaths in 1976, also included were details of estates where death occurred earlier than 1976, and in a few cases in the first quarter of 1977” (p. 101). This may make quite a difference where asset prices are changing rapidly, and when linking the series allowance is made for the potential difference. It should also be noted that the lengthy process of administration may lead to the IR/HMRC making revisions to the data. For example, revisions to the identified wealth tables for 2002 published by HMRC in 2010 led to a 2 percentage point rise in the wealth share of the top 10 per cent (although a much smaller change in the shares of the top 1 and 0.1 per cent).

sheet figure for the wealth of the personal sector, including an estimate of the value of funded private pension rights, which in 2005 was (excluding NPISH) £6,292 billion.¹⁶

Since the adjustments (ii) and (iii) cannot be carried back in time, we have given priority to consistency over the full historical period from 1895 to 2005. This means that the series of control total wealth in our paper adds the estimates of total identified wealth and the estimated wealth of the excluded population.¹⁷ The addition for the excluded population is necessary, since, as explained above, not all assets and possessions come to notice to tax authorities. In the tax year 2005-6, for example, there were 273,043 estates included in the statistics for the UK, compared with a total of 577,113 adult deaths (see Appendix B for sources). When multiplied up to give an estimate for a point in that year, the resulting number of identified wealth-holders fell considerably short of the total adult population: 18.7 million identified wealth-holders compared with an adult population of 47.1 million. Therefore, for 2005-6, it is necessary to make an addition to total wealth for that owned by the excluded 28.4 million.¹⁸

The starting point for our estimates of the wealth of the excluded population is the set of estimates that were made regularly by the HMRC as part of their reconciliation exercises. These show from 1975 to 2005 (and for 1971) the estimated totals under the headings “small estates” and “joint property” (we do not include omitted property held in trusts). Joint property, typically an owner-occupied house, has always been the larger part of the total wealth of the excluded population, but the ratio of joint property to the remainder has changed from around 2:1 in the 1970s to 10:1 in the 2000s. For earlier years before 1971, we make use of the estimates in Atkinson and Harrison (1978, page 305). As is explained in Appendix C, there are good reasons for supposing that in the period from 1950 to 1970 these earlier estimates are too low. For this reason, we employ the “higher” estimate, rather than the “central” estimate. These earlier estimates are supplemented for the period before 1923 by the series constructed in Atkinson (2013), with the 1895 figure being extrapolated from that for 1896 using the ONS Consumer Price Index. This series did not include jointly owned property, which was then much less important, and the series is increased proportionately by the ratio in 1923. The details of the estimation method are given in Appendix C.

For years beyond 2005, however, this approach cannot be followed, since this was the last year in which the HMRC made an official estimate of excluded wealth. There is therefore an inevitable hiatus in the series. It is true that we have estimates of the total identified wealth from the estate data (which have continued), and the approach closest to that employed up to 2005 would be to add this to a forward extrapolation of the 2005 total for the excluded population. As however is discussed further in Section 5, we have doubts about the identified wealth totals after 2005, and these spill over into any estimate of the excluded wealth total, which depends on both the size and composition of the group that does not appear in the estate statistics. For simplicity, we begin with an alternative approach, using the year-to-year variation of national accounts balance

¹⁶ When NPISH is added, the last item corresponds to the item “Total net worth” (item CGRC) in Table 10.10 of the national accounts.

¹⁷ This was the basis adopted by Atkinson and Harrison (1978, Chapter 6), and Atkinson, Gordon and Harrison (1989), in their long-run series on wealth concentration (reproduced in Table D1).

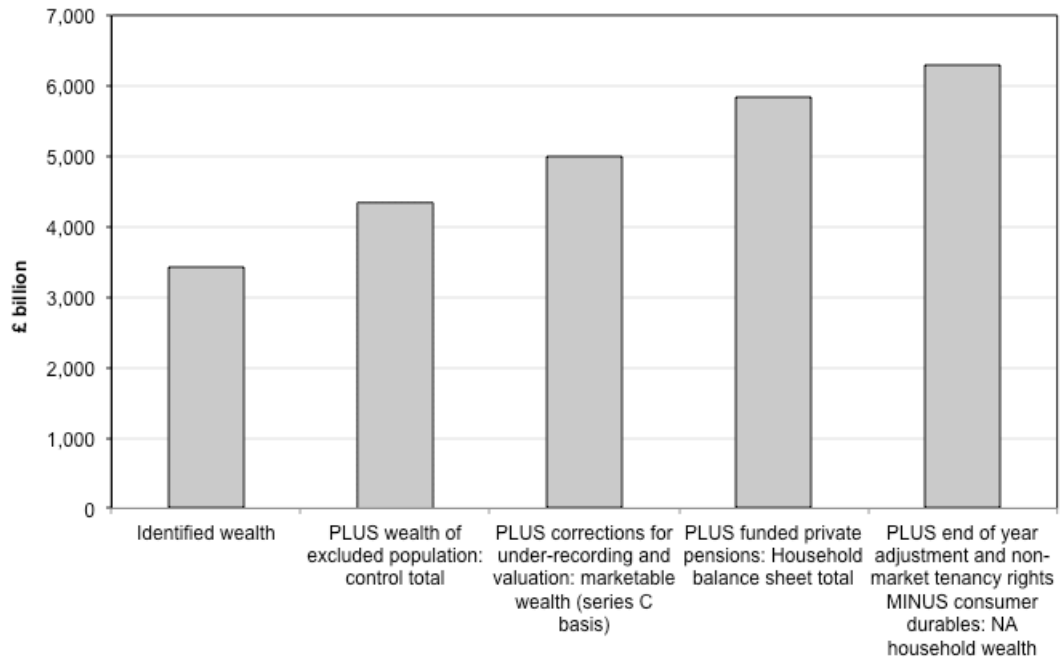
¹⁸ Differently from the case of the US where only approximately 1 per cent of estates are covered by estate statistics, the substantial coverage of the decedent population in the UK allows the derivation of internal measures of total personal wealth.

sheet total for the personal sector. This is the basis for the series developed below, with the control total for 2005 being increased by the same proportion as the rise in the national balance sheet total.¹⁹ We are therefore departing from our earlier practice in employing an external control total - but only for the purpose of linking over time. For the reasons given above, this is not ideal; the UK balance sheet totals also include non-profit institutions serving households. In view of this, we revisit the assumption in the sensitivity analysis in Section 5. A second possibility is to use the personal wealth total (excluding private pension wealth) in the Wealth and Assets Surveys (WAS), taking account of the fact that these relate to interviews carried out over a 3-year period. These, however, show rather different patterns of change over time. The WAS totals show a 1 per cent fall between 2006-08 and 2008-10, whereas the national balance sheet shows a fall of 3.3 per cent; the WAS totals show a rise of 8 per cent between 2008-10 and 2010-12, whereas the balance sheet totals show a rise of 13 per cent. In the absence of a reconciliation of the totals provided by different sources, we employ the national accounts balance sheet figures, but, as discussed further in Section 5, the uncertainty surrounding the control totals limits what we can say regarding the changes in top wealth shares since 2005.

The resulting main series for total wealth per adult combining the identified wealth and the estimated wealth of the excluded population are shown in constant consumer price terms in Figure 4. There is year-to-year variation, but the average remained relatively stable for much of the first three-quarters of the twentieth century: average wealth in 1980 was little higher in real terms than in 1920. There followed a marked rise, with the average at the start of the twenty-first century being some 3 times that in 1980. The threefold increase is similar to that recorded by Kopczuk and Saez (2004a, Table A) for the US between 1916 and 2001, but the time path is quite different, since average wealth in the US had doubled between 1916 and 1980. Among the reasons for the difference are the impact in the UK of house price booms and the spread of owner-occupation, and the transfer of wealth to the personal sector from the public sector as a result of the privatization of state enterprises and public housing. We return to the role of housing below. Figure 4 also compares the series used here - the sum of identified wealth and the wealth of the excluded population - with our attempt to construct from 1911 a “marketable wealth” series comparable with the HMRC Series C (the methods are described in Appendix D). As is to be expected, the marketable wealth series lies typically, but not universally (the adjustments may be negative) above our main series, but the time pattern is close.

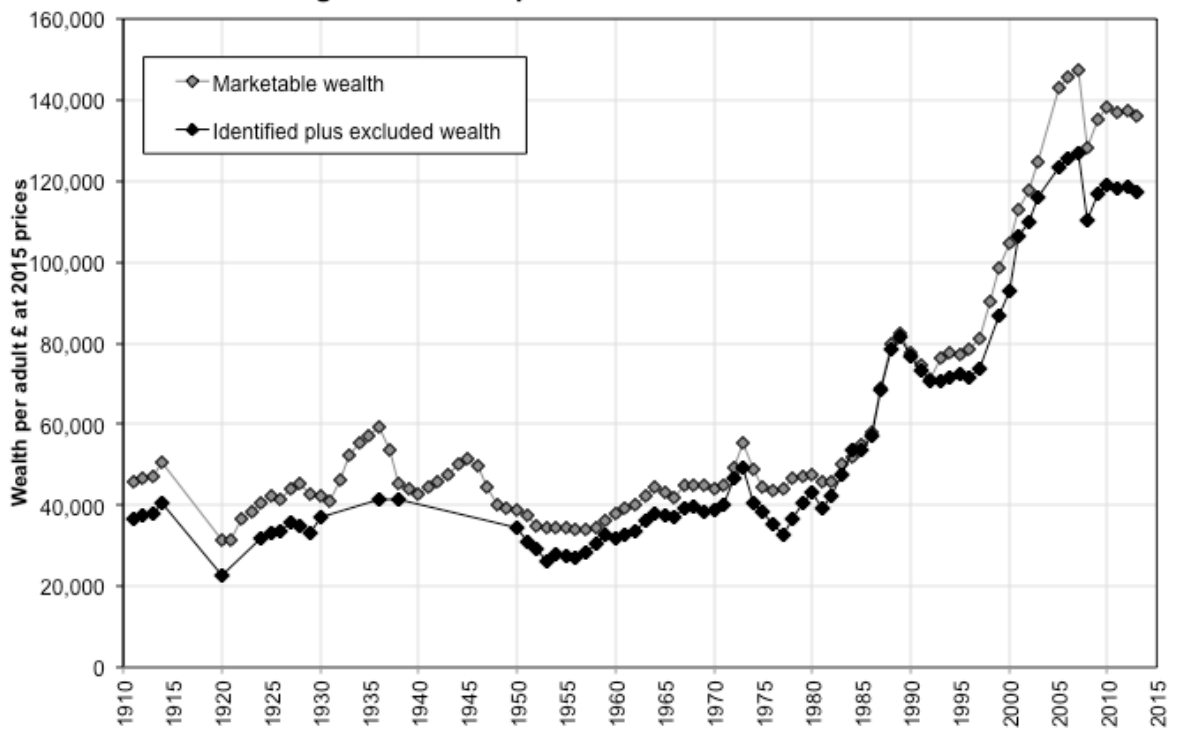
¹⁹ Blue Book 2014, Balance Sheet S.1HN. LE: B90.

Figure 3. Wealth control totals in the UK 2005



Source: Table D1 and HMRC website.²⁰

Figure 4. Wealth per adult in the UK 1911-2013



Source: Table D1.

²⁰ Table 13.4 in

http://webarchive.nationalarchives.gov.uk/20101006170448/http://hmrc.gov.uk/stats/personal_wealth/menu.htm

4. Towards a long-run series for top wealth holdings in the UK

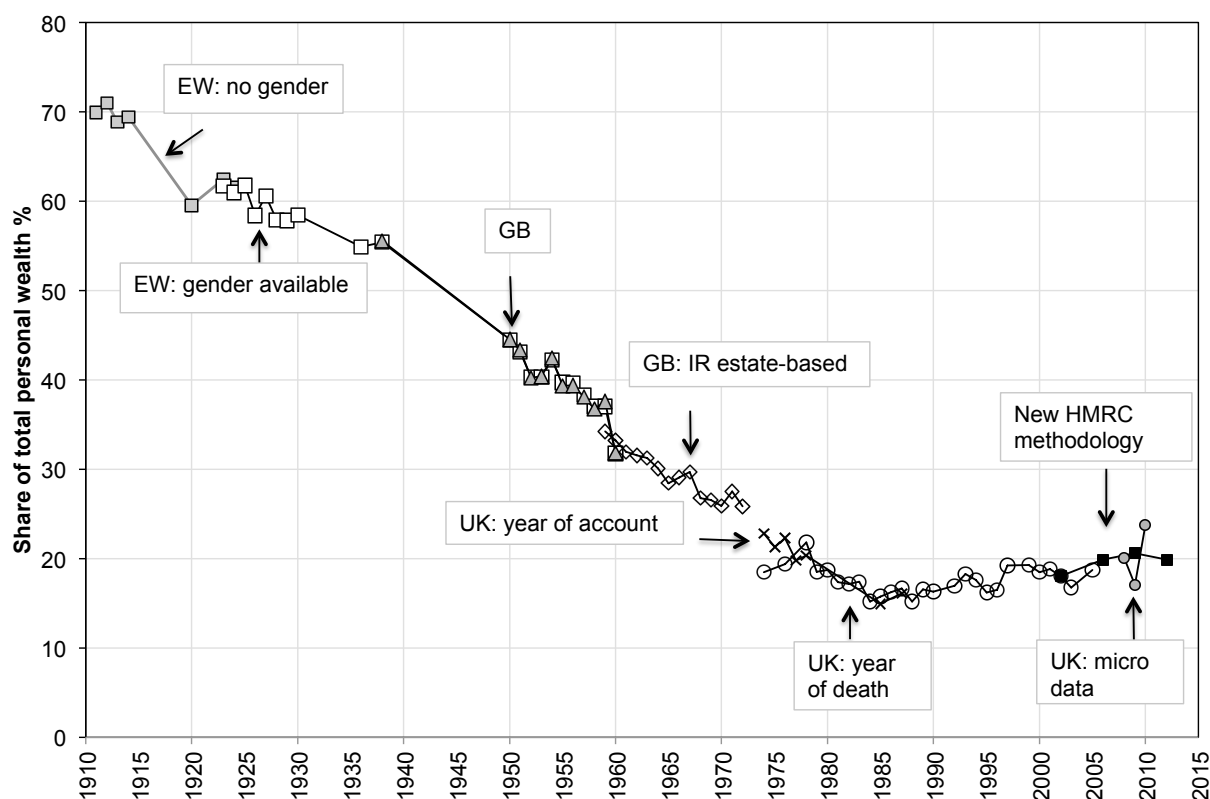
The results of the multiplier process, combined with the control totals, provide estimates of the top shares. As is inevitably the case with such a long time series, its construction involves the linking of estimates on different bases across time. There are seven potential breaks in our estimates:

- A) at 1923 which is the first year for which we have estate data broken down by gender, as well as age and estate class;
- B) in 1938 when the data begin to cover Great Britain in place of England and Wales;
- C) in 1960 when the IR began to use the estate data to make wealth estimates;
- D) in 1974 when the data begin to cover the United Kingdom in place of Great Britain;
- E) in the 1970s and 1980s when there is a switch from a year of account basis to a year of death basis;
- F) after 2002 when HMRC introduced a new methodology for wealth estimation and the “New HMRC Estimates”;
- G) 2008-2010 when it became possible to use a form of micro data from the HMRC Databab.

The different elements are summarized in terms of their implications for the share of the top 1 per cent in Figure 5. Of the seven, the element G should not in principle lead to any discontinuity (although we have drawn attention to the fact that the data in fact aggregate estates, which may lead to the results differing from those from the full micro data). In what follows, we consider the different potential breaks A-F, taking the post-2002 series as the point of reference, following the national accounts practice where estimates on earlier bases are revised to bring them into line with the most recent methodology.

First, there is geographic coverage. The earlier series constructed by Atkinson and Harrison (1978) showed a break for geographical coverage between 1938 (England and Wales, EW) and 1950 (Great Britain, GB). The differences are however small, as may be seen by comparing estimates on the two bases for 1938 to 1972 in Figure 5. For the top 1 per cent share, the maximum difference between the EW and GB estimates is 0.6 percentage points and for half the years the difference is 0.2 percentage points or less. We therefore treat the series as continuous at 1938. In the same way, the change to a UK basis in 1974 is assumed not to have materially affected the estimated top shares (the added population, that of Northern Ireland, is 2.9 per cent of the UK total).

Figure 5. Piecing together different series for the UK top 1% wealth share 1911-2012



Source: see Table G3.

The breaks B and D are therefore not further discussed. This leaves four breaks where the series have to be linked. The first of these concerns the use of gender-specific multipliers. Substituting multiplier number and wealth values with their respective weighted average by gender components in 1923 and 1924, yielded differences between the share of top 1 per cent with and without gender tabulation of respectively 0.7 and 0.5 percentage points. This suggests that we should reduce the pre-1923 figures in each case by 0.7 percentage points, on the assumption that the difference is additive.

The next break is that in 1960. The earlier series constructed by Atkinson and Harrison shows a major break in continuity in 1960 (a break that has typically been ignored by users of the data), with the share of the top 1 per cent being lower by some 7 percentage points (1978, Table 6.5). This was based on the a priori grounds that there had been major changes in 1960 in the estate data available to the Inland Revenue: from that date, the data included estates below the tax threshold which nonetheless came to the notice of the Inland Revenue when a grant of representation was obtained. The underlying data became more complete, and it is also possible that the decision to prepare official estimates of wealth-holding from that year may have led to the estate statistics being collected with more care than in the past. The effect in terms of coverage may be seen from the fact that the statistics, when multiplied up, covered 17.9 million taxpayers (48.5 per cent of total adults), compared with 3.1 million with wealth above the threshold (£3,000) who were only 8.4 per cent of adults in 1960. As noted earlier, there are good reasons to suppose that for early part of the post-war period the allowance made by Atkinson and Harrison (1978) for the property of the

excluded population was too low, under-estimating the value of joint property. This has been corrected, which reduces the downward jump in top shares (it is now 5 percentage points). Since there are no years of overlap, with estimates on different bases, there is no direct method of linking the series. However, as we argue in the next section, the data on estates are informative. Between 1959 and 1960, the estimated share of the top 1 per cent in estates fell from 34.72 per cent to 33.67 per cent. We have assumed that the difference of 1.05 percentage points represented the genuine change between the two years in the wealth shares, and linked the earlier wealth series on that basis (with corresponding assumptions for other wealth groups).²¹

For the remaining two breaks, we have estimates for overlapping years, and these form the basis for the linking. We have used the IR estimates on a year of death basis from 1978 onwards, adjusting the earlier year of account estimates by the difference in the estimated wealth shares in 1985 (an overlapping year, and one where the new estimates appear to have settled down). (The sensitivity to the choice of overlapping year is discussed below.)

Finally, there is the break associated with the adoption of a new methodology from 2002. The most important changes are the application of new multipliers and the adoption of a new sampling strategy of the estates population (HMRC, 2012). Since the latter was associated with a smaller sample size, the HMRC moved to producing estimates based on data averaged over three years (2001-2003, 2005-2007, and 2008-2010) in order to reduce sampling variation. We note that the HMRC has stated that “the overlap between the historical data and the new time period would allow users to construct a time series bearing in mind the limitations and changes to the methodology” (HMRC, 2012, page 16). However, in the main series we have adjusted the estimates prior to 2002 additively by the difference between the New HMRC Estimates for 2001-03 and those obtained for 2002 with the old methodology. In Section 5, when discussing the sensitivity of the estimates, we return to the problems surrounding the new methodology and the post-2000 wealth shares, and give an alternative set of estimates for the most recent years.

To sum up, although marginal in magnitude on average, we have made four additive adjustments in the course of linking the series, designed to bring them into line with the reference series for the most recent years.

Comparison of the distributions of estates and of wealth

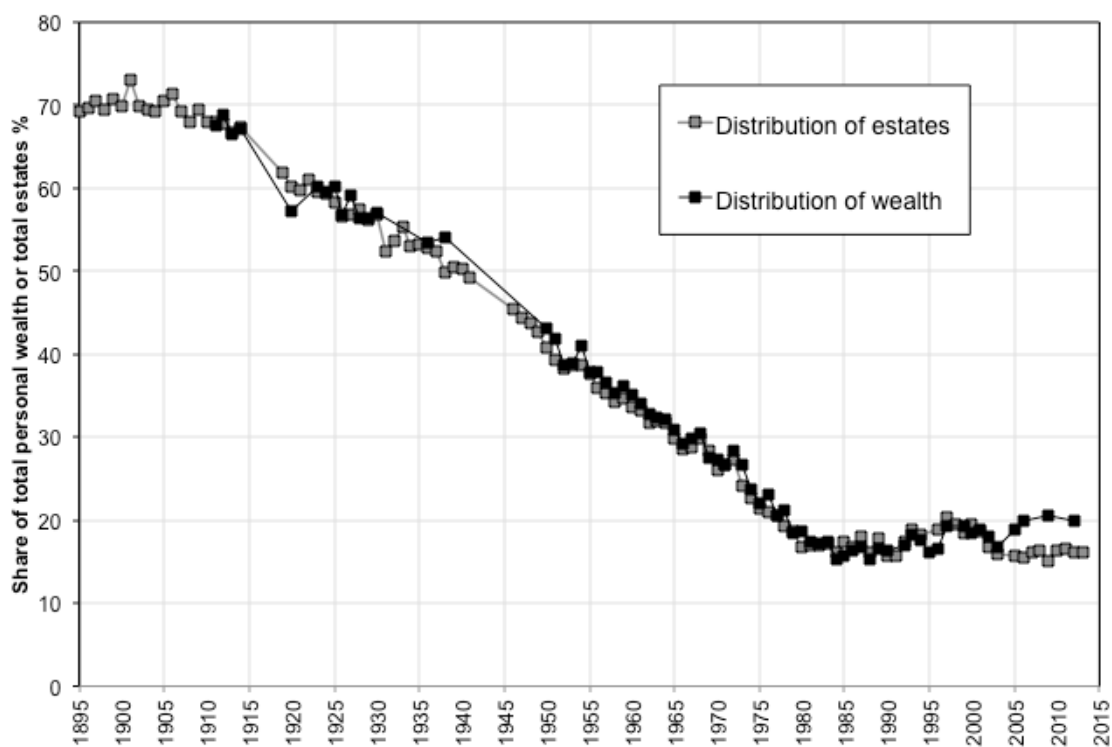
The series for the distribution of wealth is now brought together with that for the distribution of estates described in Section 2. Figure 6 compares the shares of the top 1 per cent for the two series. Theoretically, the application of multipliers embedding differential mortality by age and wealth can increase or decrease wealth shares as well as change the time pattern (relative to estate shares), depending on the evolution of the age-wealth profiles. When the age multiplier method was first employed in the UK, it was seen as overcoming a “fatal” objection to the use of estate data, since “the accumulated wealth of an individual increases with years ... and is usually greatest when

²¹ The 1959 estimates do not extend down to the top 10 per cent, so that the absolute difference for the top 5 per cent is used in this case.

a man dies” (Mallet, 1908, page 67). Our findings suggest that the objection is in fact less than fatal. In practice, for much of the period the conclusions reached regarding the degree of concentration do not change radically. As shown in section 7, such a result carries through to the US; it also applies to 19th century Paris, (Piketty, Postel-Vinay and Rosenthal, 2006). The similarity of the movement over such long periods in the three cases may be seen as a surprising finding. However, it can be proved that the effect of multipliers on the move from estates to wealth is such that the estimated distribution of wealth exceeds that of estates by a covariance term between the multiplier and the level of estates, where this covariance is likely to be positive. This has the same mathematical form as the impact of rates of return on the move from investment income to wealth.

The exception to the conclusion just described concerns the most recent years, when Figure 6 shows the wealth series as rising relative to the estate series after 2002, the wealth estimate of the share of the top 1 per cent exceeding the corresponding share for estates by an average of 5 percentage points. This departure may be explained by the limitations of the method used to construct a control total for wealth post-2005, but we believe that it also occurs on account of the changes in multipliers, as part of the changes in methodology adopted by the HMRC since 2002. We return to this in Section 5.

Figure 6. Comparison of wealth and estate distributions in the UK: share of top 1% 1895-2013



Source: Table E1 and Table G1.

The close relationship between estate distribution and wealth distribution provides a useful measurement benchmark in order to extend the wealth concentration series back in time to 1895, and to fill in missing years especially in the earlier years of twentieth century. More precisely, we apply the approach to interpolation and extrapolation proposed by Friedman (1962) involving the use of related time series. In the present case, we use the estate series to interpolate the gaps between available observations of top wealth shares. The relationship between top wealth shares and top estate shares, estimated from 1911 to 2005 by ordinary least squares, is shown in Table 1.²² The predicted values are then used to provide estimates of the top wealth shares for years that are missing from the wealth series from 1895 to 2005. The final series are shown in Figures 7a and 7b, and full results are given in Table G1. Figures for the share of top 1 percent of total wealth are those illustrated in Figure 1 in the introduction. The remaining gaps are those years for which there are no estate data, mostly during the war years.

Table 1 Linear regression of wealth shares on estate shares 1911-2005

	[1] Top 10% share (wealth)	[2] Top 5% share (wealth)	[3] Top 1% share (wealth)	[4] Top 0.5% share (wealth)	[5] Top 0.1% share (wealth)
Top 10% share (estates)	0.937*** (0.010)				
Top 5% share (estates)		0.965*** (0.008)			
Top 1% share (estates)			1.006*** (0.009)		
Top 0.5% share (estates)				1.005*** (0.012)	
Top 0.1% share (estates)					1.066*** (0.023)
Constant	2.608*** (0.699)	0.846 (0.488)	0.337 (0.337)	0.636 (0.328)	0.451 (0.374)
R-squared	0.993	0.995	0.994	0.991	0.974
Observations	58	68	68	68	60

Notes: Table based on linear regressions of top wealth shares series on the respective top estate shares measured in percentage points.

The sample used is 1911-2005 (included). Standard errors in parentheses.

* denotes $p < 0.05$.

** denotes $p < 0.01$.

*** denotes $p < 0.001$.

²² We have examined the sensitivity of the estimates to the use of semi-parametric or local non-parametric regressions. For our semi-parametric exercise, we used Robinson's (1988) double residual estimator and estimated the nonlinear relation between top estates shares and top wealth shares using a Gaussian kernel weighted local polynomial fit. Our non-parametric findings were based on a locally weighted regression of top wealth shares on estate shares (with running-line least-squares smoothing). It turns out that predicted values of top wealth shares on the basis of these different approaches track each other closely and that our estimates appear quite robust.

The distribution of wealth from 1895 to 2013

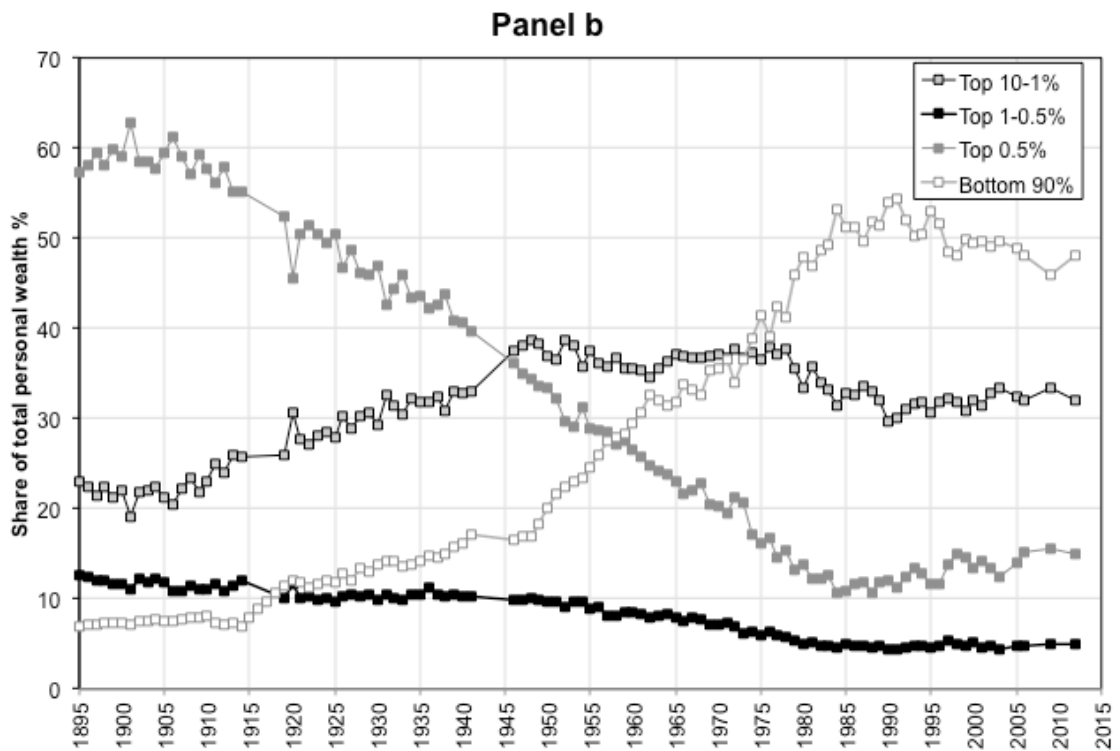
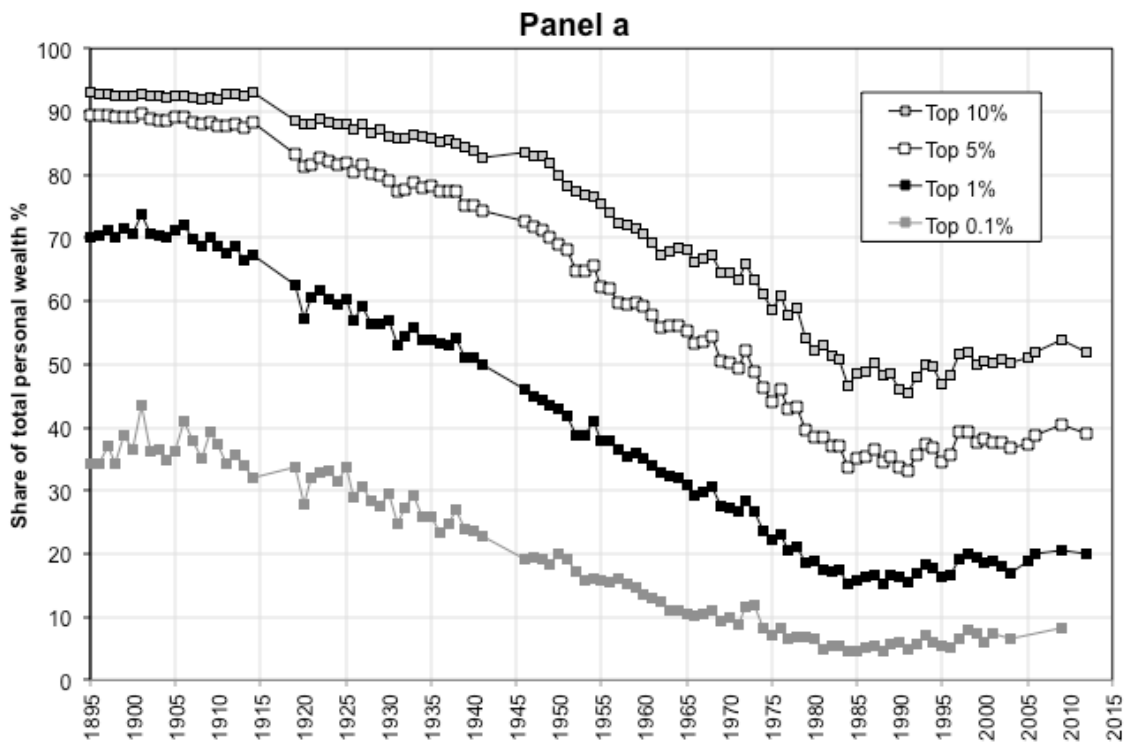
What does the final series show? The estimated top wealth shares before the First World War were very high. The share of the top 0.1 per cent was at least one third, which meant that they had more than 333 times their proportionate share. The share of the top 1 per cent was around 70 per cent, and that of the top 5 per cent around 90 per cent. In particular, it is worth noting that recorded wealth concentration was high despite the lack of correction for settled property; Daniels and Campion (1936, page 39) estimate that 15 to 20 per cent of the settled capital passing at death was excluded from the estate duty returns in 1911-13, compared with a much smaller figure (4 to 7 per cent) in 1924-30. If a substantial amount of settled property was missing from the estate duty statistics for the years 1911 to 1914, then the top shares may be significantly under-stated.²³ After 1914, the top shares then began to fall, with the rate of decline accelerating after the Second World War. By 1979 the share of the top 1 per cent, which had been around three-quarters, was closer to one-fifth. The share of the top 0.1 per cent, which had been a third, was by 1979 around 7 per cent. By any standards, this represents a dramatic reduction in wealth concentration over two-thirds of a century.

Panel b of Figure 7 demonstrates the importance of looking within the top 10 per cent. The share in total wealth of those in the top 10 per cent, but not in the top 1 per cent (i.e. the “next 9 per cent”) saw a rise in their share for the first half of the twentieth century, followed by a period of stability until the end of the 1970s. This underlines the changing shape of the upper tail, to which we return below.

Since 1980, the decline in top shares has come to an abrupt stop. The subsequent behaviour of the top shares is not easily summarized: it depends on the period considered and on the part of the upper tail on which one focuses. The reader of the official report *UK Personal Wealth Statistics 2011 to 2013* is told that over the ten year period 2001/03 to 2011/13 “the distribution of wealth held by each decile has been broadly unchanged” (HMRC, 2016, page 4): the conclusion is one of stability. However, this distribution relates only to those identified as wealth-holders, and no account is taken of the existence or wealth of the excluded population. Moreover, grouping in terms of deciles is too crude to capture properly what is happening at the top. The estimates presented in panel a of Figure 7 suggest that the trend in the share of the top 1 per cent of all adults was upward. Moreover, panel b of Figure 7 shows that the experience was not uniform across top wealth groups. The lower half of the top 1 per cent (those between the 99th and the 99.5th percentiles) saw a relative stability in their share of total wealth, whereas the upper half saw an increase. It is not just the share of the wealthy that has changed but also the *shape* of the upper tail, to which we now turn.

²³This was due to the fact that before 1914 where estate duty had been paid on settled property, duty was not payable a second time the property passed. Daniels and Campion (1936) also show that the settled property reported in 1924 and 1925 rose as a proportion of total property from 7.0 per cent for estates between £100 and £1,000 to 21.7 per cent for estates over £100,000 (Table 14).

Figure 7. Top wealth shares in the UK 1895-2013



Source: Table G1.

The shape of the upper tail

In seeking to understand further the evolution of wealth concentration, it is helpful to consider the share, S_i , of the top i per cent expressed as a multiple of their population share, $1 - F_i$. The extent to which the wealth share exceeds the population share may then be seen as the product of two components:

$$\frac{S_i}{1 - F_i} = \frac{w_i}{\mu} m(w_i)$$

where w_i is the i -th percentile from the top, expressed relative to μ , which is the overall mean wealth, and $m(w_i)$ is the mean wealth above w_i expressed as a ratio of w_i . The extent to which the top 1 per cent, say, have more than their proportionate share depends, via the first term, on the wealth required to enter this group (w_i/μ), which we refer to as the “entry price”. This may be seen as capturing the degree of skewness to the right. The second component is an indicator of the degree of concentration within the top i -th per cent, or of the thickness of the right tail. If all estates in the top i -th per cent are equal to the i -th percentile, then $m(w_i)$ equals unity.²⁴ But to the extent that there is inequality within the top i -th per cent, $m(w_i)$ is greater than 1, and the second component increases the top share. In the case of the Pareto distribution, with Pareto coefficient a , $m(w_i)$ is a constant not dependent on w_i , equal to $\beta = a/(a-1)$, often taken as a measure of concentration, and referred to as the inverted Pareto-Lorenz coefficient.²⁵

We begin with the entry price. For this element of the analysis, we consider the unlinked series, since the linking factors described earlier do not apply to percentiles, and, since we have not attempted to interpolate the percentiles, the decomposition is made only for years where the full wealth distribution has been estimated. This means that the series start in 1911. Again there is differing experience within the top 10 per cent. The “entry price” for the top 10 per cent and 5 per cent increased up to the end of the 1970s, and then levelled off. At the other end of the scale, the 99.9th percentile fell steadily up to the 1980s and then began to rise (Figure 8). Taking the period as a whole, we see that the top percentile (entry price for the top 1 per cent) has halved since 1914.

This evidence for changing shape is complemented by that for the second element: the degree of concentration within the top groups. The degree of concentration within groups is measured in Figure 9 by the values of B estimated from different “shares within shares”: for instance, the share of the top 1 per cent within the top 10 per cent. If the distribution is Pareto in form, then in that case $1/B = \log_{10}[S_{10}/S_1]$.²⁶ The results in Figure 9 for different groups show that there was a modest decline in the extent of concentration before the First World War, affecting the top 10 per cent but not the very top 0.1 per cent. There was then a sharp fall in the degree of concentration at the top in the inter-war period from 1919 to 1939, followed by a continuing fall from 1946 to the

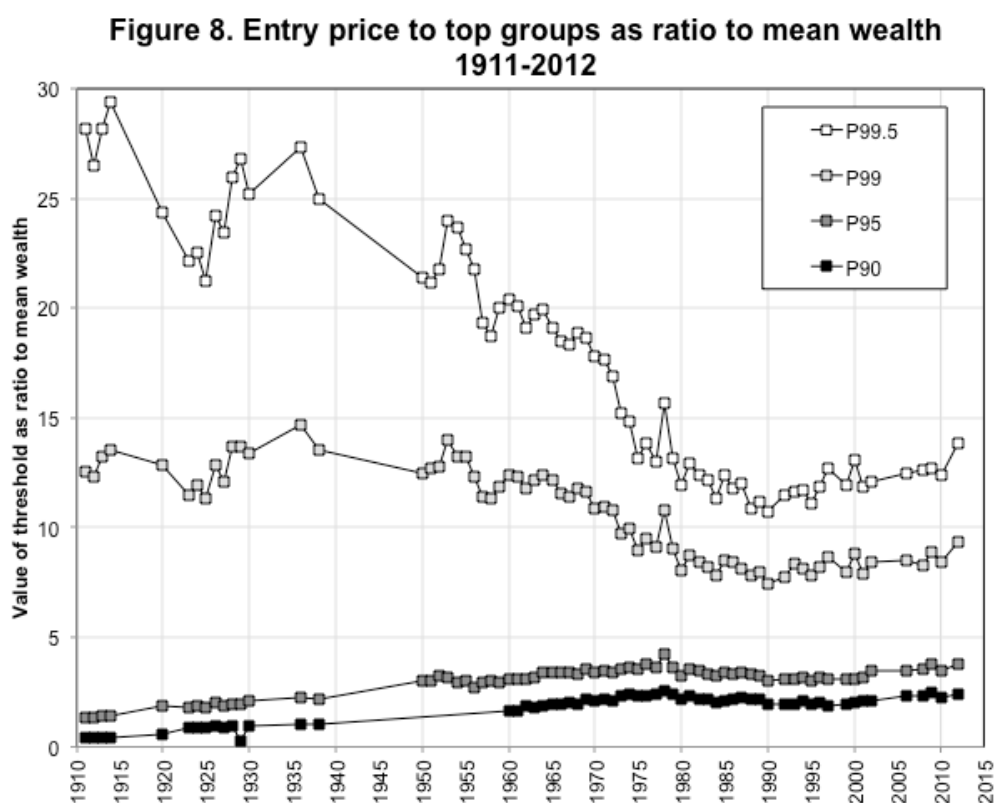
²⁴ In principle, the external control total for the adult population allows us to define the percentiles in £, and the m function can be calculated (it is unit-free).

²⁵ The m function is related to the mean excess function, or mean residual life function, used in actuarial science and risk analysis. The mean excess function is equal to $(m - 1)$ times w_i . For distributions with a finite mean, the mean excess function completely determines the distribution via an inversion formula (Guess and Proschan, 1985).

²⁶ Here we are using the linked and interpolated data, as given in Table G1.

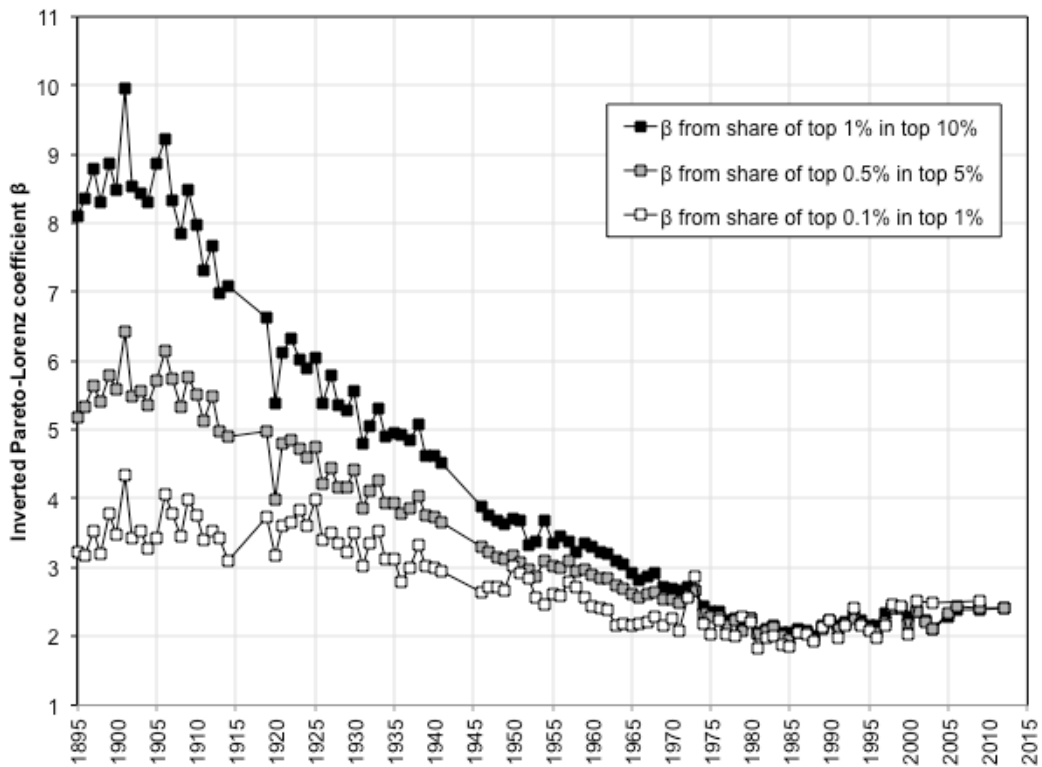
late 1980s. A value of β , such as 8 in the early years, represents a high degree of concentration. Translated into α , the more common Pareto coefficient, this corresponds to values before the First World War of 1.4 or lower, which does indeed indicate a very high level of concentration. Of the 152 Pareto coefficients collected for income by Clark (1951, pages 533-537), only twenty are below 1.4 (many of which were in pre-independence India). By the 1980s, in contrast, β had fallen to around 2, corresponding to a Pareto coefficient α of around the same value, indicating a degree of concentration closer to that found for gross income. Since 1980 there has been a rise in concentration, but the magnitude is in no way comparable with the earlier decline.

Figure 9 does however cast doubt on the validity of the assumption that the upper tail of the UK wealth distribution has throughout been Pareto in form. As noted above, with the Pareto distribution, the same value of β should apply at all wealth levels. For the latter part of the period, the constancy of β may be a reasonable first approximation, but for the early part this is not the case: the mean difference between the values obtained from S_{10}/S_1 and those with $S_1/S_{0.1}$ is 4.3 in the period 1895 to 1914, and 1.8 in the interwar period. This is a warning that a long-run comparison based on the assumption that the upper tail above the 99th percentile is Pareto in form would miss a potentially important element of the change. The threshold above which the distribution becomes Pareto may be time-varying or, alternatively, the assumption of Pareto-distributed wealth might not be a compelling one altogether.



Source: Authors' calculations.

Figure 9. Inverted Pareto-Lorenz coefficient β 1895-2013



Source: Authors' calculations from Table G1.

Understanding the dynamics of wealth concentration: the role of housing

In the discussion of average wealth, we identified the role of housing wealth, and this has been the concern of a number of commentators on the rise of capital described by Piketty (2014) - see, for example, Bonnet et al (2014), Turner (2014) and Rognlie (2015). The earlier time series analysis by Atkinson, Gordon and Harrison (1989) had identified one of the key determinants of the dynamics of UK top wealth shares up to the end of the 1970s as “popular wealth”, the sum of owner-occupied housing plus consumer durables. In particular, the authors stressed the role of house prices as reducing the share of the top 1 per cent. Since then, there have been major changes in the UK housing market.

The role of housing wealth has to be seen in terms of the tenure changes. The popular wealth variable (leaving aside consumer durables) depended on both house prices and the extent of owner-occupation. It is changes in the latter that drove much of the variation between 1920s and 1970s: the proportion of owner-occupied in England and Wales rose from 23 per cent of households in 1918 to 50 per cent in 1971, and to 58 per cent in 1981 (all of the figures in this paragraph come from Office for National Statistics, 2013, unless otherwise indicated). This coincided with the fall in housing owned by private landlords: from 76 per cent in 1918, to 11 per cent in 1981. Both factors led to a decline in the share of the top 1 per cent, which contained a disproportionate number of landlords. The shift from private-rented to owner-occupied did not in itself change the ratio of housing wealth to the total personal wealth (different people owned the same houses),

but it was affected by the growth of social housing, from 1 per cent in 1918 to 31 per cent in 1981.

In the 1980s, the position changed with the sales of public housing. By 1991 the share of social housing had fallen to 23 per cent, with owner-occupation going up to 68 per cent (private renting having then fallen to 9 per cent). More of the housing stock therefore entered personal wealth. The ratio of residential housing wealth to total wealth rose by some ten percentage points in the 1980s. But then, in the 1990s, there was a change with the return of private landlords as a result of “buy to let”: their share, having been 9 per cent in 1991, increased to 18 per cent in 2011. The increased share of private landlords came at the expense of a fall in owner-occupation (-4 points) and a fall in social housing (-5 points). Therefore, we have over the period as a whole three main stories: (i) the equalizing switch from 1918 to the end of the 1970s as owner-occupation replaced private landlords and social ownership replaced private ownership, (ii) the sale of council houses and rise in housing as per cent of total wealth in the 1980s, and (iii) in recent decades, the return of the private landlord. Whereas (ii) may have meant that increases in housing wealth were equalising in the past, the return of the private landlord is likely to imply that they have now the opposite effect. In particular, they may have re-inforced the developments post 2003.

All of this suggests that it is interesting to first decompose the assets within the top brackets of the wealth distribution between housing and non-housing assets as shown in Figure 10 for the top 1 per cent group. The construction for a series that starts in 1971 is described in Appendix H. Indeed, housing only accounts for a relatively small fraction of total wealth at the top: the share of housing wealth for the top 1 per cent is bounded between 10 and 30 percent of total net worth. Second, we may look at the distribution of wealth minus residential housing, net of mortgage liabilities. Figure 11 shows the shares excluding housing wealth for the period since 1971, where it should be noted that these shares are not fully comparable since it has not been possible to re-rank the observations in the tabulated data and the interpolation is linear (see Appendix H). It appears that, as we should expect, the top shares of the distribution of non-housing wealth are higher: the share of the top 1 per cent averages 24.7 per cent over the period 1971 to 1997, compared with 18.2 per cent for the corresponding share for all wealth. Although there is more variability in the shares excluding housing wealth (shares are smoothed to some degree by the housing element), overall there is little difference in their evolution over the twentieth century. Up to 2000, we do not get a very different story if one just takes non-housing wealth, with a decided fall in the top shares until the end of the 1970s, which came to an end and with broad stability until the end of the 1990s.

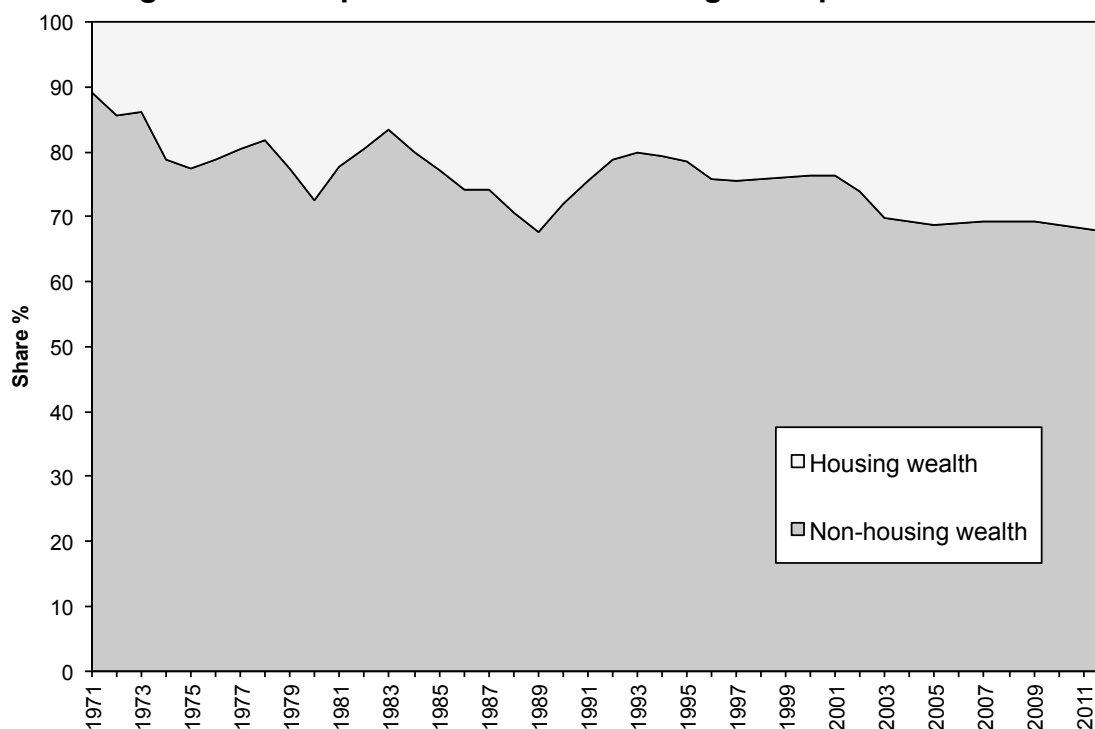
But in the 21st century, there is a distinct difference. Between 2001 and 2011-13, the gap between the share of the top 1 per cent in total wealth excluding housing and the share for all wealth widened. The changes over time in top shares are also different when we look only at wealth excluding housing (see Table H2). It appears that housing wealth has moderated a definite tendency for there to be a rise in recent years in top shares in total wealth apart from housing. When people talk about rising wealth concentration in the UK, then it is probably the latter that they have in mind.

Put differently, changes in housing wealth may have relatively little impact on top wealth shares (although they do of course affect the share of owner-occupiers as a group).

Simple arithmetic calculations allow an estimate to be made of the sensitivity of top wealth shares to an across-the-board increase in house prices (increasing the value but not affecting the mortgages). Again this can be done from 1971. The results show how the impact of a general rise in house prices has changed over the period, being negative at the outset for all groups in the top 10 per cent, but becoming positive for the top 10 per cent in the mid-1970s and positive for the top 5 per cent from the mid-1980s. At the beginning of the period a rise of 25 per cent led to a reduction of some 1 percentage point in the share of the top 1 per cent but the effect became smaller over time. Indeed the effects are modest in size: the impact on the share of the top 10 per cent averaging a gain of less than 1 percentage point and the loss for the top 1 per cent averaging less than half a percentage point.

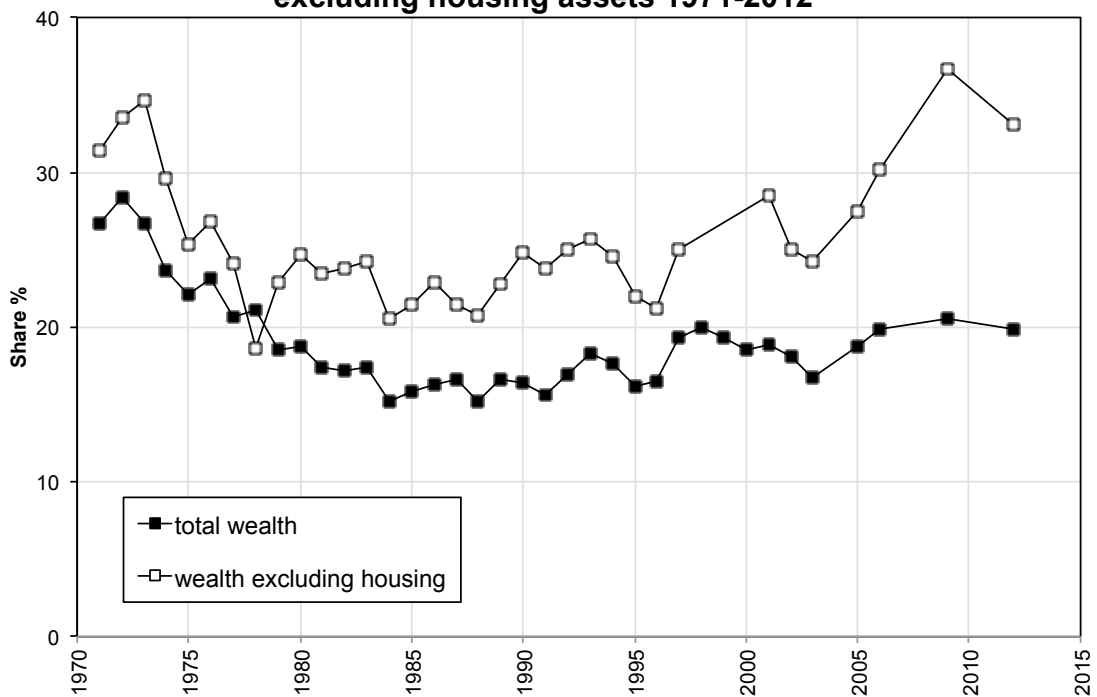
It should be stressed that our analysis refers to top shares: the relative position of owners and non-owner-occupiers in the main part of the distribution has almost certainly been affected by changes in housing wealth. But, if we concentrate on top wealth shares, then, overall, changes in housing wealth do not appear to have played a significant role over the period from 1971 to the end of the twentieth century. On the other hand, in the twenty first century, housing wealth has moderated the tendency for concentration to increase in other forms of wealth. In order to understand the trends in concentration, it is necessary to look at the distribution of non-housing wealth.

Figure 10. Composition of wealth among the top 1% in the UK



Source: Table H3.

Figure 11. Top 1% wealth share: total wealth and wealth excluding housing assets 1971-2012



Source: Table G1 and Table H2. Note: The estimates excluding housing wealth are based on the original ranges, since re-ranking is not possible, and the shares are obtained by linear interpolation. The estimates of total wealth correspond to our preferred series in Table G1. See Appendix H.

5. Internal validity of our estimates

The estimation of top wealth shares series followed a series of building blocks, choices, and assumptions, and it is important to examine how these may affect the reliability of the level of our estimates as well as their trends over time. Such an examination is necessary if our estimates are to be taken seriously by those who reject the estate method and prefer alternative approaches. In this section, we consider five sources of concerns and potential variation: (a) the choice of mortality multipliers, (b) whether the wealth of the decedent population is representative of that of the living, (c) the implications of tax avoidance, (d) the assumptions made concerning the linking of series, and (e) the derivation of the recent wealth control totals and HMRC wealth estimates.

How does the increasing longevity advantage of the rich affect our results?

In order to derive estimates of the wealth distribution of the living, multipliers based on the inverse of the mortality rates are employed, but because more wealthy individuals tend to live longer, higher multipliers have typically been applied to the upper estate ranges. The higher multipliers, referred to here as “differential adjustments” are essential to avoid an underrepresentation of the number of very wealthy individuals as well as their wealth. In practice, in the UK, the differential adjustments have been

based on social class, or occupation, but this is only an intermediate route to the variation of final concern: that with estate size. The UK differentials used for much of the period were calculated from the Registrar-General's Decennial study of mortality by occupation, with adjustments for errors in occupational statements. The resulting differentials varied over time, and at younger ages showed considerable increase: for example, for male aged 45 to 54 they increased from 18 per cent in 1921 to 35 per cent in 1961 (Atkinson and Harrison, 1978, Table 6.4b). Starting in 1977, the Inland Revenue used two different multipliers according to whether an estate was below or above a pre-specified cut-off (which was gradually increased from £10,000 to £25,000). For the estates above the cut-off, the mortality risk was assumed to reflect those of people living in owner-occupied housing (data taken from the ONS Longitudinal Study of social class and occupational mobility). The multiplier applied to estates below the cut-off was assumed to be an average between that of the general population and that for estates above the cut-off. Since 2002, the biennial waves of the English Longitudinal Survey of Ageing (ELSA) are used to link mortality rates to housing wealth levels.²⁷

In the US, there has been considerable discussion on the choice of mortality multipliers for those at the top of the distribution. The estate-based estimates of top wealth shares by Kopczuk and Saez (2004) made use of a "corrective term" obtained from external data on mortality rates of college graduates; in contrast to the UK, the same correction factor was applied over a long period. Renewed interest in the topic was stimulated by recent claims that a failure to capture the increasingly lower relative mortality rates of richer classes may substantially bias downward the level of concentration of wealth at the top in recent years (Saez and Zucman, 2016). On the basis of evidence from income tax filers, Saez and Zucman find that "the top 10% live less long than the top 1% who in turn live less long than the top 0.1%."²⁸ More importantly, the mortality gradient has been sharply increasing since 1980s; the trend is especially pronounced for men. In recent years (2004-2008), the mortality rate for men aged 65-79 in the top 1% is only 60% of the average mortality rates of male tax filers aged 65-79 versus 90% in 1979-83" (2016, page 572). The same figures for the top 10 per cent were 95 per cent in 1979-83 and 77 per cent in 2004-2008. They go on to argue that failure to allow for an increasing wealth differential may have caused the estate-based estimates to under-state the rise in top wealth shares. Additional evidence on the mortality advantage of US richer classes is contained in the work by Chetty et al (2016).

The discussion so far, it has taken for granted that a rise in the wealth differential will significantly increase the top shares. This may indeed be the case, but the effect of changes in multipliers is "less straightforward than is sometimes supposed" (Atkinson and Harrison, 1978, page 60). In the simplest case where there are independent control totals for wealth (and population), there is no impact on mean wealth from any variation of mortality multipliers and/or the wealth-differential, so that the effect on the share of the top x per cent depends only on how a change in the differential affects the mean wealth of that group. Increasing the multiplier implies that there are more people estimated to have wealth in excess of £W, and these extra people will displace some of those with smaller estates who had previously just entered the top x per cent. The mean

²⁷ The sample of the longitudinal survey refers to England only. Therefore, mortality rates are assumed the same in Scotland and Northern Ireland to derive estimates for the UK.

²⁸ Tax filers ranked by capital income (excluding capital gains).

wealth of the top x per cent must therefore rise. The direction of the effect is therefore that expected: top shares rise. The magnitude of the effect, however, depends on the underlying estate distribution. If those displaced are not very much less wealthy than the added new people, then the effect of increasing the differential will be small. (Indeed, in the limit, it could be zero, as may be seen from the hypothetical example where all those in the top x per cent have the same wealth, in which case the displaced have the same wealth as the newly added.) In any event, the extent to which higher differentials could explain a failure of the estate-based estimates to show a larger increase in top shares becomes an empirical question.

Suppose, moreover, that, the wealth control total depends on the total of identified wealth. Then an increased multiplier at the top of the estate ranges increases the identified wealth and (for a given total UK population) raises mean wealth (see Atkinson and Harrison, 1974 and 1978, Chapter 3). Discovering a clone to the top billionaire reduces his or her relative share, since the mean has risen. The impact may be seen in terms of the upper part of the Lorenz curve showing the proportionate shares of different percentage groups working downwards. When plotted in terms of data grouped by wealth ranges, the slope for the final range is given by the ratio of mean wealth to the overall mean. Applying a larger differential to the group as a whole, leaves the group mean unaffected, but raises the overall mean, so the slope for the final range is reduced, causing the shares at the very top to be reduced. At the same time, the segment based on the top wealth range is extended downwards (see Atkinson and Harrison, 1975, Figure 2). Where the mean wealth of the next range down is less, there can then be an intersection of the new and old Lorenz curves, and beyond a certain point the top shares are increased. Depending on the precise context, the shares of upper wealth groups may well increase or decrease as a result of applying higher multipliers to the estates of the wealthy.

Ultimately, therefore, the sensitivity of top wealth shares to different mortality-wealth gradients is an empirical matter, and there are two main reasons why we expect such elasticity to be relatively small in magnitude in the UK irrespective of the treatment of the wealth total. First, differently from the US, the wealth-mortality gradient has not been assumed constant over time: the adjustment varies over the years. Secondly, the UK mortality ratios of specific wealth groups with respect to the non-wealth-specific population already appear to indicate a steep wealth gradient. For instance, males aged 65-75 in the top 30, top 20 and top 10 per cent of the distribution of housing wealth in 2008-2010 have a mortality rate of 81, 75, and 69 per cent of the population rate for the same age class.²⁹ Such longevity advantage are not very distant from those of US males aged 65-79 in the top 10 per cent, top 5 per cent and top 1 per cent of the wealth distribution in 2004-2008 as estimated in Saez and Zucman, 2016 (reproduced in their Appendix Table J1, although the figures are not directly comparable).

What is the effect on our series of further increasing the current adjustment to multipliers for wealthy individuals? Suppose that we increase the multipliers above the 95th, 99th or 99.9th percentiles of the wealth distribution by 20 or 50 per cent, or even 100 per cent. Using the database of the HMRC Datalab, we find (see Appendix Table J2) that this does relatively little to change the levels and trend of our series, even in the

²⁹ For the source, see Appendix J. The housing wealth thresholds corresponding to the 8th, 9th, and 10th deciles are £300,000, £400,000 and £500,000, respectively.

case of a fixed wealth total. A 20 per cent increase in the multipliers above the top percentile, for example, increased the share of the top 1 per cent with internal wealth totals by 2.4 percentage points when averaged over 2008-2010. A 50 per cent rise increased it by 5.8 percentage points. The potential downward bias of our estimates due to lack of adjustments for “appropriate” wealth differentials appears to be more than marginal but less than is commonly asserted. Indeed, to reach the same level of top 1 per cent wealth share of 1950 or 1960, one would need to adjust wealth differentials by an implausible amount: a cut in relative mortality rate of our richest reference male group aged 65-75 to a level of 40 per cent or 30 per cent, from the benchmark level of 60 per cent. In the light of the earlier theoretical discussion contrasting the use of internal and external control totals, it is interesting to see the results in the last row of Table J2 (the base levels are different on account of the differences in method). The effects are indeed larger with an external total for the 50 percent increase.

Our discussion to this point has focused on the differential multipliers applied at the top of the distribution; we return below to the general level of multipliers applied to all those with wealth.

Are estates representative of the wealth of the living?

The data underlying our analysis reflect the value of the estates for which a grant of probate is required. This implies that any possible inference from this set of data could only be related to the population with “dutiable wealth” (e.g. for which a grant of probate would be required if they were to die”). In other words, the decedent population represented in the estate data may not be representative of the whole wealth-holding living population. Probate is not required for very small estates, and for those estates jointly held passing automatically to a surviving spouse, civil partner or other joint owners. In their recent consultation to cease the publication of Personal Wealth National Statistics, HMRC deems this as a “major issue with the HMRC Personal Wealth National Statistics” as “they do not reliably show the wealth characteristics of all people in the UK” (HMRC, 2015, page 3).

Although relevant to any attempt to measure the distribution as a whole, this concern can be mitigated in the light of our interest in the top tail of the wealth distribution. It is highly unlikely that the assets of wealthy individuals would entirely escape the probate process; whether or not they would be liable to inheritance tax is irrelevant at this stage. Indeed, it is important to recall that probate is still required for every property (above £5,000) not jointly held. To the extent that a high net-worth individual owns at least an asset in her own name (e.g. a bank account with a balance higher than £5,000 would be sufficient), the probate of her estate when she dies would reflect all the properties, individually and jointly held. The estate can still benefit from deductions and reliefs in case one’s estate is above the minimum inheritance tax threshold (e.g. spouse reliefs allow to transfer the entire estate to spouses and civil partners tax-free).³⁰ Moreover, in any given year a portion of all jointly held estates passed in earlier

³⁰ According to our estimates, the minimum net value of the estates sufficient to belong to the top 5 per cent group in 2011-2013 was around £346,000 (£21,000 above the minimum inheritance tax threshold).

years to a surviving spouse or joint owner would still be recorded when the then-surviving spouse or joint owner dies.

Further issues also suggest that the features of the wealth of decedents, as reported in the estate statistics, may not accurately represent those of the wealth of the living. For instance, decedents are a selected group on health characteristics (e.g. unhealthy people are expected to die earlier) that may affect, among other things, their patterns of consumption, saving, passing on wealth via gifts, risk attitudes, and their health care expenses (a less important consideration in the UK than in the US). This would most likely affect the composition of wealth portfolios as well as the level of wealth accumulation, although it is difficult to define the magnitude of such effects. Similarly, as the data reflect the nature of (changing) tax code, these are inevitably influenced by the expansion as well as the shrinking of the tax base affecting in turn the incentives for estate planning, and for tax evasion. These problems point in the direction of a bias (most likely negative) in the value of wealth represented in the estate data. In turn, this may affect both the level and the trend estimates of top wealth shares. It is, however, the issues of evasion and avoidance of taxes appear to be the most worrisome.

How do tax avoidance and evasion affect our results?

Careful estate tax planning (avoidance) and evasion can substantially reduce the liability of the inheritance tax, but for our purpose of estimating top wealth shares the significance of tax avoidance ought to be measured on its ability to impair (or distort) the estate information that is collected by HMRC, not merely on its ability to reduce tax collection altogether.³¹ In order to affect our estimates of top shares, based on a control total largely determined by identified wealth, tax avoidance actions have to be disproportionately represented at the top of the wealth distribution.³² It has also to be remembered that tax avoidance may reduce, or even eliminate, liability to IHT, but this does not necessarily mean that the wealth is missing from the statistics. Duty may be reduced by claiming, for instance, agricultural relief, but the full value of the property is still reported.

Inheritance tax avoidance can take different forms. Some of them simply affect the reporting arrangement of financial affairs for any given level of wealth and, as such, are less problematic for our work. Indeed, given the large set of reliefs and exemptions available, there are many different ways estates can be structured to reduce their tax liability. For instance, transferring the entire estate (even above the inheritance threshold) to a spouse, a civil partner, or a charity reduces the tax liability to zero without necessarily resorting to under-reporting of estate value.³³ According to the last

³¹ In the 2003-2004 fiscal year, according to the National Audit Office (2004), out of 310,000 estates with grant of representation, only 67,500 were above the inheritance tax threshold, of which only 30,000 were actually liable to inheritance tax.

³² This contrasts with the estate-based evidence for the United States, where the use of a fixed external wealth total from the National Accounts make estimates of top wealth shares more sensitive to tax avoidance irrespectively of whether wealthy individuals are more likely to undertake tax sheltering activities.

³³ Moreover, by leaving at least 10 per cent of net estate value to charity one can reduce the IHT tax rate from 40 per cent to 36 per cent. Similarly, transfers of business assets and agricultural

available report on the inheritance tax by the National Audit Office, “two-thirds of estates which exceed the tax threshold claim reliefs and exemptions to reduce their Inheritance Tax liability, including 10 per cent which are able to eliminate it altogether” (2004, page 9).³⁴

Gifts inter-vivos. At the time of the first mortality multiplier estimates in the UK, there was much discussion of the extent to which the figures missed wealth transferred through gifts inter-vivos. It is important however to distinguish between the impact on estimates of the total amount of wealth passed on from one generation to the next (as investigated by Piketty, 2011, in France, and Atkinson, 2013, in the UK), and the impact on the estimated distribution of wealth among those living at a particular date, which is our concern here. Gifts may change *who* owns the wealth, but still appear in the distribution. As was pointed out by Mallet and Strutt, the recipients are subject to the risk of mortality: “the receivers of gifts must stand a certain chance of dying (at first a small one) from the moment of receipt” (1915, page 569). Of course, gifts tend to be given by those with a higher mortality risk to those with a lower risk, but provided that this differential mortality is taken into account, the wealth does appear. Where the problem arises is with unobserved heterogeneity in mortality. If, as seems probable, gifts are more likely to be made by those who have unobserved characteristics that lead them to have higher mortality, and the reverse is the case with the recipients, then there is a risk of under-statement. To the extent that gifts are used for tax optimization, such under-reporting is likely to lead to our under-estimating top wealth shares.³⁵ This is an example of the more general problem of selection to which we have referred. On the other hand, in the case of gifts inter-vivos there is a specific problem, which may lead to an over-counting of gifts. Since Estate Duty was introduced, there has been an anti-avoidance provision according to which gifts made within a certain period before death are aggregated with the estate. To the extent that some of the recipients die, the wealth is also included in their estate, and there is double-counting. Moreover, the treatment of gifts has changed significantly over the period considered in this paper, and the varying degree of double-counting may affect the comparability of the results over time.³⁶

Assets held in trusts. Opportunities of estate tax avoidance are provided by the settlement of assets within trusts. Although inheritance tax is payable (at a reduced rate of 20 per cent) for transfers made to discretionary trusts during life-time since 2006, the

properties can be done entirely inheritance tax free under the provisions of Business Relief and Agricultural Relief.

³⁴ The use of spouse relief appears to be the most significant and used by estates of all sizes. Reliefs can be very effective and the evidence from the NAO (2004) shows that, in 2001-2003, they could offset up to 66 per cent of the estates of the 800 wealthiest individuals exceeding the estate threshold (estates above £2 million). In comparison, only 40 per cent of the estate was offset by reliefs for the estates of value between £300,000 and £400,000.

³⁵ Under the (realistic) assumption that tax avoidance incentives are higher for richer individuals. Larger estates have proportionately more liquid assets compared to lower value estates (residential property is often the main asset).

³⁶ The time limit period was 12 months under the Probate duty (1894 Finance Act) and was increased to 3 years in 1909, a limit that remained in force until the Finance Act 1946 when the threshold was further increased to 5 years. With the Finance Act 1968 the time period threshold was raised to 7 years. A significant change was made in 1975 with the introduction of Capital Transfer Tax (CTT) in place of Estate Duty, which extended the tax to all lifetime transfers, but this provision was short-lived and a 10 year period was in effect from 1981 and returned to 7 years when CTT was replaced by the current Inheritance Tax in the Finance Act 1986.

settled properties within discretionary trusts do not generally require probate as trustees legally acquire the ownership of the assets. This makes discretionary trusts an effective tax avoidance scheme. Similarly to gifts, however, if transfers to a discretionary trust were made during the seven years before the death of the “settlor”, the estate administrator has to include these transfers within the probate (and an extra tax rate of 20 per cent is due on the assets transferred to match the inheritance tax rate).³⁷ On the contrary, non-discretionary trusts are dutiable. The official series C constructed by HMRC up to 2005 attempted to cover excluded wealth in trusts within the estimates of top wealth shares; they were relatively small in magnitude implying a marginal effect. Between 1994 and 2005 wealth in trusts accounted less than 1 per cent of the wealth control total. Those estimates were however based on studies for only two years (1976 and 1988), which were dated. A significant investment would no doubt have been required to bring the estimates up to date, but it is unfortunate that such an investment has not been made.

In an attempt to provide more recent evidence, we used HMRC data to capitalize total taxable capital income from trusts and estates making a Self-Assessment return between 2001 and 2012 (excluding income from property and chargeable gains, although capitalizing capital income including chargeable gains did not lead to substantial changes). We then assumed that 80 per cent of the estimated excluded wealth could be attributed to the top 1 per cent (90 per cent of total settled wealth). The remaining additional wealth is attributed to the next top 4 per cent. Applying these adjustments to the wealth distributions for the years from 1994 and 2005, we found that the incorporation of wealth in trusts typically accounted for 2 per cent of total wealth held by the top 1 per cent and increased their relative share by less than 1 percentage point every year.

Off-shore accounts and the foreign wealth of non-domiciled. Tax shielding wealth in unreported off-shore accounts is not a new phenomenon; it impacts both the levels and trends of the current estimates, particularly if the avoidance incentives have increased disproportionately for the top of the distribution.³⁸ The manipulation of the residence for tax purposes has similar effects, only UK assets being liable to inheritance tax for non-domiciled.³⁹ The so called “non-dom” status for income tax purposes, however, does not always shield individuals from IHT liability. Indeed, individuals residents in the UK for 17

³⁷ Some trusts are set up so that the beneficiaries have ownership or a legal right to the income or assets in the trust (a “bare” trust). In this case both income and assets have to be considered part of their estate when they die and reported within the tax inheritance form.

³⁸ According to Zucman (2013), 4 per cent of US household financial wealth is held off-shore, much of which is unreported. If the same percentage were assumed to correspond to the UK top 1 per cent of wealth holders in 2008-2010, it would increase their share from 20.6 to 22.7 per cent. Doubling the number to 8 per cent would bring the top 1 share up to 24.7 per cent. Such changes are salient but they are not enough to revert the concentration of wealth to pre-1950s levels.

³⁹ UK residents who are not domiciled in the UK can choose to pay tax on the remittance basis so that any income and gains they hold offshore are only taxable as and when they are brought in to the UK. Since 2008, those who have lived in the UK seven years or more have to pay a charge (up to £90,000), known as the remittance basis charge, for each tax year in which they use the scheme. In 2012-13 110,700 UK taxpayers were registered as non-domiciled, out of whom 46,700 claimed the remittance basis (the rest either had no significant income abroad or paid income tax on it), and 5,100 paid the charge; all others presumably lived in the UK for less than seven years. Residents in the UK for 17 of the previous 20 years are deemed domiciled; the same applies, during the first three years after the moving, to those who establish their home abroad.

of the previous 20 years are automatically “deemed domiciled” and, as such, all their world estate has to be reported in the tax forms. Similarly, all those individuals who had moved their permanent home abroad within three years from their death are deemed domiciled.

Given the variety of ways to effectively avoid inheritance taxation and their relative appeal to wealthy individuals with potential estates above minimum tax threshold, it is likely that our estimates represent a lower bound of the true wealth concentration level. The extent of the bias is, however, difficult to assess and we do not attempt to correct our final figures in the absence of reliable empirical anchors. At the same time, there are factors working in the opposite direction. The UK top inheritance tax rate is today much lower than in the past (now 40 per cent, when it had been as high as 85 per cent in 1970), and the tax authorities have over the years been undertaking steps in order to improve tax compliance, restricting existing schemes of avoidance, and improving on fiscal fraud investigation, although it remains the case that, as the National Audit Office noted in its review of inheritance tax, that HMRC “has no overall measure of the ‘tax gap’ on Inheritance Tax [which] provides a measure of the level of tax non-compliance” (2004, page 3).

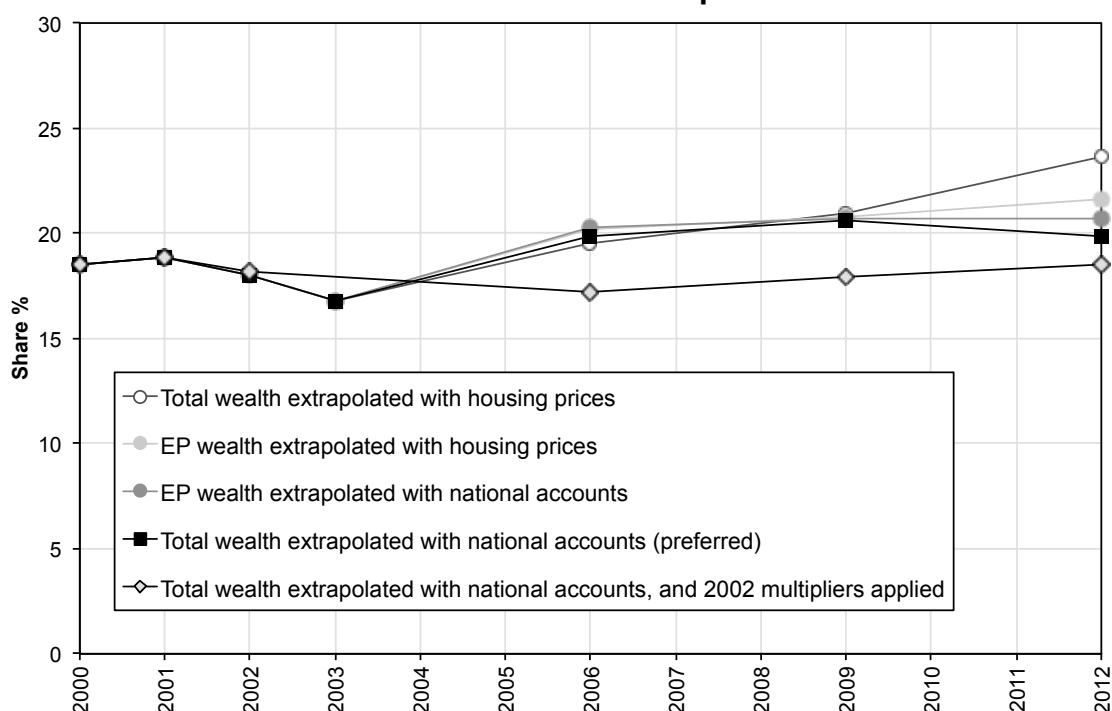
Sensitivity and the estimates for the 21st century

Earlier, we explained that the control totals for wealth could not be taken beyond 2005 in the same way as for earlier years, and that the method adopted in Section 4 departed from that followed in the series up to 2005, in that it used personal sector balance sheet totals as the basis for projecting total wealth. This approach was used *faute de mieux*, since the pre-2005 method could not be applied, but is not fully satisfactory. We now consider the sensitivity of the top share estimates for the 21st century to alternative approaches. This in turn leads us to probe more deeply into the new methodology introduced by HMRC to construct wealth estimates.

The pre-2005 wealth control totals are based on adding HMRC estimates of the wealth of the excluded population to the total wealth identified from the estate data. The barriers to applying that approach after 2005 are that HMRC ceased to make estimates of the wealth of the excluded population (EP), and that we lack the information required to make such estimates, which depend on the size and composition of the EP. All that we can do is to extrapolate forward the average wealth per person in the EP, an extrapolation that does not, for example, allow for any changes in composition. In other words, rather than extrapolating total wealth as in Section 4, we extrapolate the average wealth of the excluded population and add this amount, multiplied by the EP, to the identified wealth to arrive at the control total for wealth. This still leaves open the issue of the variable to be employed when making the extrapolation. Two approaches have been tried: (i) given the importance of housing in joint property passing without need for probate, extrapolation based on the ONS housing price index (ONS website, 2015, Table 24 Housing Price Index, average house prices for all dwellings) and (ii) extrapolation based on average wealth per adult from the personal sector balance sheets. Over the period in question, these two series moved rather differently.

Figure 12 shows the share of the top 1 per cent series preferred in Section 4, together with alternatives. Given the overlap of data, the projections start from 2000: the figures for 2005-07 are shown as 2006, those for 2008-10 as 2009, and 2011-13 as 2012. The main departures come in 2012; until that point the alternative series yield very similar values for the top 1 per cent share. In 2012, the Section 4 estimate was 19.9 per cent. With the wealth of the EP extrapolated using the balance sheet totals, this would rise to 20.7 per cent, and using the house price index it would become 21.7 per cent. The corresponding figures for the top 10 per cent share show a rise from 51.9 per cent to 54.1 per cent and 56.5 per cent, respectively. From this we conclude that our earlier estimates may have under-stated the rise in top shares in the most recent year. This is re-inforced by the fact that a further variant shown in Figure 12 - extrapolating the total, not in line with the personal sector balance sheets, but in line with the housing price index - shows the top 1 per cent share rising to 23.6 per cent. It should be stressed that these conclusions relate only to 2011-13; for earlier years the series move closely together. The main conclusion is that the production of reliable estimates requires a major investment in the reconciliation of different sources of evidence about total personal wealth.

Figure 12. Top 1% wealth share in the 21st century: sensitivity to total wealth and multipliers



Source: Table F1 and Table G1.

Examination of the sensitivity of the findings for recent years, and of the wealth totals, does moreover raise the issue that the total identified wealth in the new HMRC estimates is lower than that obtained using the earlier method. For 2001-03, we can make a direct comparison with the estimates obtained using the previous method. The new HMRC average for 2001-03 shows 15.987 million identified wealth-holders, who are 85.1 per cent of those identified in the earlier HMRC series averaged over the years from 2001 to 2003. For the total identified wealth, the corresponding figures are £2,465.4

billion, compared with £2,648.9 billion, the new HMRC figure being 93.1 per cent of the earlier estimate. In other words, the new HMRC estimates show a reduced number of identified wealth-holders, and hence a larger excluded population, and the reduction is proportionately greater among those in the lower part of the identified wealth population. In the last years of the previous HMRC estimates, the identified wealth-holding population represented some 40 per cent of the adult population; in the more recent years the proportion is closer to 30 per cent.

As far as the changes in the multipliers made by HMRC are concerned, there are two factors at work: a change in the differential variation of multipliers with wealth levels, and a reduction in the overall level of the multipliers. The former comes about on account, not of increasing the multipliers for the rich, as discussed above, but of reducing the multipliers for the smaller estates, as described by HMRC:

“in the old method, by applying an adjustment part way between those for the larger estates and those for the population as a whole, all estates were assumed to have a lower mortality rate than the population as a whole regardless of how small they are. The new method ... captures the possibility that some of the smaller estates would have higher mortality rates due to low levels of wealth. Consequently some of the multipliers can be much lower for the small estate sizes” (HMRC, 2011, page 10).

Secondly, there was a change from use of data on mortality differentials from the ONS Longitudinal Study to differentials based on the relationship between housing wealth and mortality as modelled using the English Longitudinal Survey of Ageing (ELSA). Housing wealth was employed rather than total wealth as there was found to be a stronger relationship between housing wealth and mortality: “an adjustment was calculated for each housing wealth decile, age group, gender and marital status which compared the modelled mortality rate for that housing wealth decile to the overall mortality rate for that age group, gender and marital status. These adjustments were applied to the data for the over 45s, effectively increasing the multipliers applied to the estates with the greater housing wealth and reducing them for the estates with less housing wealth” (HMRC, 2011, page 9). As is recognized, the new approach has limitations. No adjustments are made for those aged under 45. The mortality data relate only to England, excluding Scotland, Wales and Northern Ireland.

The end result is that there is an overall reduction in the general level of multipliers. This may be seen from the “average multiplier” applied: i.e. the ratio of the number of identified wealth-holders to the number of estates. Over the period 1974 to 2005, the mean value of the average population multiplier was 66.1 and there was no evident trend. The corresponding figure for 2011-13 is 53.4. To examine the possible impact of this reduction in the general level of multipliers, we have applied the average multipliers per estate bracket in 2002 (HMRC earlier series) to the averaged estate data for 2005-07, 2008-10 and 2011-13. The results are given in Table G1 as Memorandum items and illustrated for the top 1 per cent share in Figure 12 (the same national balance sheet control totals for wealth are employed as in Section 4). As may be seen, the estimated shares lie below those obtained using the new HMRC multipliers, up to 2011-13 when they are close to the Section 4 series. Such calculations are only approximate, but are the best that can be done without access to the underlying data. The size of the identified population and identified total wealth are increased. The

estimated top wealth shares are more comparable, we believe, with those obtained for earlier years using the old HMRC methodology. Moreover, the estate shares and the wealth shares are closer and move in line.

We have worked in Section 4 with the results derived applying the new HMRC multiplier methodology, but we are of the view that comparability over the long-run is better served by the alternative estimates for years after 2005 shown as Memorandum items.

Sensitivity of the estimates to the use of different linking assumptions

Previous sub-sections have explored how the final estimates may be affected by the change of wealth control totals or the nature of the mortality multipliers. Another important source of variation may come from different procedures for linking at four distinct breaks in the series described earlier. As explained above, we made use of overlapping years where possible and, between 1959 and 1960, of the estate data. The adjustments have been assumed to be additive. They take as a base (i.e. no adjustment) in 2002 the new HMRC series, and involve changes measured in percentage points. The series changes take place at “jump” points, as shown below:

2001: +0.19 on “old HMRC series” (this also applies to 2003 and 2005 old HMRC estimates);

1978: +0.80 when data relate to year of account, rather than year of death;

1959: -2.32 when more limited estate data available;

1923: -0.74 when estate data was not available by gender.

These changes are cumulative in that the total addition in a year is the sum of the previous changes. This means, for instance, that the linked series for 1960 is higher by $0.19+0.80 = 0.99$ percentage points.

Here we consider three sets of alternatives: (1a) ruling out all linking assumptions, making use of the unadjusted new series every time it becomes available (see Figure 5); (1b) using the full set of five overlapping years in the 1970s and 1980s (1974, 1976, 1978, 1985, and 1987) in order to account for the switch from a year of account basis to a year of death basis; and (1c) replacing the use of estate data for the 1959 to 1960 by the assumption that there was no change in the shares between the two years (otherwise retaining an additive adjustment for the other breaks).

The magnitudes listed above should make it clear that the effects are small, as is the impact of the alternative assumptions. There is some tendency for the effects to be greater in earlier years. For example, under the assumption used in our series, years before 1960 have a downward adjustment of 1.33 percentage points. If we were make assumption (1c) this would become an upward adjustment of 0.99. Both effects are modest. It is of course possible that they interact with other effects, generating a larger combined effect. Our conclusion is however that the linking assumptions taken on their own have only limited consequences for the estimates.

6. Triangulation

In the previous section, we concentrated on the internal validity of the approach adopted; we now consider whether there is external evidence that is helpful in assessing the reliability of our estimates on the concentration of wealth in the UK. In this section we provide evidence about the concentration of investment income in the UK and on a variety of existing sources on wealth concentration ranging from household surveys, rich lists and estimates relying on hybrid methods. A similar comparison with the US estate-based estimates (Saez and Zucman, 2016) suggested that estate-based estimates may today substantially understate the wealth concentration at the top. Finally, we compare our estimates of top wealth shares to the official series provided by the HMRC and to other estimates available in the research literature.

The distribution of investment income

The capitalization of investment income is, as noted at the beginning of the paper, one route to obtain estimates of the distribution of wealth, but the available data in the UK pose some limitations for a robust application of the method in recent decades, and we do not use this approach here. At the same time, the distribution of investment income is potentially a valuable source of complementary evidence. Of course, given that investment income is the product of the rate of return and the level of wealth, there is no reason to expect the degree of concentration to be the same as for wealth on its own. At the same time, examining the relation between the two distributions can be instructive. Where, for instance, the rate of return is distributed with a positive variance independently of wealth, the distribution of investment income can be expected to be more dispersed than the distribution of wealth (see Appendix VII of Atkinson and Harrison, 1978). In what follows, we examine how far this is the case in the UK, and how the two distributions - of investment income and wealth - have moved over time.

The main source of the distribution of investment income data in the UK is provided by the regular income tax returns through the Survey of Personal Incomes (SPI), and, in earlier years, the surtax returns (the sources for each year are found in Appendix Table A3). The distribution of investment income can be recovered for the top of the capital income distribution in the form of tabulated data from 1948-49 to 1979-80. Investment income consists of rent, dividends and interest, and (until 1963) Schedule A imputed income on owner-occupied property. After 1979 the tabulations were no longer published in the necessary form, but for the years 1985-86 and 1995-96 to 2010-11 we have access to micro-data on investment income.

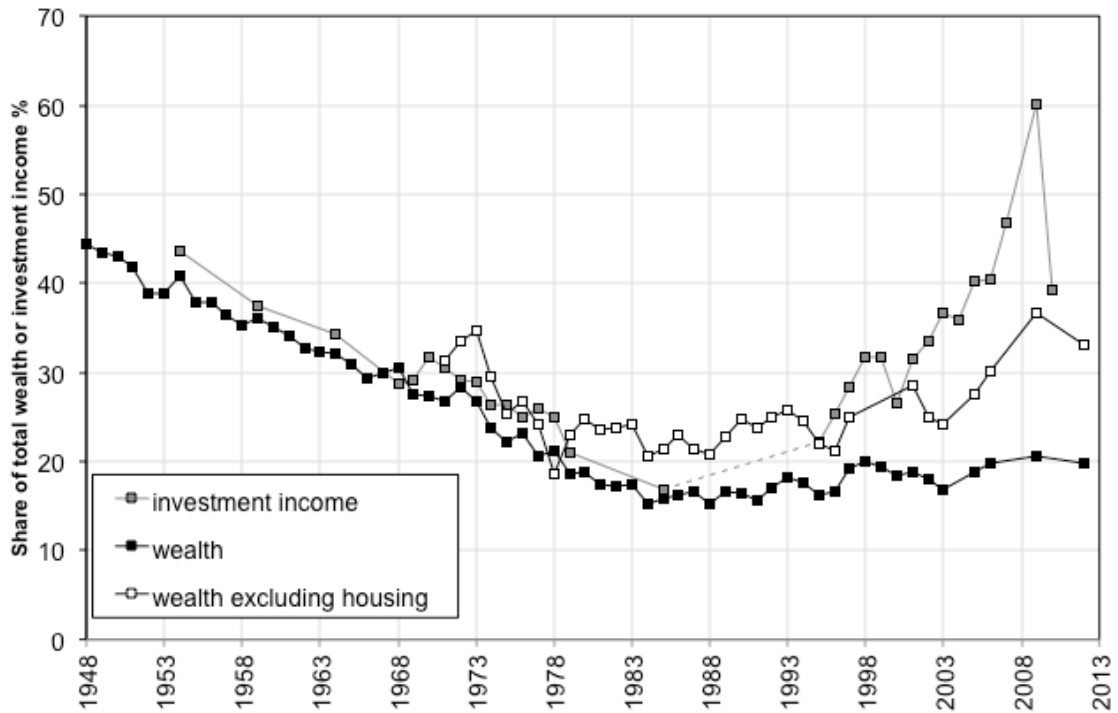
The investment income share of the top 1 per cent is compared with their share of total wealth in Figure 13 for the top 1 per cent. On account of the hiatus in the investment income data, we consider the results in two parts. For the period up to 1979-80, there is year-to-year variation, but shares of investment income and wealth move closely together. Between 1954-55 and 1979-80, the share of the top 1 per cent in investment income halved, as did the share of the top 1 per cent in wealth. For the years from 1995-96, when we are able to access micro-data, the share of the top 1 per cent in investment income is increasingly higher than the share of wealth. There is a strong

upward trend from the year 2000. One potential reason for the difference is the change in the reference population: the distribution of capital income changes from tax units to individuals from 1990-91. This is not however likely to account for the widening gap. To understand this, it is informative to look at the distribution of wealth excluding housing. The investment income figures do not include imputed rent, so that the distribution excluding housing wealth does indeed provide a better basis for comparison. From Figure 13, which shows the share in total wealth excluding housing of the top 1 per cent, it appears that the rising share of the top 1 per cent in investment income supports the view, reached in Section 4, that the UK has seen since 2000 a rise in the top shares of non-housing wealth.

The people in the top 1 per cent of the distribution by investment income not necessarily the same as those in the top 1 per cent of the distribution of wealth excluding housing, but a check on the plausibility of the estimates can be made by comparing their total investment incomes and total wealth. By using our estimates of the distribution of wealth excluding housing assets in Section 4, we can estimate the implied rate of return in money terms. Excluding 2009 (affected by the forestalling of capital income in advance of the rise in the maximum tax rate), the average rate of return over 1995-96 to 2010-11 was 5.5 per cent for the top 1 per cent, and 4.3 per cent for the top 10 per cent group (see Table L4). These rates of return, which do not include capital gains, do not seem unreasonable.

This examination of the UK investment income data adds to our conviction that a better understanding of the capital side of the account is necessary in order to explain the movements of top shares in recent years. Even stopping short of seeking to capitalize investment income, these data provide a valuable alternative perspective, and we hope that the UK statistics in this area can be developed.

Figure 13. Comparison of the top 1% share of the distributions of total wealth, wealth excluding housing assets, and investment income



Sources: Tables G1 and H2 for the distribution of wealth, and Table L1 for the distribution of investment income. Notes: (1) the decline in income shares in 1966-67 was due to the payment of “unusually large dividends in 1965-66 (in anticipation of the introduction of Schedule F)” (IRS 1971, page 69). Similarly, the spike in 2009 is the result of the forestalling of income in advance of the rise in the top income tax rate from 40 to 50 per cent. (2) The distribution of investment income refers to tax units until 1990, and to individuals from that date.

Comparison with the evidence from Rich Lists

Another window through which we can get partial evidence on the concentration of wealth is that of the Rich Lists; they can provide valuable insights into the upper tail of the distribution. For instance, it is likely that the estate method does not appropriately capture structural transformations reflecting younger entrepreneurs with lower mortality risks climbing up the pyramid. The Lists could timelier capture such transitions of the sources of concentration, where self-made fortunes become more salient.

In the UK there are two main lists: the global *Forbes List* of (Dollar) Billionaires, published annually by the business magazine since 1987, and the *Sunday Times Rich List*, which has since 1989 published a list of the wealthiest people or families in Great Britain every year. The Sunday Times Rich List aims to include the 1000 richest wealth holders every year, which allows for the identification of the top 0.001 per cent in Britain.⁴⁰ The resulting series is represented in Figure 14, together with our estimate of the share of the top 0.5 per cent. On average, over the period shown, the share of the top 0.5 per cent is some 3.75 times larger, for a group that is 500 times larger. If a Pareto distribution applied, then the inverted Pareto coefficient required to generate such a ratio would have to be as high as 4.7, or well above the levels reported for recent decades in Figure 9. This cautions against assuming that the observations are drawn from the same distribution. On the other hand, we have to distinguish between *level* and *trend over time*. The changes in the Rich List estimates do appear to track quite closely the dynamics of our top 0.5 per cent wealth share. Year to year variations are often aligned, with the exception of the years around the recent financial crises, when the rich list-based shares appear to capture a higher degree of concentration, most likely due to asset market dynamics. This effect seems to operate only at the very top, as illustrated by the line where we subtract the Rich List estimate for the top 0.001 per cent from the estate-based share for the top 0.5 per cent (so we are looking at the top 0.5-0.001 per cent). The 2011-13 estimate is no higher than that at the beginning of the century.

It is not easy to assess the representativeness and reliability of the Rich Lists. The data are often based on journalistic estimates that can be subjected to several types of errors, and the methodology cannot be transparently evaluated. The value of liabilities may be under-estimated and the unit of analysis is not always consistent across observations and time, and it is not comparable to that used in the estate statistics. Whereas the estate-based estimates attributes wealth to individuals, the Lists refer (not always clearly) to individuals, households, or extended families.⁴¹ Figure 14 assumes that every observation in the rich lists refer to a family of two individuals, but that assumption is arbitrary. The geographical scope of the data may also differ. The list includes people who live and work in Britain, but also British citizens abroad, and people who are married to Britons, who have strong links with Britain, who have estates and other assets there, or who have

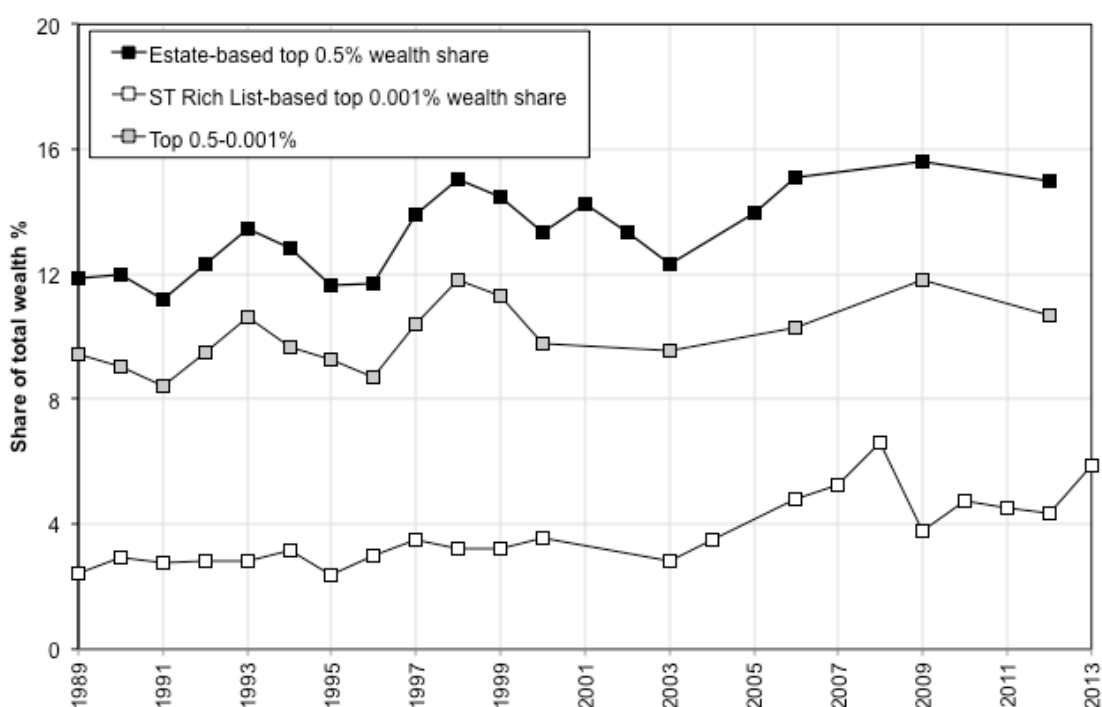
⁴⁰ With Forbes we can only identify 0.00003% of the Britain adult population from 2002 (approximately 13 individuals per year, see Appendix M).

⁴¹ In the case of the Rich Lists, the unit may be more extensive than the household. For example, in the 2014 Sunday Times list, the top entry was the Hinduja brothers; third was Lakshmi Mittal and family, which includes his son and daughter; the wealth of number 11 includes that of Galen Weston, his wife and his nephew, George Weston. There are often multiple generations, such as number 19 (Earl Cadogan and his son, Viscount Chelsea).

backed British political parties, British institutions and British charities. The population represented is therefore more extensive than that in the estate-based estimates.

For those millionaires in the Sunday Times List who have passed away, we can compare the wealth given in the list around the year of death with the probate values of their estates. We have identified at least 74 cases, given in Appendix Table N1. General conclusions from this comparison are difficult. Probate values tend to understate the HMRC/IR figures as they are only intended to cover all those assets which an executor must dispose of in accordance with the testator's will (or the intestacy rules), this is, property that the decedent is legally empowered to distribute; this excludes, for instance, the trusts of which the decedent is beneficiary but over which he has no power of disposal. The HMRC/IR valuation covers all assets subject to estate tax, including non-discretionary trusts. At the same time, charitable gifts made during lifetime, which are substantial in many of the shown cases, are not given in the probate. Notwithstanding these facts, the following elements are worth stressing: (i) the relationship between probate values and List values are much higher for people identified as individuals than for extended families; and (ii) it is notable that for the top 4 estates (above £200 million at 2015 prices) the List considerably underestimates wealth; the same applies to 7 out of the top 10 estates (above £100 million).

Figure 14. Rich Lists vs. estate-based top wealth shares in the UK



Source: Table G1 and Table M1.

Comparison with existing estimates of the distribution of wealth in the UK

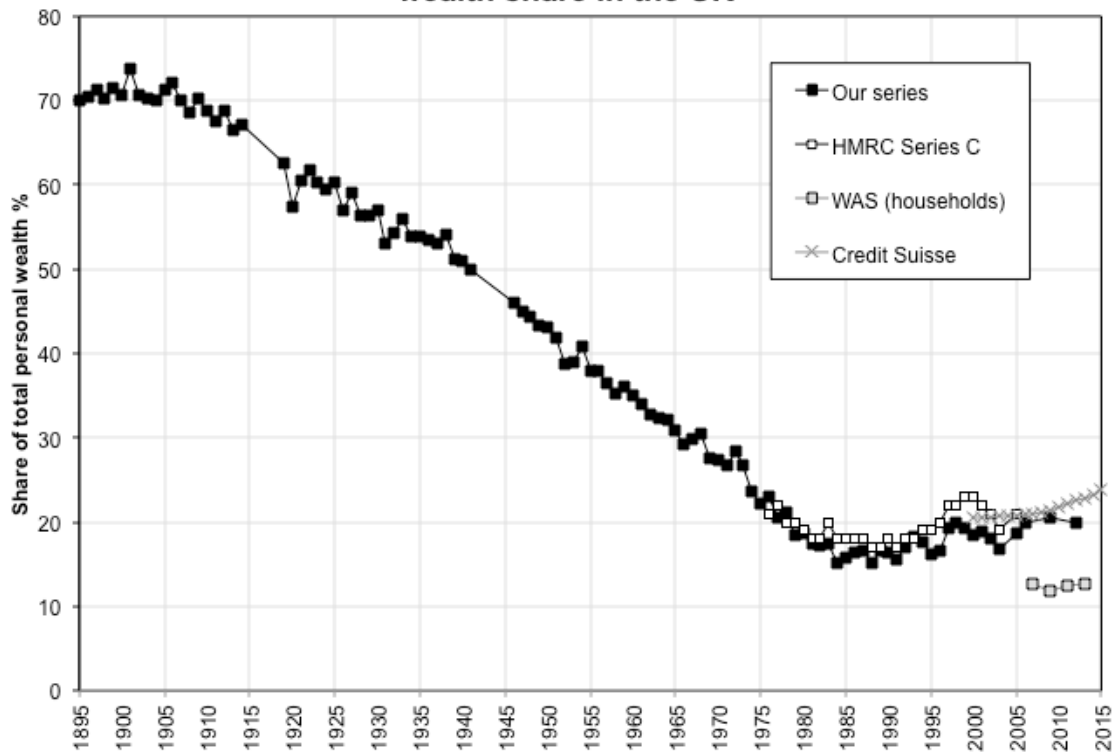
Data on estates at death have long been used for economic research in the UK, ever since Baxter (1869) made estimates of total personal wealth on the basis of the revenue from the Probate Duties (that preceded Estate Duty). Atkinson and Harrison (1978) estimated the first long-run series of wealth concentration starting in 1923 using a methodology similar to that employed here. It is therefore not surprising that available estimates since 1923 are not very distant from our series - see Appendix Table K1. The Inland Revenue (now HMRC) has published its official Series C covering 1966-1976 and its revised version from 1976 to 2005. Series C, in addition to adding, as in our series, estimates of the wealth of the excluded population, also corrected for under reporting of wealth of the included population, for missing wealth held in trusts, and adjusted the valuation of included wealth, but the time path is again similar, as shown in Figure 15. These, averaged over decades, were the basis for the series published by Piketty (2014, Figure 10.3).

More recently, UK evidence on the distribution of wealth has come from household surveys. The triennial Wealth and Assets Household Survey (WAS) was launched in 2006. This source is important as it provides an independent source of information on wealth. The obvious advantage of the evidence based on household surveys is that the data are unaffected by problems of tax avoidance and tax evasion because, in principle, unrelated to the tax administration operations. Moreover, differently from our estate-based definition of wealth, WAS data include information about pension entitlements. The main disadvantages, however, are the exclusion of business assets from wealth, the use of household unit of account, and the very low rates of cooperation of households, and potentially high non-response rates of wealthier households (see Alvaredo, Atkinson and Morelli, 2016 for a more detailed account). The exclusion of business assets and the issues of non-response and under-reporting at the top mean, in our view, that the Wealth and Assets Survey cannot, at this stage, provide a fully satisfactory representation of the upper tail of the UK wealth distribution.⁴² The WAS evidence (including pension wealth), shown in Figure 15 from 2006-2008 to 2012-2014, indicates that the share of total national wealth accruing to the richest 1 per cent of British households was stable and around 12 per cent. As argued in Alvaredo, Atkinson, and Morelli (2016), these shares are substantially below that estimated using estate-data, even allocating wealth to individuals and excluding pension wealth to make the two series more comparable.

Other scholars have attempted to correct the evidence available in the WAS using that from the Forbes Rich list. The Credit Suisse Research Institute (Davies and Shorrocks, 2014) combines the WAS distribution of wealth at 2006-2008 and the *number* of Forbes billionaires to obtain annual estimates of top wealth shares from 2000 to 2014. Vermeulen (2014; see also 2014a and 2016, although these do not contain estimates for the UK) combines extreme observations on the *number* of billionaires as well as their *wealth* from the Forbes List with the WAS data, for the year 2009, fitting a Pareto distribution to the data. Such adjustments of household survey data bring the estimated shares of total wealth accruing to the top wealth brackets closer to our own estimates.

⁴² The ONS is engaged on updating the methods to oversample wealthier households in order to improve the reliability of the household survey, building on the experience in the US with the Survey of Consumer Finances, conducted by the Federal Reserve Board. It remains to be seen whether this can overcome the problems identified above.

Figure 15. Comparison with existing estimates of the top 1% wealth share in the UK



7. The UK and US compared

Since the US Federal Revenue Act of 1916 imposed the estate tax, statistics of tax returns have been collected by the Internal Revenue Service and information began being published in *Statistics of Income* from 1923. Researchers in the US were, however, slow to make estimates of the distribution of wealth along the lines of studies in the UK and other countries (New Zealand, for example, published official estimates of the wealth distribution in the 1920s). The first estate-based study in the US was that by Mendershausen (1956). This was followed by Lampman (1962). A number of studies took up the subject later, but the longest and most complete set of estate-based estimates are those by Kopczuk and Saez (2004), which have subsequently been updated by Saez and Zucman (2016) to cover more recent years.

The methods adopted in the US are in principle similar to those in the UK, and Lampman argued that, with the exception of the treatment of life assurance, “the British data seem to be quite comparable with our own” (1962, page 211). There are however several reasons why the estate data in the US are less satisfactory as a basis for wealth estimates than those we employ for the UK. In terms of process, in the US probate is granted before the payment of the tax, whereas in the UK the two steps are contemporaneous making the inheritance tax forms more reliable as a source of data. In the UK there is a unified system for probate in each country (England and Wales, Northern Ireland, and Scotland), whereas in the US the administration of probates is a matter for each individual state, going through specific or generic state courts. This means that procedures are not necessarily uniform across the US. Finally, the coverage of the estate tax data in the US is much more limited. In 1921, the estate data covered

1 per cent of adult deaths. By 1976 this had risen to 7.6 per cent, but by 2000 it had fallen back to 0.5 per cent. In contrast, in the UK, the data for 1895 covered some 13 per cent of adult deaths; the proportion rose to a third in the inter-war period; and since 1960 the estate data cover around a half of all adult deaths (see Figure C1 in Appendix C).

In his comparison of the US and the UK, Lampman, drawing on the estimates for England and Wales by Langley (1950, 1951 and 1954), concluded that, while the “historical picture of decline in the degree of inequality of wealth distribution is similar in the two countries ... for the period 1922-46 ... throughout the whole period the inequality has been considerably greater in England and Wales than in the United States” (1962, page 215). In broad terms, the top 1 per cent of adults owned around a half of total wealth in England and Wales in 1946-47, whereas in the US in 1953 they owned less than a quarter. To today’s ears, this may sound like a surprising conclusion.

With the aim of seeing whether the same is true half a century later, we follow identical order as with our earlier UK estimates, beginning with the distribution of estates. Not only is this a valuable building block, but also the estate distribution as such has received little attention in the US literature. The US estimates of the distribution of estates shown in Figure 16 are new. As discussed in Section 2, the estimates depend on the assumption made regarding the total of estates not covered by the estate tax returns. For the US, we have estimated the total estates by applying the ratios between the average wealth of the dying and the average wealth of the living given in Alvaredo, Garbinti and Piketty (2015) to the wealth series in Kopczuk and Saez (2004), updated in Saez and Zucman (2016).

The distribution of estates is given in Appendix Table O3 on three different bases, none of which corresponds to our preferred choice (we have to make use of the data as published; we have not had access to microdata). “Taxable estate” refers to its size after deduction of the tax exemption, whereas the “gross estate” is before deduction of debts. This means that the gross estate is likely to overstate the top shares, and the “taxable estate net of debt” will understate the shares. The difference is most marked in the recent period. For the sake of simplicity, Figures 16a (share of the top 1 per cent) and 16b (share of the top 0.1 per cent) focus on the distribution of gross estates.

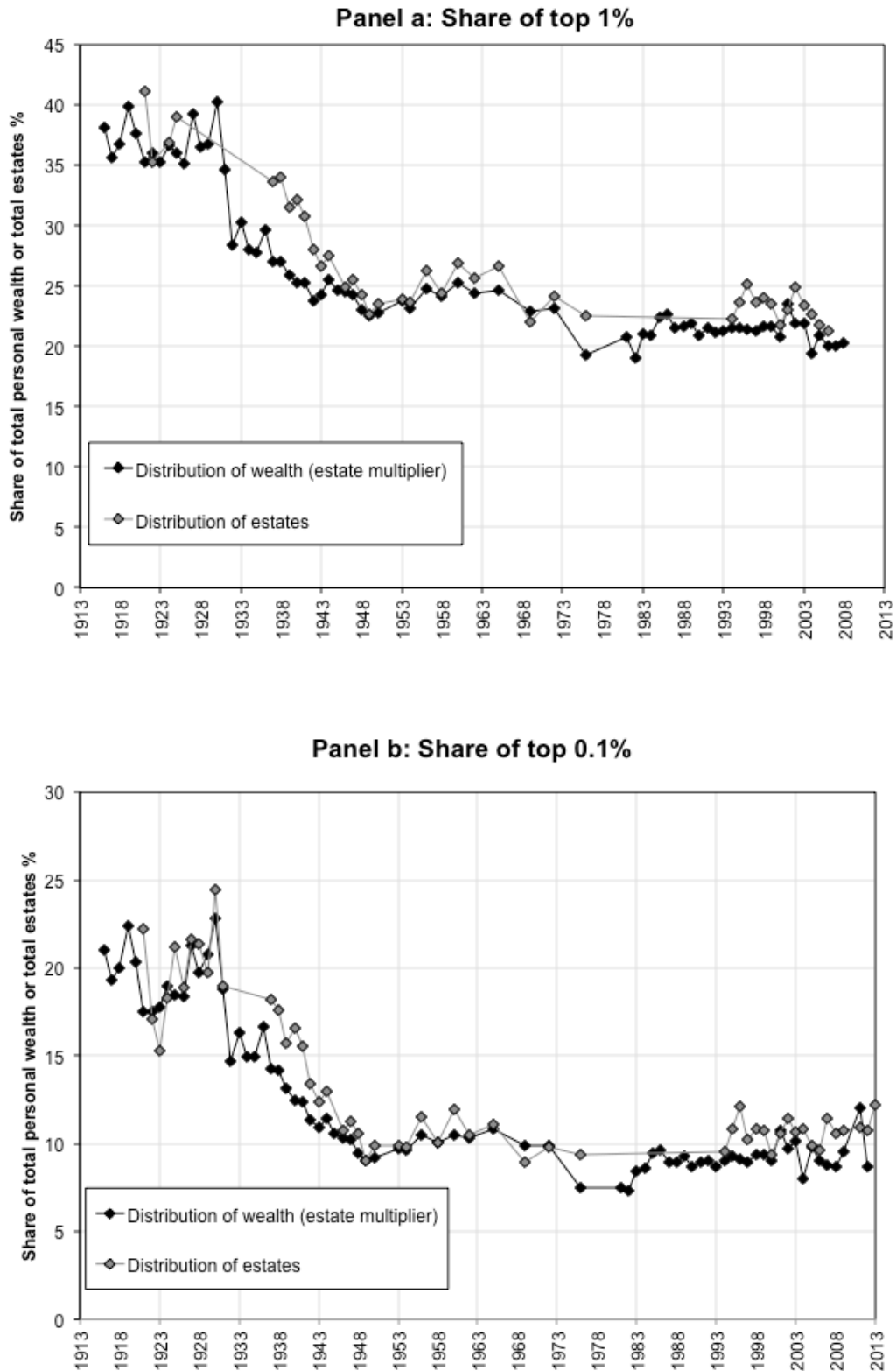
The US estate data are multiplied-up in the wealth estimates of Kopczuk and Saez (2004 and 2004a) and Saez and Zucman (2016), and these are also shown in Figures 16a and 16b, for comparison with the estate distributions. Unlike in the UK, the years covered in the estate and wealth distributions are the same; adopting an estate approach does not extend the coverage. This underlines the greater richness of the UK data. The comparison of estate and wealth distributions does however show the same similarity of time path as in the UK. Again the picture appears to be little affected by the application of the mortality multiplier process. In 1922, the share of the top 1 per cent in gross taxable estates was 35.2 per cent and that of the top 1 per cent in total wealth was 36.0 per cent; fifty years later, in 1972, the shares were 24.1 per cent and 23.1 per cent, respectively. Both series show a reduction of a third in the share of the top 1 per cent.

We turn now to the comparison of the US and the UK, shown in Figure 17a for the top 1 per cent and in Figure 17b for the top 0.1 per cent. For the top 1 per cent, there is a

clear point of convergence towards the end of the 1970s. The UK top shares started off above those in the US, and at the end of the period were, if anything, lower. This reflected the protracted period of leveling that took place in the UK after 1914 and lasting up to 1979. In contrast, the leveling in the US was largely confined to the 1930s, according to the estate-based estimates. The top 1 per cent share in 2008 was little different from that in 1948. A similar pattern is shown for the top 0.1 per cent in Figure 17b, and in this case the contemporary UK share is distinctly lower than found in the US using the estate method.

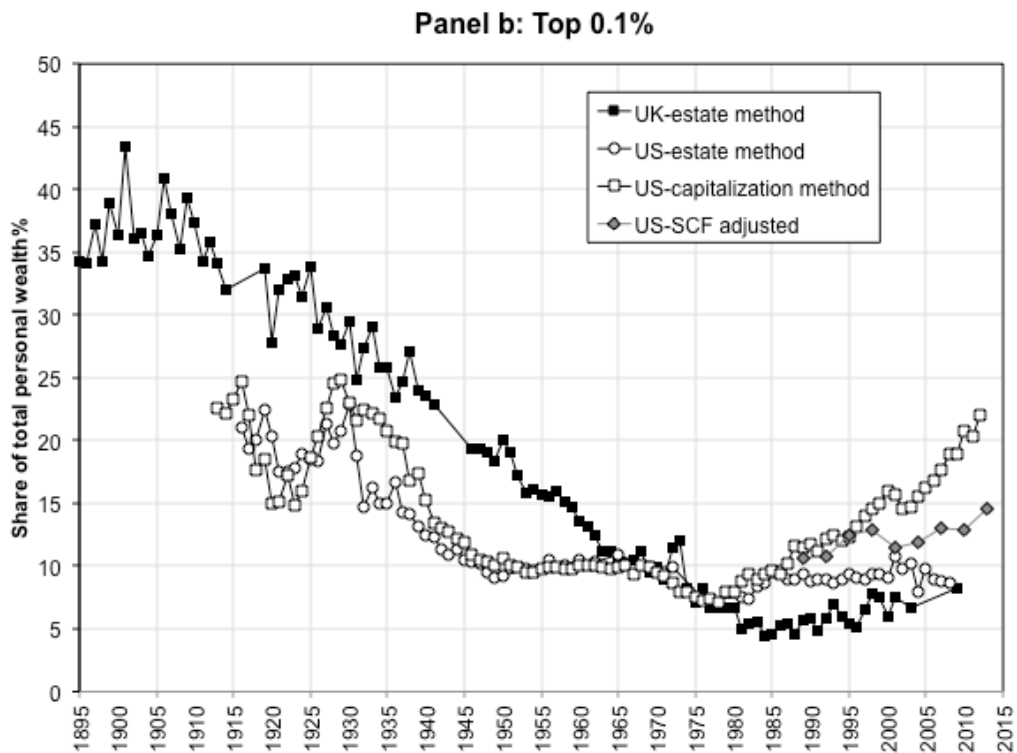
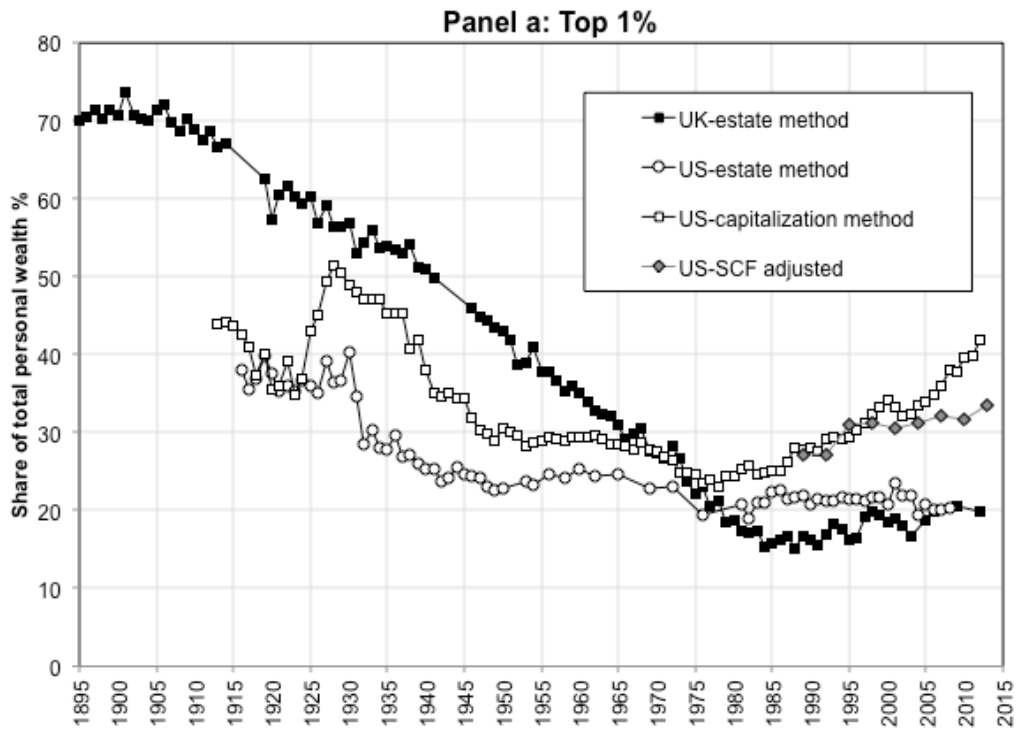
A major issue in the US has been the relation between the estate-based estimates and those using the capitalization of investment income by Saez and Zucman (2016). These estimates differ in a number of respects from those obtained using the estate data. The investment income refers to the tax unit rather than individuals, and the estimates include pension wealth. The income capitalization method does indeed yield higher estimates of the share of the top 1 per cent, as shown in Figures 17a and 17b, but until the 1980s the movements over time were close. The estimated shares of the top 0.1 per cent are “remarkably similar” (Saez and Zucman, 2016, page 570) from 1916 to 1976. In recent decades, however, there has been a major departure, with the capitalization method showing “the comeback of wealth inequality at the top” (Saez and Zucman, 2016, page 551). Between 1989 and 2012, the share of the top 1 per cent rose from 27.8 to 41.8 per cent, an increase of 14 percentage points, a change which is comparable in magnitude to the fall that took place between 1929 and the Second World War. Half of this increase took place between 2000 and 2012. The difference between the estate-based estimates and those obtained by capitalization is discussed by Saez and Zucman, who emphasize the limitations in the former case of the mortality multipliers and the unreported wealth held in trusts. As we have explained earlier, we do not believe that this is the full story. While we recognize the shortcomings of the estate approach (see Section 5), we are of the view that, in the present incomplete state of knowledge about top wealth-holdings, all sources of evidence should be taken into account. In this context, we note that the estimates of Bricker et al, (2016, Figure 5) based on the Survey of Consumer Finances show an increase in the share of the top 1 per cent between 1989 and 2013 which is 6.3 percentage points, or under half that found using the income tax data, and that most of the increase occurred between 1989 and 1995.

Figure 16. Comparison of wealth and estate distributions in the US



Sources: Distribution of estates: Table O3; distribution of wealth: Kopczuck and Saez, 2004, and Saez and Zucman, 2016. Notes: The distribution of estates refers to gross taxable estates until 1931, and to gross estates from 1932. The distributions of net taxable estates and gross estates (taxable and non-taxable) are given in Appendix Table O3.

Figure 17. Comparison of top 1% share in UK and US



Sources: UK estate method: Table G1; US estate and capitalization methods: Kopczuck and Saez, 2004, and Saez and Zucman, 2016; US SCF adjusted: preferred series in Bricker et al., 2016, based on household distribution.

8. Conclusions

The contribution of the paper is summarized under three headings: (i) *methodological and the provision of a new series* on UK wealth concentration, (ii) *substantive findings* in terms of the evolution over time of top wealth shares in the UK and the comparison between the UK and the US, and (iii) *implications for future research*.

Methodological contribution and new series

This paper has taken a fresh look at the use of administrative data for the UK on the wealth people leave at death: their estates. By exploiting more fully the available data, we have been able to construct a new series of top wealth shares covering virtually the entire period from 1895 to the present day. Time series with more than 100 observations are rare in the fields of wealth and income inequality. Construction of this long series has proved possible because the distribution of individual wealth appears to mirror closely the distribution of estates, and we have employed the latter to amplify the picture that can be obtained about wealth concentration. This means, in the case of the UK, the creation in Section 4 of an “estate-interpolated series of wealth-holding” to complete the historical record, the interpolations covering years for which wealth estimates are not possible, and to give a continuous series (in contrast to the earlier series in Atkinson and Harrison, 1978, where there are distinct, but often ignored breaks in 1938 and 1960).

In order to make sense of the relation between estates and the wealth of the living, we have investigated the process by which the latter is obtained via the application of mortality multipliers. The implications of applying such multipliers are often misunderstood. While we believe that critics of existing estate-based estimates are right to point to the likely steepening of the wealth mortality differential, with higher multipliers now being applicable to top wealth-holders, the impact needs to be assessed in terms of its ultimate consequences for the estimated distribution. We have investigated this impact by comparing the distribution of estates and of multiplied-up wealth, and by examining the impact of alternative multipliers. This indicates that the application of a sharper gradient to the mortality multipliers at the top does not radically change the estimated degree of concentration. We have investigated the new methodology with regard to multipliers introduced in recent years by HMRC. While this is followed in the Section 4 series, it leads to a distinct break, and we have given an alternative set of estimates for the years from 2005 as “Memorandum items”.

The new series for the UK presented here is more extensive in its time coverage than any available to date, and will, we hope, provide the basis for future time series analyses of wealth dynamics. At the same time, we have tried to stress its deficiencies. Some of these are of long-standing concern, such as tax avoidance and the incomplete coverage of trusts, notably discretionary trusts. Others are of more recent concern, such as the treatment of wealth held by foreigners and non-domiciled, and the problems of constructing appropriate wealth totals. The user may also choose to reject the estate-based interpolation that generates the full run of years.

Since any source is open to challenge, we have sought to triangulate with respect to other evidence, making use of evidence about the concentration of investment income in the UK and from the Sunday Times Rich Lists. We have compared the top shares with those found in household surveys and in estimates relying on hybrid methods. Whereas in the US it has been argued that the estate-based estimates may today substantially understate the wealth concentration at the top (Saez and Zucman, 2016), for the case of the UK the supporting evidence does not appear inconsistent with our account of wealth concentration and its trend over time.

Substantive findings

The new series for the UK documents the remarkable change that has taken place in the position of top wealth holders in the UK over the past 100 years. Before the First World War, the top 5 per cent of wealth holders owned around 90 per cent of total personal wealth. There were very few owner-occupiers (Keynes never owned a house). A hundred years later, the share was around 40 per cent. The top 1 per cent used to own two-thirds of total wealth; their share is now around one fifth. Half of the wealth of the top 1 per cent used to belong to the top 0.1 per cent; their share is now around 7½ per cent. This is still a highly concentrated distribution: the top 1 per cent have some 20 times their proportionate share. On this basis, wealth is indeed more unequally distributed than gross income. The World Wealth and Income Database shows the top 1 per cent in the UK with 12.7 per cent of total gross income in 2012.

The fall in wealth concentration at the top was slight before the First World War. The UK was not embarked on the downturn of a Kuznetsian process in the nineteenth century: the fall in concentration came after 1914. But the decline in top shares after that date was a continuing process; and cannot be simply attributed to the First or Second World War. Between 1919 and 1939, the share of the top 1 per cent fell by some 7 percentage points; between 1946 and 1979 the share was more than halved. The explanation of UK wealth trends cannot be found solely in terms of war-time disruption.

With the 1980s, the downward trend in top shares came to an end and went into reverse. As we have shown, there are a number of difficulties in reaching firm conclusions about the extent to which top wealth shares are now increasing. The difficulties include the construction of appropriate wealth control totals and the implications of changes in the overall level of mortality multipliers. Our results show the importance of separating out the role of housing wealth and provide evidence of increasing concentration in the distribution of wealth excluding housing, a conclusion that is re-inforced by evidence from the distribution of investment income.

The different periods can usefully be analyzed in terms of two determinants of top shares: the wealth required to enter the top 1 per cent in the UK and the concentration within the top 1 per cent. Both factors contributed to the decline in top shares between 1914 and the end of the 1970s. The wealth required to enter the top 1 per cent in the UK is now some half the level required before the First World War, but it is also the case that wealth became less concentrated within the top 1 per cent. The fall in the degree of concentration can be represented in terms of the implied Pareto coefficient. Before the First World War, this coefficient was some 1.4, indicating a high level of

concentration; by the end of the 1970s, it had risen to around 2, indicating a degree of concentration closer to that found for gross income. At the same time, our analysis showed that for the first half of the twentieth century there are doubts about the adequacy of the Pareto distribution as a description of the upper tail. It may be not just the parameter that has evolved but also the shape of the distribution. A long-run comparison based on the assumption that the upper tail above the 99th percentile is Pareto in form could miss a potentially important element of the change.

Implications for future research

The distribution of wealth is on the policy agenda for a number of reasons - in addition to concerns about the concentration in a few hands of economic power. There are concerns linked to the housing market, and we have investigated the role played by rising house prices and the changing extent of owner-occupation. There are concerns about the impact of the large programmes of long-term bond purchases, being pursued in the US, the UK, and by the European Central Bank. For the 90 per cent who make up the majority of wealth-holders, this impact may be monitored via household wealth surveys, but the wealth of the upper tail cannot be adequately captured by such surveys. There are therefore reasons, apart from concerns about social justice, for investment in better statistical evidence about the evolution of the distribution of wealth. The case acquires greater weight from the fact that, as we have shown, our knowledge is particularly poor when it comes to the period from 2005 onwards.

If we are to understand what is happening in the UK to the top of the wealth distribution, there are, in our view, three priorities. The first is to revive and revivify the official Series C based on re-worked estate records; for this, the data must be made available. The second is to develop and reconcile the balance sheets of the household sector. Such a reconciliation exercise must take fully into account the changing nature of the global capital market, and may be best undertaken as part of an international project. The third is to improve the information available about investment income and the underlying assets, so that the capitalization method can be further explored. We believe that there is considerable value in a multi-source approach to investigating the distribution of wealth. No single method is sufficient on its own, and we need to have as full a picture as possible of the advantages conveyed by large wealth-holdings.

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Appendices

The paper comes with a long appendix section, including tables. They are available, in pdf and excel format, from the authors' websites.

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Appendix O. The distribution of estates in the United States

Appendix A. Sources of distributional data

Table A1 lists the sources of data on the distribution of estates in the UK since 1895. Table A2 lists the sources on data for the IR/HMRC distribution of identified wealth. Table A3 lists the sources of data for the distribution of investment income.

Appendix B. Sources of population, deaths, and mortality multipliers

The population and deaths data for England and Wales from 1901 to 1992 are from the OPCS, Medical Statistics Division, “Historic Mortality and Population Data, 1901-1992” (interpolated to give 18 plus population), distributed by UK Data Archive, University of Essex, Colchester, May 1994 (2nd Edition); the source for deaths 1895-1900 is SN 5705 - Annual Deaths by Cause, Age and Sex in England and Wales, 1848-1900; the population breakdown by age for 1895 to 1900 is from www.mortality.org.

The population and deaths data for Scotland from 1895 to 2011 are from <http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/population-estimates-time-series-data> and

<http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/vital-events/deaths/deaths-time-series-data>.

The population and deaths data for Great Britain are the sum of those for England and Wales and Scotland. The population data for the UK from 1974 to 1975 are Inland Revenue Statistics (IRS) 1978, Table 4.20, from 1976 to 1983 from IRS 1993, Table 13.5, from 1984 to 1996 from IRS 2000, Table 13.5, from 1997 to 2005 from HMRC website, 2005, Table 13.5, from 2006 to 2010 from ONS website, *Mid-1971 to Mid-2010 Population Estimates: Quinary age groups for Constituent Countries in the United Kingdom* (interpolated), and 2011 from ONS website, *Mid-2011 Population Estimates: United Kingdom; estimated resident population by single year of age and sex*. The deaths data from 1974 are from ONS website Death registrations by single year of age.

Series are provided in Table D1.

The mortality multipliers applied in the period from 1911 up to 1960 (after which we use the IR estimates of identified wealth-holders and wealth) are shown in Table B1. The multipliers are in all cases differentiated by age and from 1923 by gender. Separate multipliers are available for Scotland from 1938. Table B2 gives the adjustment to multipliers applied in 1911-1960 and 2008-2010.

Appendix C. Sources for estimates of the wealth of the excluded population

The series of wealth shares presented in Section 4 are based on the total wealth identified in the IR/HMRC estimates of the wealth distribution plus the estimated wealth of non-filers (the excluded population), measured as far as possible in the same way as the wealth of those covered by the statistics. The resulting total, expressed per adult, is similarly used as the basis for the allowance made for non-filers when estimating the distribution of estates in Section 3. The series may be contrasted with that for total marketable wealth used in the HMRC Series C, which is in addition adjusted for wealth that is missing from the estate statistics, including an allowance for trusts, and for differences in the appropriate valuation for a living person as opposed to the valuation at death (for example pure life policies have a smaller surrender value than the value at maturity). In many years, such as 2005 illustrated in Figure 3, these adjustments lead the marketable wealth total to exceed that used in our series, but there are years, such as 1989, in which the downward adjustment for valuation cancels the additions for missing wealth (see Table D1). The derivation of series C wealth total is explained in Appendix D.

There are two points of departure in estimating the total wealth of the excluded population: (a) the IR/HMRC “reconciliation of estimates of identified personal marketable wealth and personal sector balance sheets”, and (b) the estimates of Atkinson and Harrison covering the period 1923 to 1972 (1978, Chapter 6 and Appendix VI). From the former, we take the two elements of “excluded property” that are labeled “joint property” and “small estates” (sources in Table C1).⁴³ The former includes all property held in common, typically with a spouse, that passes by survivorship. It includes financial assets, such as joint bank accounts, but much the largest element in recent decades has been residential property. With rising housing wealth, the ratio of joint property to the remainder has changed from around 2:1 in the 1970s to 10:1 in the 2000s. In view of the dominance of joint property, the extrapolation beyond 2005 has been based on the ONS UK housing price index (see below).

For earlier years, we make use of Atkinson and Harrison (AH) (1978, page 305), where there are three estimates: a larger (in the book classification, B2), a central (B3) and a smaller (B4) figure. There are reasons to believe that for the post-war period the central figures are too low (1978, pages 301 to 302), and that they under-estimate the value of joint property. For 1971, the one year of overlap with the original AH series, the B3 AH figure is around half the HMRC estimate. In the light of this, we have used here the higher AH series (B2) for the years 1950 to 1970. For 1971, the AH B2 estimate is £9,567m, which is close to the HMRC figure of £10,500m when allowance is made for the fact that the former relates to GB and the latter to the whole UK. The better correspondence of the higher figure is illustrated in Figure F1. The same figure shows that the differences between the two assumptions before 1950 are small, and the higher figure is therefore used throughout.

Examination of Figure C3 shows that the size of the allowance for the wealth of the excluded population varies considerably: from around 10 per cent to around 50 per cent

⁴³ It should be noted that the total given for Identified wealth in these tables is not always identical to that shown in the IR/HMRC wealth distribution estimates; we have used the total from the latter (see Table D1).

of identified wealth. This is not surprising, since the coverage of the estate data has varied considerably, reflecting the differences in the tax threshold and in the statistical practice (Figure C1 and C2). The fraction excluded fell in the period before the Second World War, but then rose sharply when the threshold was increased from £100 to £2,000 in 1946. The coverage fell substantially when the statistics were extended in 1960 to cover estates below the tax threshold, which nonetheless came to the notice of the Inland Revenue when a grant of representation was obtained. There was some upward drift after 1980 as the proportion excluded rose from 50 per cent to 60 per cent. More important in this period, however, was the rise in house prices and extension of owner-occupation affecting the value of joint property.

Our judgment is that the combination of the IR/HMRC estimates, coupled with the AH higher estimates, provide a reasonable basis for the total wealth of the excluded population. There are, however, the following gaps to be filled:

- i) Period before 1923;
- ii) Gaps in the period 1931 to 1941;
- iii) Period 1946 to 1949;
- iv) Gaps in the period 1971 to 2005;
- v) Period from 2005.

For the period before 1923, the UK series constructed in Atkinson (2013) is used. This series did not include jointly owned property, which was then much less important, and the series is increased proportionately by the ratio in 1923 (1/0.65). To adjust to EW, it is then reduced by a factor 0.929. The 1895 figure is extrapolated from that for 1896 using the ONS Consumer Price Index (ONS, 2004, Table 1).

The gaps in the period 1931 to 1941 were filled by linear extrapolation.

For the period 1946 to 1949, we took account of the substantial increase in the estate duty threshold in 1946, which led to a larger total for the wealth of the excluded population, and extrapolated the 1950 figure backward on the basis of the ONS Consumer Price Index.

The gaps from 1971 to 2005 are filled by (for 1973 and 1974) the Atkinson, Gordon and Harrison estimates (1986, Table A2), increased by the ratio of the Higher to Central estimate in 1972, and (for 1997 to 2000) interpolated from 1996 using the HMRC Series C total marketable wealth.

For the post-2005 period, the results in Section 4 are based on extrapolation of total personal wealth from 2005, using the national accounts balance sheet totals for the personal sector, but in Section 5 alternative approaches are considered that are based on the calculation of the wealth of the excluded population as described there.

In the case of the distribution of *estates*, the total of estates is taken as the sum of the identified total in the estate returns plus an estimate of the total of excluded estates. The latter is in turn calculated from the estimated total wealth excluded from the wealth estimates described above, by making the assumption that the amount of excluded wealth passing in a year is given by the overall mortality rate of the excluded population (the ratio of deaths among the excluded population to the total number of living persons in that population). In other words, it is assumed that the average wealth of the dying

among the excluded population is equal to the average for the living in that population. Such an assumption would not be appropriate if applied to estates as a whole but, as noted in the main text, may not be unreasonable as a first approximation when applied to a group whose wealth is by definition limited. A calculation for the whole population (included and excluded) of the ratio of the average wealth of decedents to the average wealth of the living shows that values in the early part of the period are around 2, falling to 1.5 in the 1950s (see Figure C4). These do not seem unreasonable when compared with those in France.

Figure C1. Adult decedents covered by the estate statistics in the UK 1895-2013

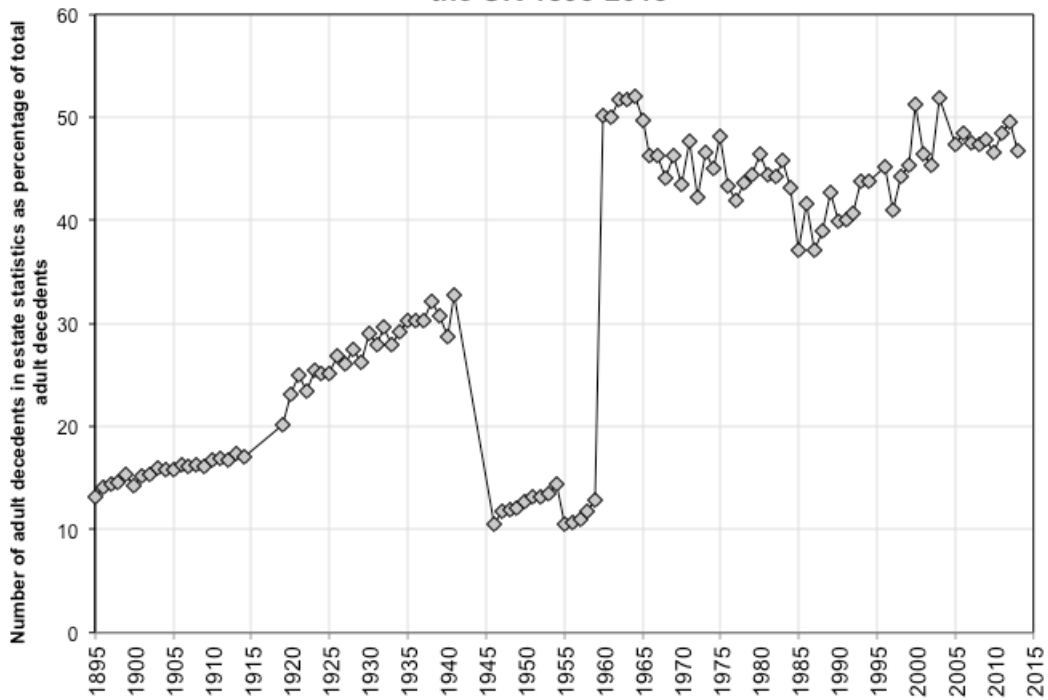


Figure C2. Excluded population as percentage of total adult population

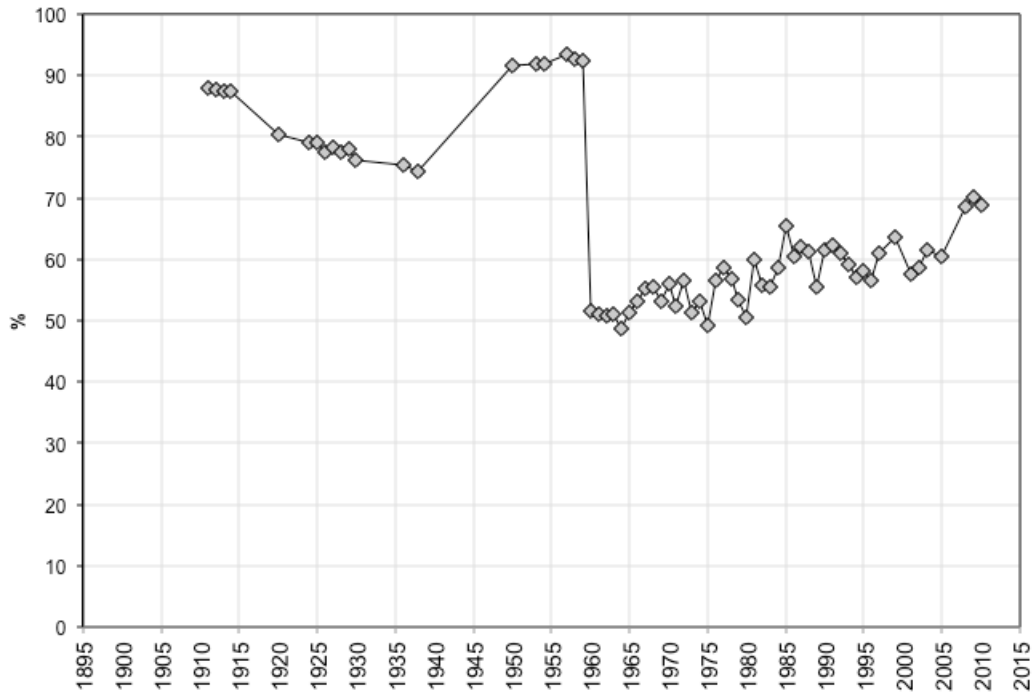
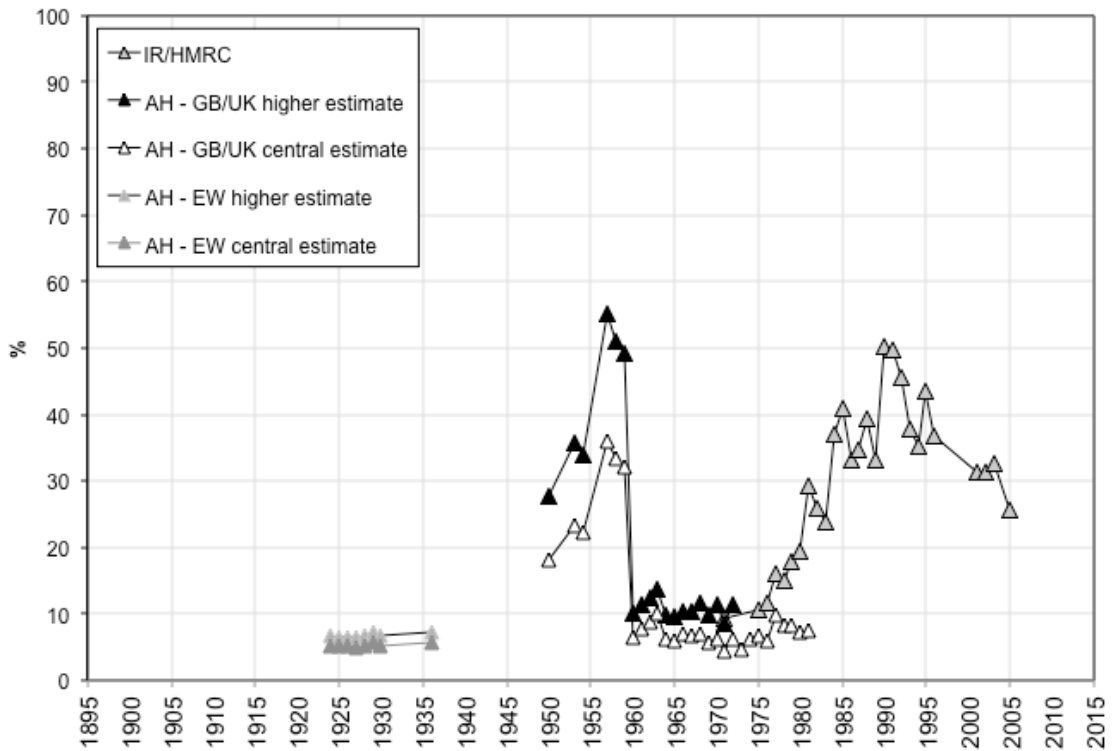
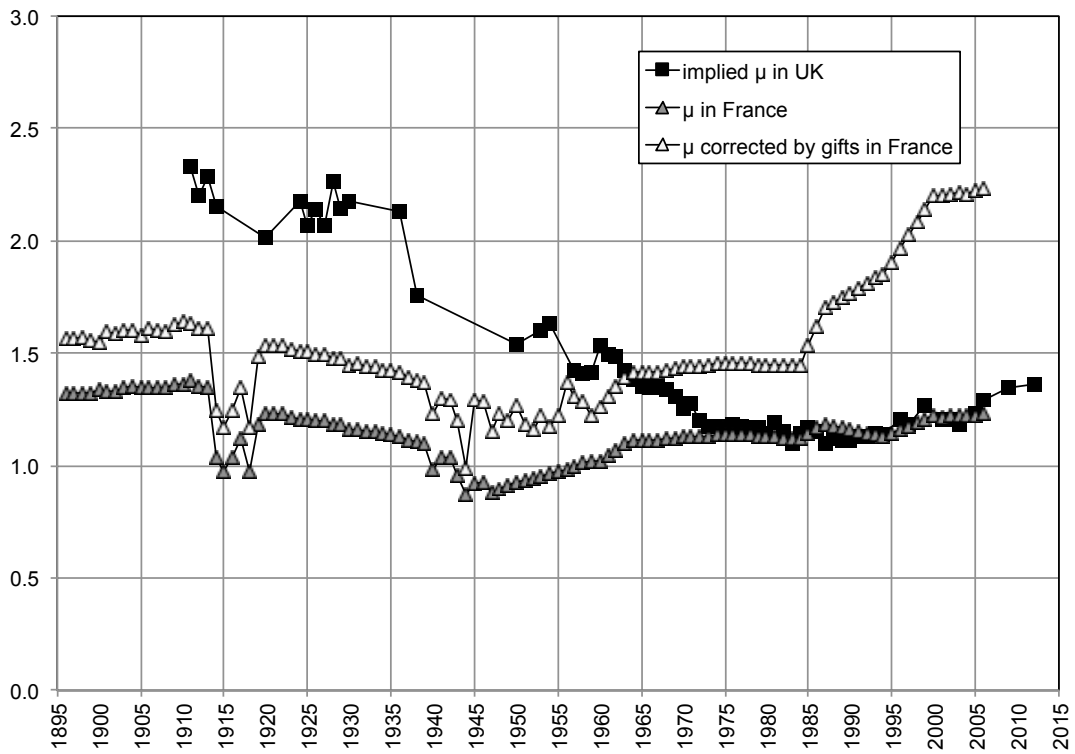


Figure C3. Wealth of the excluded population as percentage of total identified wealth



Notes: AH is Atkinson and Harrison (1978).

Figure C4. Ratio between the average wealth of the dying and the average wealth of the living



Sources: UK: Calculated as ratio of total estates (including estates of excluded population) per adult decedent, to total wealth per adult (Table D1); France: Piketty (2011, Figure IV). Note: μ denotes the ratio of the average wealth of decedents to the average wealth of the living, so that a ratio of 2 means that the average estate is twice the average wealth of the living.

Appendix D. Control totals for adult population, total estates, and total wealth

Table D1 gives the number of adult deaths, the adult population control total, the estimates for the estates of the identified and the excluded decedents, the control totals used here for wealth, the marketable wealth series, and the price index.

Derivation of Series C total for personal wealth. As reported in the text, our benchmark series of total wealth sums up total identified wealth to the wealth of the excluded population. An alternative series can be constructed, the so called series for total marketable wealth (Series C), that incorporates also the adjustments for coverage and valuation. However, the total marketable wealth series is not always available; past estimates cannot be recast in this form, and recent values cannot be taken from the reconciliation exercise that was discontinued in 2005. We therefore extend the series backwards in time to 1911.

For the total marketable wealth series, our starting point is the official HMRC Series C total that is available for 1966, 1971, and from 1976 to 2005. In order to extrapolate this back to earlier years, we have used the estimates of personal sector net worth by Blake and Orszag (1999), which covers the period 1948 to 1994 (we use the data from 1948 to 1976), Solomou and Weale (1997), which covers the period from 1920 to 1956 (we use the data from 1920 to 1947), and made our own estimates for the period 1911 to 1920. Consumer durables are included. In each case, we have made the link by considering the relationship between the series over a number of years (rather than simply using one overlapping year). For the period 1976 to 1994, the marketable wealth Series C averaged 106 per cent of the Blake/Orszag series; for the years 1948 to 1956, the Blake/Orszag series averaged 92.9 per cent of the Solomou/Weale series. We have therefore taken the Blake/Orszag series multiplied by 1.06 and the Solomou/Weale series multiplied by 1.06×0.929 .⁴⁴ We use for the years 1911 to 1914 the higher of the two estimates made by Campion (1939, Chapter II). He builds up a figure averaged for 1911-13 as follows: estate data multiplied up by social class multipliers (differentiated by age but not by gender) plus estimated wealth of the excluded population plus omitted settled property. The resulting total is in the form of a range from £8,270 million to £9,235 million. The higher figure is taken since a comparison of his estimate for 1926-28 with our balance sheet totals suggests that his figures may be on the low side.

Prior to 1974, the series relates to Great Britain (GB), rather than the United Kingdom, thus excluding Northern Ireland, and prior to 1938 the estimates relate to England and Wales (EW), excluding Scotland.⁴⁵ In the case of total wealth, Revell (1967, page 147) found that in 1961 excluding Northern Ireland (NI) reduced the GB total to 98.3 per cent of the UK, and this percentage is applied here for all years. For Scotland, we have made calculations for 1938 and 1950 of the share in total identified wealth and these show

⁴⁴ The series may be compared with the earlier work of Revell (1967) and Roe (1971), the latter covering 1957 to 1966, the official balance sheet estimates of Reid (1978), Pettigrew (1980), Bryant (1987), and the series published in Financial Statistics (February 1984, Table S12). The series move very much in line.

⁴⁵ Evidence about the distribution of estates exists for the UK as a whole; it is only the age-related breakdown (necessary to apply age-related multipliers) that is limited to EW.

that in both years EW was 91.3 per cent of the GB total. We have taken the EW total to be equal in all years to 0.913 times the GB total.

The marketable wealth series is projected forward from 2005 on the basis of the personal sector balance sheet totals, as described in Section 3.

Appendix E. Distribution of estates

Table E1 gives the distribution of estates since 1895. Table E2 shows the thresholds and average estates for the top groups.

Appendix F. Sensitivity of shares to total wealth and the estimates for the 21st century

Table F1 shows the estimates of top wealth shares under different assumptions in Figure 12.

Appendix G. New series for top wealth shares in the UK

Table G1 gives the shares of top groups of the distribution of wealth since 1895. Table G2 gives the average wealth of those top groups.

Appendix H. Estimates of distribution of wealth excluding housing assets

The method to arrive at the new estimates for the distribution of wealth excluding housing assets (EXHO) is to take the tabulated wealth estimates, subtract net housing wealth from each range; then re-calculate the wealth shares using as a control total the total of all wealth minus the net value of housing, where the latter is the value of residential property minus mortgage liabilities. The net value of housing is the sum of this item for identified wealth-holders and the estimated net housing wealth of the excluded population (see below). The property may be owner-occupied or owned for rent or vacant.

In order to apply the analysis, we need data on ranges of total net wealth giving the composition of wealth in terms of housing assets and liabilities. These tabulations were introduced in IRS 1973 (Table 94), and cover the years from 1971 to 2005.⁴⁶ The sources are listed in Table H1. Before 1978 these refer to the year of account; from 1978 they are on a year of death basis.

This method adopted here is described in more detail below; as will be clear there are a number of limitations:

a) The classification by ranges remains the same (i.e ranking by total net wealth), so that the shares in wealth EXHO are under-estimated (re-arrangement to give correct ranking would raise the top shares). This also means that we can only apply the linear interpolation of the Lorenz curve, since the range intervals no longer apply. The results are therefore compared with the tabulated results from linear interpolation. They therefore differ from those reported elsewhere in the paper, and are referred to as estimates including housing wealth (with HO).

b) The net value of housing wealth is calculated from 1980 onwards as the value of UK residential dwellings less mortgages. Net housing wealth is over-stated to the extent that households have other borrowing to finance house purchase: e.g. bank loans. It excludes property owned abroad (which seems correct). The net value of housing wealth before 1980 is calculated as the value of residential buildings (freehold and leasehold) minus “deductions against realty”.

c) The estimated net housing wealth of the excluded population is based on the asset composition estimates of IR/HMRC as part of their estimation of the total wealth of the excluded population (see Appendix C). The sources of the data are given in Table H1. Not all years are covered. The data commence in 1975 and give a series up to 2005, when results of the reconciliation exercise ceased to be published. (There are also some gaps in the available data.) In order to provide control totals for the earliest years, 1971 to 1974, and for the recent years not covered we have constructed an index to be applied to the total of personal wealth ex housing. By applying it to the total, we avoid the need to allow for the changing size of the excluded population. The index, which is the product of the proportion of the housing stock in private ownership (source DCLG Table 104) and the ONS index of average house prices (ONS HPI series 22 for the UK), takes account of both the decline in social housing as the stock was privatized and the evolution of house prices.

⁴⁶ For years before 1971, there are tabulations of estates by range and asset type, but these are not classified by age/gender, so that it is not possible to apply mortality multipliers.

The distribution of wealth excluding housing obtained in this way is shown in Table H2. The split of wealth between housing and non-housing for different wealth groups is shown in Table H3.

Appendix I. Estates and wealth sampling procedures

This appendix describes the current sampling procedures, with a look back where possible at earlier years. The estate data are based on a stratified sample of the IHT returns for the population of estates passing on death in a financial year in need of a grant for representation. The analysis of the sampling strategy and its potential effect on our estimates is made particularly difficult by the lack of official IR/IHMRC documentation on the sampling methodology. For many years, the sampling rates were given in *Inland Revenue Statistics*, but information on the number of observations by individual strata was not supplied. Only an approximate calculation can be made: for example, for 1976-1977 we derived an implied sample size of approximately 34,000 estates (12 per cent of a total 288,000 estates that were granted probate in 1976), although this is probably an under-estimate.

The HMRC wealth estimates, in contrast, are based on a different sample, based on the same source, but relating to calendar years. The estimates for 2010-2012, for example, use data from estates passing on death in 2010, 2011 and 2012 calendar years. The samples also differ because they are drawn at different dates, depending on the calendar for publication, and the timing may affect the reported information because the IHT returns are subject to revision.

The sample used to produce the HMRC wealth estimates contained, in 2008-10, approximately 57,000 returns. From this sample, a data set has been produced for distribution via the HMRC Datalab. To avoid risks of disclosure and to protect taxpayer confidentiality, the micro data are aggregated so that each row in the Datalab database represents many sampled estates.

Both samples make use of the IHT returns. As we understand it, the Trusts and Estates, Inheritance Tax Office in Nottingham receives a summary of all deaths for which a probate has been granted from the District Probate Registries, and samples monthly all the IHT400 forms. The form IHT400 is the Inheritance Tax account form required if there is Inheritance Tax to pay or if the deceased person's estate does not qualify as an 'excepted estate'. An 'excepted estate' is one with gross value above the probate minimum (£5,000) but below the IHT threshold; in this case, a "short form" (IHT205) is submitted to the Probate Registry.⁴⁷ The IHT205 form contains the information required to make the wealth distribution estimates, not being restricted to assets for which probate is sought. HMRC selects the additional sample of the forms IHT205. In 2003, according to a report of the National Audit Office (2004), there were approximately 240,000 excepted estates. Only 3,300 such forms (1.4 per cent) were sampled by the HMRC and no sampling information was given for the remaining 67,500 estates above the IHT threshold. Problems with the sample of "excepted" estates and other "operational" issues with the sampling frame led HMRC to deem the 2004 and 2006 wealth tabulations not "suitable" for publication.

⁴⁷ Estates with a gross value of up to £1million can also be classified as "excepted" if no inheritance tax has to be paid due to the spouse, civil partner, or charity exemption. Similarly, an estate is "excepted" if up to twice the value of the inheritance tax threshold and the transfer of unused nil band is claimed. This process is in place since the 2004 Finance Act in order to ease the administrative burden and reduce the compliance costs.

Appendix J. Analysis of sensitivity to choice of multipliers

This section describes the estimates of the sensitivity of top wealth share to different mortality-wealth gradients.

Table J1 provides the actual mortality rate (relative to the mortality of the population) of UK individuals by age and gender for the top three deciles of the household housing wealth in 2008-2010, as estimated from the English Longitudinal Study of Ageing (ELSA) by HMRC.⁴⁸ Relative mortality is also compared to that in top groups of the US capital income distribution (top 10, top 5 and top 1 per cent) for years 2004 to 2008, as described in Saez and Zucman (2016). Using the database of the HMRC Datalab for 2008, 2009, and 2010 we simulate the effects of changes to multipliers on the final estimates of top wealth shares. We carry out the analysis using both (case A) an internal wealth total endogenous to changes in multipliers (wealth of the identified population plus wealth of the excluded population); and (case B) an external wealth total unaffected by the simulations.

Table J2 provides the comparison between the top 1 per cent wealth share and the respective simulated series in 2008-2010 based on 10, 20, 50 and 100 per cent variation of mortality multipliers above a pre-specified wealth percentile (P95, P99, and P99.9). The results indicate that the potential downward bias of our estimates due to lack of adjustments for “appropriate” wealth differentials are marginal, in either the external or the internal wealth total scenario. Results further show that results are robust if we confine the adjustments only to the very top of the distribution (P99.9th).⁴⁹

⁴⁸ Individuals with housing wealth at least equal to £300,000 would fall in the 8th decile of housing wealth. The 9th decile is £400,000 whereas the 10th decile is estimated to be at £500,000.

⁴⁹ Although we cannot rule out the possibility that future progress in medicine, and widening gaps in wealth, may reduce the relative mortality rates of the wealthiest individuals to such levels, at present these adjustments are hard to justify. Similarly, future radical changes in the age distribution of wealth may have more tangible implications on the use of wealth differentials (and more generally on the use of mortality multipliers) for the estimation of top wealth shares.

Appendix K. Other estimates of the distribution of wealth in the UK

Table K1 provides

i) the IR/HMRC earlier series C 1966-1976.

ii) the IR/HMRC series C 1966-2005.

iii) the series given in Atkinson and Harrison (1978) and Atkinson, Gordon and Harrison (1989).

Appendix L. Distribution of investment income

There are two sources of tabulated investment income data: the surtax returns and the Survey of Personal Incomes (details for each year in Table A3). The IR tabulated total income by ranges from the introduction of surtax in 1908, but only began to publish the distribution of investment income with effect from 1948-49, referred to here as 1948. We then have a complete annual series up to and including 1972-73, when the surtax was integrated into the regular income tax. The surtax data relate to those tax units assessed to surtax, so that the data are only complete for persons whose investment income is sufficient on its own to render them subject to surtax. The surtax threshold for much of the period was £2,000 plus a number of reliefs (such as the single/married personal allowance, child allowance from 1956-57). The data typically cover some 0.5 per cent of total tax units, but the use of the data for lower ranges could be misleading. In our analysis, we have used ranges of investment income (i) from £4,000 for 1948-49, 1971-72 and 1972-1973; (ii) from £3,000 for 1969-70 and 1970-71; and (iii) from £2,500 for all other years (for example, the 111th IR Report, page 82, shows that married couples with 3 children would indeed have been paying surtax on an income of £2,500 in 1967-68). Table L3 shows the surtax rates and bands in different years. Investment income consists of rent, dividends and interest, and (when in effect) Schedule A income on owner-occupied property and rented property.

The Survey of Personal Incomes (SPI) is based on a sample drawn from the income tax records. In covering all taxpayers, it is superior to the surtax data and it is the sole source since 1972-73. It does however have limitations. Initially, the SPI was only carried out at 5 year intervals; information has only been tabulated by ranges of investment income since 1954-55; the fact that it has been based on a sample limits the detail available on the higher income ranges; and in the earlier years corrections were made for the significant deficiency in the amount of investment income reported (believed to arise where taxpayers report the amount received after deduction of tax at source, where this is not verified for those not liable for surtax). These limitations mostly apply to the earlier years. The SPI became annual with effect from 1962-63; more detail has been published from 1969-70; and the IR ceased to make adjustments for investment income from 1965-66 (although the deficiency continued to be present).

After 1979-80, the tabulations were no longer published in the necessary form, but for the years 1985-86 and 1995-96 to 2010-11 (2008-09 missing) HMRC has provided access to the SPI micro-data sample. In the last years, the sample has an approximate size of 1.5 percent of the adult population. The micro-data sample provides the composition of investment income in four broad categories: dividend income from shares in UK companies and unit trusts, property income, net interest from UK banks, building societies and other deposit takers, and other investment income comprising interest on securities, interest from partnerships and from trusts, settlements and estates.

Table L2 shows the control totals for population (tax units before 1990-91, adults from 1990-91) and total investment income. The derivation of the population series is described in Atkinson (2005). The first part of the series for total investment income is based on the total of rent, dividends and interest received by the household and NPISH sector (initially the personal sector) obtained from the Blue Book sources listed in Table L2. Changes to the national accounts with effect from 1996 meant that, to construct a comparable investment income control total, we started with the most recent data on

rent, dividends and interest (given jointly for the household sector and NPISH) from the Blue Book 2014, and took 90 per cent of the national accounts figures to allow for differences in definitions. We converted the annual data to a tax year basis by taking $\frac{3}{4}$ of year t and $\frac{1}{4}$ of year $t+1$. Finally, we added back the rental income from the SPI (rental income is not distinguishable from other sources in the mixed income of the national accounts); the control total may be underestimated on this account. Working backwards, the resulting totals were then linked to the earlier series in 1996.

The results for top investment income shares are given in Table L1. The two sources, surtax returns and SPI, may be compared for the years 1969-70 to 1972-73. The top shares are consistently higher for the surtax data, but the difference is not large, and appears similar in all four years (see Table L1).

Appendix M. Top wealth shares based on The Sunday Times Rich Lists

Table M1 shows the wealth share of the top 0.001% group based on the Sunday Times Rich Lists. One major problem with the use of the List is that the unit of analysis is not always clear and could be quite extensive - in contrast to the individual basis of our wealth estimates. *Faute de mieux*, we have assumed that every observation in the list refers to a family of two individuals (so the 1,000 observations in the annual list represent 2,000 adults) in which they equally share their wealth. The population and wealth control totals are those for Great Britain (and not the UK) given in Table D1.

The results from 2002 in an alternative source - the Forbes List - are not shown due to the limited time scope of the series and the sample size on which they are based. The top 0.00003 per cent richest UK individuals owned 0.5 per cent of total UK personal wealth in 2002, and the share went up to 0.7 per cent in 2012. Again the trend, as well as the year-to-year variation, is fairly similar to that of our estate-based series. The Forbes List shows the wealth holding of UK individuals in US\$. The annual average spot exchange rate from the Bank of England (XUAAUSS- US\$ into Sterling) is used to convert the currency.

Appendix N. Comparison of probate values and Sunday Times Rich Lists

Table N1 provides the comparison between probate values and the Sunday Time Rich List values around the year of death, for those millionaires in the List who have passed away since the List started in 1989. Probates have been obtained from <https://probatesearch.service.gov.uk/>. In addition to the points made in the main text, it should be noted that several cases disappear from the list before death, despite having estates considerably above the minimum wealth in the list, and that charitable gifts made during lifetime are not given in the probate records, but they are substantial in some known cases (for instance, Anita Roddick and Felix Dennis), affecting the comparison.

Appendix O. The distribution of estates in the United States

Table O1 provides the sources of the distribution of estates in tabulated form from 1916 to 2013. The first publication, the *IRS Statistics of Income 1920*, only gives the data aggregated for the returns filed between September 1916 and January 1922 and we have not used these. Consequently our series start in 1921. Table O2 gives total wealth, estates, adult population and deaths.

Total adult decedents: They come from www.mortality.org from 1933 to 2013. For years before 1933, we have taken the number of adult decedents from the periodical publication *Mortality Statistics* by the US Department of Commerce and the Bureau of the Census; as this only covered the registration states, we have up-scaled the numbers to the continental US using the information given in the same publication.

Total adult population: This comes from www.mortality.org from 1933. For years before 1933, we have linked the series backwards following that given in Kopczuk and Saez (2004).

In both cases, living population and decedents, the adult age cut-off is 20 years old. This is different to that selected for the UK (18 years old), but identical to the definition used by Kopczuk and Saez (2004), making our estate distribution series for the US comparable to their series for the distribution of wealth.

Adult mortality rate (m): It is estimated from total adult decedents over total adult population.

Total personal wealth (w): This comes from Kopczuk and Saez (2004) for years up to 2002, and from Saez and Zucman (2016) for years from 2003.

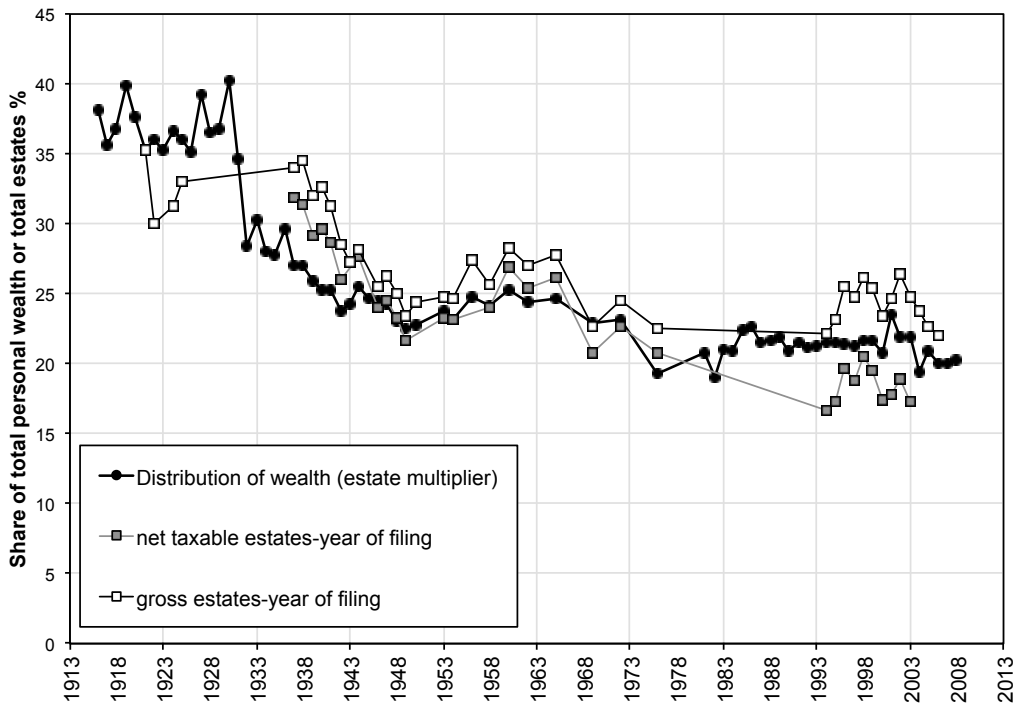
Ratio between the average wealth of the dying and the average wealth of the living (μ): This has been taken from Alvaredo, Garbinti and Piketty (2015), where it is given for years 1870 (based on US Census), 1962, 1983, 1986, 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010 and 2013 (based on the Survey of Consumer Finances, and corrected by differential mortality). Intermediate years have been linearly interpolated.

Total wealth passed at death: This has been estimated as $(m \mu w)$. Due to the low population coverage of US estate statistics, this is slightly different from the procedure followed for the UK (where a specific distinction has been made between identified estates and excluded estates - see Section 2 in the main text).

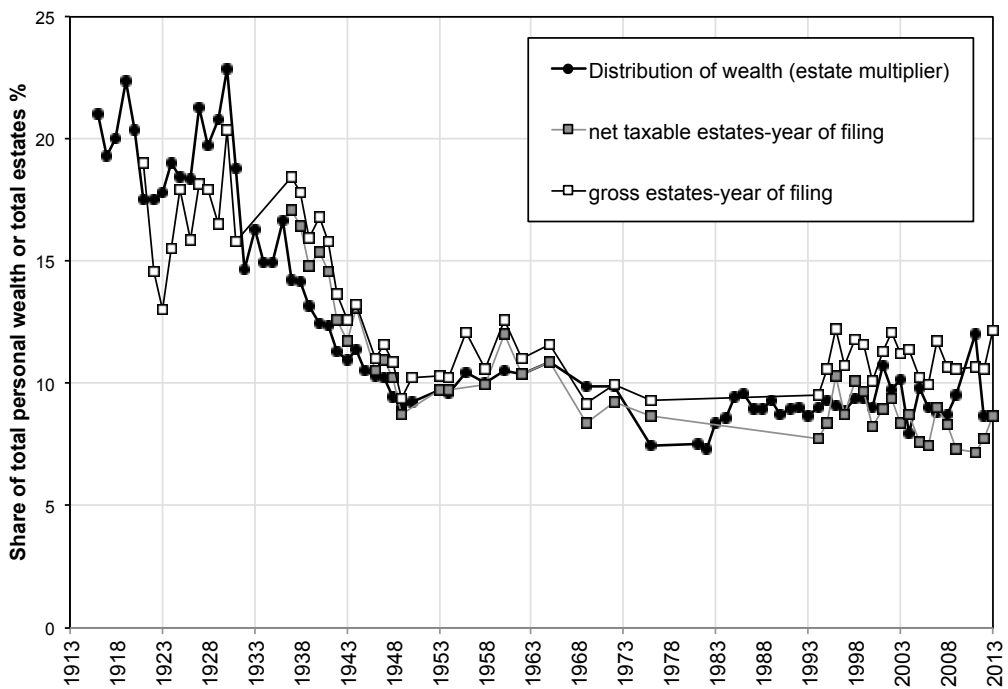
Table O3 gives the distribution of estates on four different bases, none of which corresponds to our preferred choice, but we have to make use of the data as published (we have not had access to estate micro-data). “Taxable estate” refers to its size after deduction of the tax exemptions (but including the specific exemption), whereas the “gross estate” is before deduction of debts. This means that the gross estate is likely to overstate the top shares, and the “taxable estate net of debt” will understate the shares. The difference is most marked in the recent period. There is also the distinction between year of filing and year of death. Figure O1 compares the top 1 per cent and top 0.1 per cent according to the different definitions.

Figure O1. Comparison of wealth and estate distributions in the US

Panel a: Share of top 1%



Panel b: Share of top 0.1%



Appendix additional references

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Table A2. Sources of data for IR/HMRC distribution of identified wealth 1960-2013

Financial year starting	Source for IR/HMRC distribution of wealth	Basis for estimate
1960	IRS 1970, Table 123	Year of account adjusted
1961	IRS 1970, Table 123	Year of account adjusted
1962	IRS 1970, Table 123	Year of account adjusted
1963	IRS 1970, Table 123	Year of account adjusted
1964	IRS 1970, Table 123	Year of account adjusted
1965	IRS 1970, Table 123	Year of account adjusted
1966	IRS 1970, Table 123	Year of account adjusted
1967	IRS 1970, Table 123	Year of account adjusted
1968	IRS 1970, Table 123	Year of account adjusted
1969	IRS 1971, Table 130	Year of account adjusted
1970	IRS 1972, Table 86	Year of account adjusted
1971	IRS 1973, Table 92	Year of account adjusted
1972	IRS 1974, Table 104	Year of account adjusted
1973	IRS 1975, Table 106	Year of account adjusted
1974	IRS 1976, Table 104	Year of account adjusted
1975	IRS 1977, Table 111	Year of account adjusted
1976	IRS 1978, Table 4.16	Year of account adjusted
1977	IRS 1979, Table 4.16	Year of account adjusted
1978	IRS 1980, Table D3	Year of account adjusted
1979	IRS 1983, Table 4.12	Year of death
1980	IRS 1984, Table 4.12	Year of death
1981	IRS 1985, Table 4.11	Year of death
1982	IRS 1986, Table 4.11	Year of death
1983	IRS 1987, table 7.1	Year of death
1984	IRS 1988, table 10.1	Year of death
1985	IRS 1989, table 10.1	Year of death
1986	IRS 1990, table 10.1	Year of death
1987	IRS 1991, table 11.1	Year of death
1988	IRS 1992, table 11.1	Year of death
1989	IRS 1993, table 13.1	Year of death
1990	IRS 1994, table 13.1	Year of death
1991	IRS 1995, table 13.1	Year of death
1992	IRS 1996, table 13.1	Year of death
1993	IRS 1997, table 13.1	Year of death
1994	IRS 1998, table 13.1	Year of death
1995	IRS 1999, table 13.1	Year of death
1996	IRS 2000, table 13.1	Year of death
1997	IRS 2000, table 13.3	Year of death
1998		Year of death
1999	HMRC website 2002, table 13.1	Year of death
2000		Year of death
2001	HMRC website through the National Web Archives 2003, table 13.1	Year of death
2002	HMRC website through the National Web Archives 2003, table 13.1 (2002 and 2001-2003)	Year of death
2003	HMRC website through the National Web Archives 2003, table 13.1	Year of death
2004		Year of death
2005	HMRC website through the National Web Archives 2010, table 13.1	Year of death
2006	HMRC website through the National Web Archives 2011, table 13.1 (2005-2007)	Year of death
2007		Year of death
2008	HMRC Datalab microdata	Year of death
2009	HMRC Datalab microdata and HMRC website 2012, table 13.1 (2008-2010)	Year of death
2010	HMRC Datalab microdata	Year of death
2011-2013	HMRC website 2016, table 13.1 (2011-2013)	Year of death

Note: IRS denotes Inland Revenue Statistics.

Table A3. Sources of data for the distribution of investment income 1948-2010

Financial year starting	Surtax data
1948	IR 93rd Report, page 60 Table 45
1949	IR 94th Report, page 139 Table 129
1950	IR 95th Report, page 157 Table 199
1951	IR 96th Report, page 87 Table 71
1952	IR 97th Report, page 85 Table 73
1953	IR 98th Report, page 82 Table 73
1954	IR 99th Report, page 109 Table 98
1955	IR 100th Report, page 147 Table 170
1956	IR 101st Report, page 99 Table 81
1957	IR 102nd Report, page 85 Table 74
1958	IR 103rd Report, page 87 Table 78
1959	IR 104th Report, page 95 Table 83
1960	IR 105th Report, page 210 Table 146
1961	IR 106th Report, page 102 Table 86
1962	IR 107th Report, page 104 Table 91
1963	IR 108th Report, page 105 Table 82
1964	IR 109th Report, page 91 Table 68
1965	IR 110th Report, page 116 Table 70
1966	IR 111th Report, page 91 Table 63
1967	IRS 1970, page 53, Table 42
1968	IRS 1971, page 58, Table 47
1969	IRS 1972, page 58, Table 47

Survey of Personal Incomes (SPI) data

1954	IR 101st Report, page 76+77 Table 61
1959	IR 105th Report, page 136+137 Table 106
1964	IR 109th Report, page 132 to 133 Table 96
1968	IRS 1971, Table 78, pages 98-99
1969	SPI 1969-70, Tables 32 and 33, pages 52-55
1970	SPI 1970-71 pages 42-43 Tables 34 and 35
1971	IRS 1974 Tables 88 and 89, pages 100-101
1972	IRS 1975 pages 92 and 93
1973	IRS 1977, pages 100-101
1974	IRS 1977, pages 100-101
1975	SPI 1975/76 and 76/77, pages 82-83
1976	SPI 1975/76 and 76/77, pages 154-155
1977	SPI 1977/78, pages 88-89
1978	SPI 1978/79, pages 92-93
1979	SPI 1979/80, Table 71, pages 88-89

1985 and 1995
to 2010 HMRC SPI micro-data

Notes: AR denotes Annual Report of the Inland Revenue; SPI denotes Survey of Personal Incomes; IRS denotes Inland Revenue Statistics; NIE denotes National Income and Expenditure (Blue Book).

Table B1. Mortality multipliers (inverse of mortality rates, before social class adjustment factors) 1911-1960

Country	age													age not stated												
	MALES													FEMALES												
	0-5	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	75-85	85-above	age not stated	under 25	25-35	35-45	45-55	55-65	65-75	75-85	85-above	age not stated				
1911 EW	22.7	290.7	485.1	339.9	275.3	213.3	133.4	73.9	37.1	17.3	7.8	3.9	67.1	367.8	292.5	208.4	117.5	55.1	22.7	9.2	4.3					
1912 EW	29.7	322.0	528.6	355.2	291.1	222.3	136.9	75.3	37.5	17.1	7.8	3.9	73.2	360.2	285.0	209.9	115.5	52.9	21.1	8.6	4.0					
1913 EW	26.6	314.0	514.8	369.4	292.8	224.2	137.1	74.8	37.2	17.2	7.9	3.9	70.9	357.5	292.4	209.8	116.2	55.2	21.6	8.6	3.7					
1914 EW	27.0	292.5	476.6	340.9	275.3	212.4	131.9	73.5	37.1	17.1	7.9	3.7	70.1	377.0	301.6	215.7	122.1	57.4	22.8	9.3	3.9					
1920 EW	29.9	302.4	512.9	345.3	259.7	215.2	155.0	92.1	45.5	19.9	8.5	4.4	77.8	371.7	290.4	205.9	114.9	54.7	21.1	8.4	3.5					
1923 EW					345.5	264.3	176.4	99.8	46.7	19.8	8.4	4.1		373.9	306.6	218.7	123.0	58.5	22.6	9.4	3.8					
1924 EW					342.5	263.9	170.3	97.5	44.9	18.5	7.9	3.9		354.6	288.3	204.7	111.6	51.9	19.2	7.6	3.1					
														390.8	310.6	232.3	128.2	60.1	23.5	9.4	4.0					
														455.8	369.0	254.0	131.6	60.5	23.7	9.4	4.0					
														507.8	402.4	278.8	143.4	64.5	25.8	10.2	4.4					
Scotland														398.4	333.3	228.3	119.8	55.0	22.1	9.2	3.8					
1950 EW														1058.7	690.3	431.3	188.7	79.3	28.8	10.4	4.6					
Scotland														643.7	400.1	313.0	159.8	64.9	23.6	9.6	4.5					
1951 EW														1297.0	766.8	433.5	187.6	76.3	27.1	9.5	3.9					
Scotland														843.5	529.5	335.3	157.0	63.6	22.9	8.6	3.7					
1952 EW														1560.2	911.9	477.9	204.2	84.1	31.0	11.2	4.7					
Scotland														1008.8	637.8	364.7	164.1	68.4	24.8	9.7	4.3					
1953 EW														1755.9	935.4	474.8	208.8	85.9	31.1	11.0	4.6					
Scotland														708.3	387.5	166.8	74.3	27.1	10.2	4.5	3.7					
1954 EW														1838.3	987.3	478.9	210.4	88.0	31.6	11.4	4.8					
Scotland														758.6	387.7	161.3	69.6	26.6	9.7	4.3	3.5					
1955 EW														2105.1	1061.1	519.0	212.8	88.4	30.9	11.0	4.5					
Scotland														1643.4	778.6	422.0	178.9	70.8	25.6	9.6	4.0					
1956 EW														2240.3	130.9	525.2	221.4	89.1	31.4	11.1	4.5					
Scotland														931.4	448.7	179.3	79.3	72.1	26.3	9.7	4.0					
England														2040.0	1157.8	522.0	219.4	89.2	32.3	11.9	5.0					
Wales														2024.1	1157.8	522.0	219.4	89.2	32.3	11.9	5.0					
Scotland														1916.8	958.7	403.1	183.2	73.2	27.2	10.4	4.1					
England														2236.9	1253.7	555.6	222.4	91.5	32.4	11.4	4.6					
Wales														2236.9	1253.7	555.6	222.4	91.5	32.4	11.4	4.6					
Scotland														181.6	73.0	27.0	10.0	4.0	3.7							
England														2062.7	931.5	562.3	229.1	92.6	32.8	11.6	4.6					
Wales														2249.4	1265.5	562.3	229.1	92.6	32.8	11.6	4.6					
Scotland														2249.4	1265.5	562.3	229.1	92.6	32.8	11.6	4.6					
England														2026.0	1083.6	436.0	191.7	72.5	27.0	10.0	3.9					
Wales														2492.8	1361.6	577.6	230.1	94.7	33.9	11.9	4.8					
Scotland														2228.0	1172.3	452.0	189.9	77.0	27.4	10.3	4.2					

Table B1 (cont). Mortality multipliers (inverse of mortality rates, before adjustment factors) 2001-2013

	age																			
	0-1	01-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	above 85	
2001	Males	186.2	4,391.6	9,661.9	6,229.1	2,027.5	1,404.4	1,214.6	1,018.0	848.1	599.0	369.4	237.8	146.0	87.6	53.4	30.9	18.1	11.6	5.9
	Females	223.8	5,054.0	9,198.8	11,092.0	4,659.5	3,792.0	3,107.9	2,222.2	1,446.7	945.7	573.4	356.8	233.1	143.6	89.2	50.4	28.9	17.0	7.2
2002	Males	184.9	4,296.9	9,581.0	6,993.0	2,105.6	1,397.0	1,233.2	1,044.5	853.9	605.7	368.2	241.6	151.7	89.0	54.5	31.8	18.5	11.7	5.8
	Females	241.7	5,628.0	11,274.7	9,357.8	4,667.6	3,928.9	3,283.6	2,220.5	1,554.0	988.2	560.9	369.2	240.0	146.2	91.3	51.7	28.9	17.2	6.9
2003	Males	191.2	4,494.7	9,283.5	7,576.1	2,294.3	1,390.2	1,316.3	1,055.1	860.1	586.4	387.4	239.5	152.2	90.5	56.1	33.1	19.2	11.7	5.7
	Females	223.6	4,782.0	11,281.2	9,105.0	5,050.3	3,866.1	2,977.2	2,193.8	1,542.0	946.9	579.3	364.5	240.9	150.5	92.2	52.9	29.1	16.8	6.7
2005	Males	195.4	4,701.5	13,815.5	7,250.2	2,310.1	1,624.7	1,501.2	1,112.3	872.7	614.1	399.8	255.5	164.8	98.3	61.3	36.3	21.2	12.4	6.3
	Females	254.9	5,987.7	13,151.6	9,941.1	5,073.2	4,104.3	3,274.0	2,368.8	1,595.8	996.9	614.8	381.5	250.0	160.9	97.4	58.4	31.8	17.6	7.3
2006	Males	201.5	4,857.1	9,743.2	7,463.3	2,381.4	1,654.9	1,467.0	1,130.9	871.3	626.9	410.6	253.5	164.2	101.2	62.8	38.4	22.2	12.8	6.6
	Females	238.3	5,057.4	12,877.4	11,059.6	5,083.9	4,514.3	3,382.0	2,581.8	1,587.0	1,011.6	627.2	391.7	254.8	162.7	101.4	60.2	33.4	18.5	7.7
2007	Males	205.6	4,297.9	9,831.6	8,578.5	2,553.9	1,682.2	1,493.7	1,110.9	878.3	633.2	431.5	265.8	163.8	106.1	63.5	40.3	23.0	13.2	6.6
	Females	253.5	5,902.6	14,117.8	9,619.9	5,484.9	4,494.4	3,775.7	2,438.7	1,637.2	1,002.7	642.3	400.6	257.6	165.5	103.3	61.6	34.4	18.6	7.7
2008	Males	210.1	5,270.8	12,936.4	10,142.9	2,612.4	1,649.0	1,511.8	1,152.0	843.7	618.4	417.0	268.4	170.2	108.8	65.9	40.7	23.6	13.5	6.6
	Females	265.6	5,284.6	12,333.3	13,114.6	5,588.0	4,523.1	3,593.3	2,291.0	1,606.1	992.2	650.3	394.3	261.8	167.3	105.3	62.7	35.1	18.8	7.5
2009	Males	215.9	6,284.9	12,037.0	9,813.4	2,630.7	1,844.4	1,542.9	1,236.9	841.3	599.4	434.3	282.8	171.3	113.0	69.7	42.6	25.0	14.1	6.8
	Females	262.4	6,126.7	12,772.7	11,031.9	6,006.8	4,845.9	3,546.5	2,492.6	1,654.4	1,027.4	674.2	424.9	266.5	174.5	111.3	66.2	37.4	20.0	8.0
2010	Males	235.5	5,813.8	11,329.4	10,552.7	3,401.1	1,913.7	1,760.3	1,275.7	918.3	628.3	444.7	288.4	176.8	113.6	71.2	43.3	25.7	14.6	6.9
	Females	272.3	6,564.2	12,581.2	12,285.6	5,724.3	5,314.0	3,728.5	2,621.0	1,587.8	1,039.6	693.1	420.0	269.8	178.4	113.7	67.3	38.0	20.4	8.0
2011	Males	222.4	5,752.7	18,666.0	11,475.2	3,647.3	2,265.2	1,846.8	1,425.6	941.8	649.2	459.5	296.8	184.0	118.2	75.1	44.1	27.2	15.2	7.1
	Females	298.6	6,523.3	17,794.8	14,257.4	7,410.1	5,010.4	3,814.3	2,521.3	1,715.6	1,062.3	699.2	438.9	282.9	180.1	115.3	69.1	39.9	21.4	8.2
2012	Males	241.7	5,960.3	12,596.1	10,647.2	3,569.5	2,348.9	1,961.8	1,477.0	1,023.8	670.7	466.1	313.3	193.5	119.3	77.2	45.2	27.2	15.2	6.8
	Females	303.7	7,651.5	13,667.5	13,633.1	7,622.8	5,517.3	4,205.4	2,707.4	1,755.6	1,132.5	705.6	454.4	281.1	181.0	117.7	69.2	39.9	21.0	7.8
2013	Males	1,517.3	6,152.4	12,752.5	11,164.3	3,748.2	2,437.9	1,870.3	1,419.4	944.1	654.7	455.6	308.2	191.9	117.7	78.3	46.0	27.5	15.2	6.8
	Females	1,440.2	6,866.3	15,047.0	12,958.8	7,913.1	5,507.9	3,932.4	2,589.7	1,705.3	1,091.6	726.4	458.6	287.3	184.2	119.2	70.6	40.3	21.2	7.7

Table B1 (end). Mortality multipliers (inverse of mortality rates, before adjustment factors) 2008-2010

A. As applied by HMRC

		age									Age not stated
		0-18	18-25	25-35	35-45	45-55	55-65	65-75	75-85	above 85	
2008	Males	1,705.4	1,595.5	944.7	461.0	194.2	78.6	33.5	13.9	6.2	32.2
	Females	3,722.3	3,722.3	1,728.7	762.6	320.2	136.1	58.6	21.5	6.5	38.5
2009	Males	1,739.6	1,755.4	1,254.3	421.8	210.0	82.8	34.5	14.5	6.6	31.0
	Females	393.0	4,268.4	2,468.5	830.0	326.7	142.4	62.0	23.1	7.0	38.6
2010	Males	661.0	1,808.6	1,216.1	469.7	211.7	84.7	36.1	15.0	6.6	35.0
	Females	818.7	1,054.7	2,352.8	761.3	354.4	142.0	62.6	23.3	7.1	41.0

B. As computed from ONS registers on deaths and population

		age									Age not stated
		0-18	18-25	25-35	35-45	45-55	55-65	65-75	75-85	above 85	
2008	Males	2,306.6	1,649.0	1,313.9	711.2	331.4	132.8	51.3	18.2	6.6	124.7
	Females	3,109.8	4,523.1	2,819.2	1,219.5	802.4	204.0	79.7	25.4	7.5	119.9
2009	Males	2,381.3	1,844.4	1,378.0	696.0	347.5	135.8	54.0	19.1	6.8	128.3
	Females	3,157.7	4,845.9	2,946.6	1,257.5	529.8	210.1	84.4	27.1	8.0	125.3
2010	Males	2,629.9	1,913.7	1,485.4	740.7	354.9	137.7	55.2	19.7	6.9	129.5
	Females	3,234.5	5,314.0	3,094.7	1,245.9	532.2	213.6	86.2	27.5	8.0	125.1

Table C1. Sources and amounts for IR/HMRC distribution of identified wealth

year	Sources for IR/HMRC reconciliation of estimates of identified personal marketable wealth and personal sector balance sheets	Small estates	Joint property
		£ billion	£ billion
1971	Economic Trends, November 1978, page 106, Table 3 UK	3.5	7
1972			
1973			
1974			
1975	Economic Trends, November 1978, page 105, Table 2 UK	8.5	11.5
1976	IRS 1980 Table 4.19	10	13.5
1977	IRS 1981, Table 4.12	11.5	22
1978	IRS 1982, Table 4.12	11	28
1979	IRS 1983, Table 4.11	16	41
1980	IRS 1984, Table 4.11	10	67
1981	IRS 1985, Table 4.10	16	93
1982	IRS 1986, Table 4.10	9	108
1983	IRS 1987, Table 7.2	11	117
1984	IRS 1988, Table 10.2	33	182
1985	IRS 1989, Table 10.2	38	209
1986	IRS 1990, Table 10.2	48	187
1987	IRS 1991, Table 11.2	49	254
1988	IRS 1992, Table 11.2	48	354
1989	IRS 1993, Table 13.2	40	360
1990	IRS 1994, Table 13.2	52	502
1991	IRS 1995, Table 13.2	55	504
1992	IRS 1996, Table 13.2	59	472
1993	IRS 1997, Table 13.2	59	414
1994	IRS 1998, Table 13.2	56	411
1995	IRS 1999, Table 13.2	55	517
1996	IRS 2000, Table 13.2	57	458
1997			
1998			
1999	IRS webarchive, Table 13.3	67	712
2000	IRS webarchive, Table 13.3	53	661
2001	HMRC website Table 13.3	59	718
2002	HMRC website Table 13.3	59	766
2003	HMRC website Table 13.3	68	861
2004			
2005	HMRC website Table 13.3	75	809

Table D1. Control totals UK. Wealth, estates, population, prices

Year	Adult population aged 18 and over				Wealth - identified wealth (or wealth of the identified population)				Excluded wealth (or wealth of the excluded population)				Wealth control total: Identified wealth plus excluded population				Marketable wealth (series C basis)		Controlled wealth per adult		Price index	
	GB £m	UK £m	EU £m	WORLD £m	GB £m	UK £m	EU £m	WORLD £m	GB £m	UK £m	EU £m	WORLD £m	GB £m	UK £m	EU £m	WORLD £m	GB £m	UK £m	£	£ 2015	2015=100	2015=100
1985	369,549	331,446	204	5	209	278	239	274	309	306	306	318	306	306	306	19,167	17,489	653	777	22,702	31,336	0.833
1986	378,119	340,375	204	5	213	281	244	274	312	309	309	324	312	312	312	19,508	16,990	708	708	22,862	31,268	0.835
1987	386,118	348,675	205	5	217	286	244	274	317	312	312	329	317	317	317	19,908	16,990	708	708	23,282	31,336	0.837
1988	394,118	357,037	206	6	221	291	244	274	322	317	317	336	322	322	322	20,308	16,990	708	708	23,702	31,336	0.839
1989	402,118	365,414	207	6	225	296	244	274	327	322	322	344	327	327	327	20,708	16,990	708	708	24,122	31,336	0.841
1990	410,118	373,791	208	6	229	301	244	274	332	327	327	352	332	332	332	21,108	16,990	708	708	24,542	31,336	0.843
1991	418,118	382,168	209	6	233	306	244	274	337	332	332	361	337	337	337	21,508	16,990	708	708	24,962	31,336	0.845
1992	426,118	390,545	210	6	237	311	244	274	342	337	337	370	342	342	342	21,908	16,990	708	708	25,382	31,336	0.847
1993	434,118	398,922	211	6	241	316	244	274	347	342	342	379	347	347	347	22,308	16,990	708	708	25,802	31,336	0.849
1994	442,118	407,299	212	6	245	321	244	274	352	347	347	388	352	352	352	22,708	16,990	708	708	26,222	31,336	0.851
1995	450,118	415,676	213	6	249	326	244	274	357	352	352	397	357	357	357	23,108	16,990	708	708	26,642	31,336	0.853
1996	458,118	424,053	214	6	253	331	244	274	362	357	357	406	362	362	362	23,508	16,990	708	708	27,062	31,336	0.855
1997	466,118	432,430	215	6	257	336	244	274	367	362	362	415	367	367	367	23,908	16,990	708	708	27,482	31,336	0.857
1998	474,118	440,807	216	6	261	341	244	274	372	367	367	424	372	372	372	24,308	16,990	708	708	27,902	31,336	0.859
1999	482,118	449,184	217	6	265	346	244	274	377	372	372	433	377	377	377	24,708	16,990	708	708	28,322	31,336	0.861
2000	490,118	457,561	218	6	269	351	244	274	382	377	377	442	382	382	382	25,108	16,990	708	708	28,742	31,336	0.863
2001	498,118	465,938	219	6	273	356	244	274	387	382	382	451	387	387	387	25,508	16,990	708	708	29,162	31,336	0.865
2002	506,118	474,315	220	6	277	361	244	274	392	387	387	460	392	392	392	25,908	16,990	708	708	29,582	31,336	0.867
2003	514,118	482,692	221	6	281	366	244	274	397	392	392	469	397	397	397	26,308	16,990	708	708	30,002	31,336	0.869
2004	522,118	491,069	222	6	285	371	244	274	402	397	397	478	402	402	402	26,708	16,990	708	708	30,422	31,336	0.871
2005	530,118	499,446	223	6	289	376	244	274	407	402	402	487	407	407	407	27,108	16,990	708	708	30,842	31,336	0.873
2006	538,118	507,823	224	6	293	381	244	274	412	407	407	496	412	412	412	27,508	16,990	708	708	31,262	31,336	0.875
2007	546,118	516,200	225	6	297	386	244	274	417	412	412	505	417	417	417	27,908	16,990	708	708	31,682	31,336	0.877
2008	554,118	524,577	226	6	301	391	244	274	422	417	417	514	422	422	422	28,308	16,990	708	708	32,102	31,336	0.879
2009	562,118	532,954	227	6	305	396	244	274	427	422	422	523	427	427	427	28,708	16,990	708	708	32,522	31,336	0.881
2010	570,118	541,331	228	6	309	401	244	274	432	427	427	532	432	432	432	29,108	16,990	708	708	32,942	31,336	0.883
2011	578,118	549,708	229	6	313	406	244	274	437	432	432	541	437	437	437	29,508	16,990	708	708	33,362	31,336	0.885
2012	586,118	558,085	230	6	317	411	244	274	442	437	437	550	442	442	442	29,908	16,990	708	708	33,782	31,336	0.887
2013	594,118	566,462	231	6	321	416	244	274	447	442	442	559	447	447	447	30,308	16,990	708	708	34,202	31,336	0.889

Table F1. Sensitivity of wealth shares to total wealth in the 21st century

	Total wealth extrapolated with National Balance Sheet (preferred)		Wealth of EP extrapolated with National Balance Sheet		Wealth of EP extrapolated with Housing Price Index		Total wealth extrapolated with Housing Price Index	
	Top 10%	Top 1%	Top 10%	Top 1%	Top 10%	Top 1%	Top 10%	Top 1%
	per cent [1]	per cent [2]	per cent [3]	per cent [4]	per cent [5]	per cent [6]	per cent [7]	per cent [8]
2000	50.6	18.5	50.6	18.5	50.6	18.5	50.6	18.5
2001	50.2	18.9	50.2	18.9	50.2	18.9	50.2	18.9
2002	50.8	18.0	50.8	18.0	50.8	18.0	50.8	18.0
2003	50.3	16.8	50.3	16.8	50.3	16.8	50.3	16.8
2004								
2005								
2006	52.0	19.9	53.1	20.3	52.8	20.2	51.0	19.5
2007								
2008								
2009	54.0	20.6	54.3	20.7	54.5	20.8	54.9	20.9
2010								
2011								
2012	51.9	19.9	54.1	20.7	56.5	21.7	61.7	23.6
2013								

Notes: The preferred series (columns [1] and [2]) correspond to results also shown in Table G1. The extrapolation of wealth in the different scenarios starts from 2005 onwards, as explain in the text.

Table H1. Sources of data for the distribution and control total excluding housing wealth

	Source for IR/HMRC distribution of housing wealth	Notes	Source for IR/HMRC net housing wealth of excluded population	Control total excluding housing wealth £ million
1971	IRS 1973, Table 94	Great Britain; Year of account basis until 1979		86,307
1972	IRS 1974, Table 106	Great Britain		105,464
1973	IRS 1975, Table 108	Great Britain		111,777
1974	IRS 1975, Table 113	United Kingdom from 1974		105,823
1975	IRS 1977, Table 113		Dunn and Hoffman, 1978, Table 1	132,320
1976	IRS 1978, Table 4.18		IRS 1980, Table 4.19	146,287
1977	IRS 1979, Table 4.18		IRS 1981, Table 4.12	157,932
1978	IRS 1980, Table D3		IRS 1982, Table 4.12	188,976
1979	IRS 1981, Table D1		IRS 1983, Table 4.11	219,306
1980	IRS 1984, Table 4.12	Year of death basis from 1980	IRS 1984, Table 4.11	258,669
1981	IRS 1985, Table 4.11		IRS 1985, Table 4.10	276,902
1982	IRS 1986, Table 4.11		IRS 1986, Table 4.10	324,146
1983	IRS 1987, Table 7.1		IRS 1987, Table 7.2	386,467
1984	IRS 1988, Table 10.1		IRS 1988, Table 10.2	449,619
1985	IRS 1989, Table 10.1		IRS 1989, Table 10.2	463,664
1986	IRS 1990, Table 10.1			483,742
1987	IRS 1991, Table 11.1		IRS 1991, Table 11.2	672,164
1988	IRS 1992, Table 11.1		IRS 1992, Table 11.2	721,340
1989	IRS 1993, Table 13.1		IRS 1993, Table 13.2	785,639
1990	IRS 1994, Table 13.1		IRS 1994, Table 13.2	778,518
1991	IRS 1995, Table 13.1		IRS 1995, Table 13.2	830,029
1992	IRS 1996, Table 13.1		IRS 1996, Table 13.2	903,929
1993	IRS 1997, Table 13.1		IRS 1997, Table 13.2	969,640
1994	IRS 1998, Table 13.1		IRS 1998, Table 13.2	1,007,301
1995	IRS 1999, Table 13.1		IRS 1999, Table 13.2	1,072,145
1996	IRS 2000, Table 13.1	Last entry for wealth of excluded population referring to "dwellings".	IRS 2000, Table 13.2	1,103,354
1997	IRS 2000, Table 13.3			1,152,784
1998				
1999				1,425,697
2000				1,562,924
		Entries for wealth of excluded population refer to "UK residential buildings"		
2001	HMRC website, 2002, Table 13.1		Table 13.3 website	1,640,260
2002	HMRC website, 2002, Table 13.1		Table 13.3 website UK	1,670,859
2003	HMRC website, 2003, Table 13.1		Table 13.3 website UK	2,038,201
2004				
2005	HMRC website, 2005, Table 13.1		Table 13.3 website UK	1,959,065
2005 to 2007	HMRC website, 2005-07, Table 13.1	Averaged over 3 years		2,025,511
2008 to 2010	HMRC website, 2008-10, Table 13.1	Averaged over 3 years		1,792,431
2011 to 2013	HMRC website, 2011-13, Table 13.1	Averaged over 3 years		2,221,471

Notes

(1) IR denotes Inland Revenue; IRS denotes Inland Revenue Statistics.

(2) where no source shown for housing wealth of excluded population, the total has been interpolated as described in the text.

Table J1. Relative mortality in UK and US

UK					US				
	Mortality rate relative to population wide mortality rate for the same age class			population wide mortality rate (%)		Mortality rate relative to population wide mortality rate for the same age class			population wide mortality rate (%)
	UK housing wealth distribution					US capital income distribution			
	Top 30%	Top 20%	Top 10%			Top 10%	Top 5%	Top 1%	
Men (2008-2010)					Men (2004-2008)				
Aged 50-64	0.84	0.78	0.72	0.65	Aged 50-64	0.61	0.53	0.43	0.81
Aged 65-75	0.81	0.75	0.69	1.91	Aged 65-79	0.77	0.71	0.60	2.76
Aged 75-75	0.79	0.73	0.67	5.58	Aged 80+	0.97	0.91	0.92	8.47
Aged 85+	0.78	0.73	0.67	14.82					
Women (2008-2010)					Women (2004-2008)				
Aged 50-64	0.81	0.75	0.69	0.42	Aged 50-64	0.67	0.57	0.71	0.48
Aged 65-75	0.78	0.72	0.66	1.35	Aged 65-79	0.76	0.73	0.69	1.99
Aged 75-75	0.72	0.67	0.62	3.89	Aged 80+	0.97	0.92	0.91	7.22
Aged 85+	0.74	0.68	0.63	12.75					

Sources: Data on relative mortality rates of UK population across household housing deciles taken from HMRC estate database from the HMRC datalab, estimated from ELSA. Data on UK mortality and population are taken from ONS, The 21st Century Mortality Files, Deaths Dataset, 2001-2014. Data on the US relative mortality and population wide mortality are taken from Saez and Zucman (2016).

Table J2. Sensitivity of the top 1% wealth share to changes in the mortality-wealth gradient

	Original estimates with mortality multipliers as applied by HMRC	+20% adjustment to multipliers above P99	+20% adjustment to multipliers above P99.9	+50% adjustment to multipliers above P99	+50% adjustment to multipliers above P99.9	+100% adjustment to multipliers above P99	+100% adjustment to multipliers above P99.9
Case A: simulated top wealth shares based on internal wealth total							
Wealth shares (per cent)							
2008	19.6	21.9	21.0	25.1	23.1	30.5	27.2
2009	18.2	20.1	19.2	22.7	20.8	24.8	21.9
2010	23.5	26.5	25.7	30.7	29.1	37.4	35.0
Wealth of the identified population (£ billion)							
2008	3,339	3,505	3,411	3,754	3,520	4,169	3,701
2009	3,280	3,434	3,334	3,665	3,416	4,051	3,551
2010	3,940	4,186	4,064	4,554	4,252	5,169	4,564
Wealth of the excluded population (£ billion)							
2008	1,224	1,221	1,224	1,217	1,223	1,209	1,222
2009	1,142	1,139	1,142	1,135	1,141	1,127	1,140
2010	1,199	1,196	1,199	1,190	1,198	1,181	1,197
Case B: simulated top wealth shares based on external fixed wealth total							
Wealth shares (per cent)							
2008	20.1	22.4	21.5	30.5	27.2	30.5	27.2
2009	17.0	18.8	18.0	24.8	21.9	24.8	21.9
2010	23.7	26.8	26.0	37.4	35.0	37.4	35.0

Notes: The table shows the effect of changes in mortality adjustment factors on the top 1% wealth share. 20 percent, 50 percent and 100 percent changes are applied above P99 and P99.9 fractiles respectively. Two cases are considered. Case A refers to the internal wealth total: the sum of the identified wealth and the wealth of the excluded population. The latter is derived by extrapolating to 2008-2010 the 2005 HMRC estimate of the wealth of the excluded population using ONS UK housing prices index. Case B refers to the external wealth total, which does not change with changes in adjustment factors.

Table K1. Earlier estimates of the distribution of wealth in the UK

	IR/HMRC Series C							IR/HMRC Earlier Series C				
	Distribution among the adult population of marketable wealth							Distribution among the adult population of marketable wealth				
	Top 50%	Top 25%	Top 10%	Top 5%	Top 2%	Top 1%	Gini Coeff.	Top 25%	Top 10%	Top 5%	Top 2%	Top 1%
	per cent							per cent				
1966								87	65	56	42	33
1967												
1968												
1969												
1970												
1971								86	65	52	39	31
1972												
1973												
1974								84	57	43	30	23
1975								83	58	44	31	24
1976	92	71	50	38	27	21	66	84	60	45	32	24
1977	92	71	50	39	28	22	66					
1978	92	71	49	37	26	20	64					
1979	92	72	50	37	26	20	65					
1980	91	73	50	36	25	19	65					
1981	92	73	50	36	24	18	65					
1982	91	72	49	36	24	18	64					
1983	91	73	50	37	26	20	65					
1984	91	71	48	35	24	18	64					
1985	91	73	49	36	24	18	65					
1986	90	73	50	36	24	18	64					
1987	91	74	51	37	25	18	66					
1988	92	71	49	36	23	17	65					
1989	92	70	48	35	24	17	65					
1990	93	71	47	35	24	18	64					
1991	92	71	47	35	24	17	64					
1992	93	73	50	38	25	18	66					
1993	93	73	51	38	26	18	66					
1994	93	74	52	39	27	19	67					
1995	92	72	50	38	26	19	65					
1996	93	74	52	40	27	20	68					
1997	93	75	54	43	30	22	69					
1998	91	72	52	40	28	22	69					
1999	94	74	55	43	30	23	70					
2000	95	75	56	44	31	23	71					
2001	93	72	54	41	29	22	68					
2002	92	72	54	41	28	21	67					
2003	93	73	53	40	27	19	67					
2004												
2005	94	77	54	40	28	21	70					

Sources: IRS 1981, Table 4.8; IRS 1984, Table 4.8; and HMRC website, Table 13.5, 2005.

Table K1 (Cont.). Earlier estimates of the distribution of wealth in the UK

Series given in Atkinson and Harrison (1978) and Atkinson, Gordon and Harrison (1989)								
Shares of total personal wealth								
	England and Wales				Great Britain			
	Top 20%	Top 10%	Top 5%	Top 1%	Top 20%	Top 10%	Top 5%	Top 1%
	per cent				per cent			
1923	94.2	89.1	82.0	60.9				
1924	93.8	88.1	81.5	59.9				
1925	93.8	88.4	82.1	61.0				
1926	93.2	87.4	79.9	57.3				
1927	93.8	88.3	81.3	59.8				
1928	93.1	87.2	79.6	57.0				
1929	92.6	86.3	78.9	55.5				
1930	92.6	86.6	79.2	57.9				
1931								
1932								
1933								
1934								
1935								
1936	92.0	85.7	77.4	54.2				
1937								
1938	91.2	85.0	76.9	55.0	91.6	85.4	77.2	55.0
1939								
1940								
1941								
1942								
1943								
1944								
1945								
1946								
1947								
1948								
1949								
1950			74.3	47.2			74.4	47.2
1951			73.6	45.8			73.8	45.9
1952			70.2	43.0			70.3	42.9
1953			71.1	43.6			71.2	43.5
1954			71.8	45.3			72.0	45.3
1955			71.1	44.5			70.8	43.8
1956			71.3	44.5			71.1	44.0
1957			68.7	43.4			68.6	42.9
1958			67.8	41.4			67.7	40.9
1959			67.6	41.4			67.9	41.8
1960	83.1	71.5	59.4	33.9	83.6	72.1	60.0	34.4
1961	83.3	71.7	60.6	36.5	83.6	72.1	60.8	36.5
1962	80.2	67.3	54.8	31.4	80.7	67.9	55.4	31.9
1963								
1964	84.3	71.4	58.6	34.5	85.2	72.0	59.2	34.7
1965	85.5	71.7	58.1	33.0	85.8	72.3	58.7	33.3
1966	83.8	69.2	55.5	30.6	84.2	69.9	56.1	31.0
1967	84.5	70.0	56.0	31.4	84.9	70.5	56.4	31.5
1968	35.1	71.6	58.3	33.6	85.4	72.0	58.6	33.6
1969	83.3	67.7	56.1	31.1	84.1	68.6	56.6	31.3
1970	84.5	68.7	53.6	29.7	84.9	69.4	54.3	30.1
1971	84.2	67.6	52.3	28.4	84.8	68.3	53.0	28.8
1972	84.9	70.4	56.0	31.7	85.3	71.7	57.2	32.0
1973	84.9	66.8	50.8	27.3	85.4	67.5	51.5	27.4
1974	83.1	64.1	47.8	22.6	83.6	65.0	48.6	22.9
1975	80.8	61.9	45.8	22.7	81.1	62.5	46.5	23.1
1976	83.7	65.1	48.7	24.4	84.0	65.4	49.0	24.6
1977	81.0	62.5	46.5	22.1	80.9	62.5	46.4	22.1
1978	81.5	62.4	45.6	21.9	81.9	62.9	45.9	22.0
1979	80.3	61.2	45.2	21.5	80.5	61.4	45.3	21.4
1980	79.4	59.3	42.4	19.4	79.9	59.8	42.8	19.6
1981	82.3	62.6	45.9	22.7	82.5	62.8	46.0	22.5

Sources: Atkinson and Harrison, 1978, Table 6.5, and Atkinson, Gordon and Harrison, 1989, Table 1.

Table L2. Population and income control totals for the distribution of taxable investment income in the UK 1948-2013

Population control		Income control sources						Income control
Tax units	Adults	Rent, dividends and interest of the personal sector	Rent, dividends and interest of HH and NPISH	Rent, dividends and interest of HH	Rent, dividends and interest of HH and NPISH	Rent, dividends and interest of HH and NPISH	Source	
			Earlier series including taxes on portfolio income paid by non residents	Post-1950 series				
000	000	million £	million £	million £	million £	million £		million £
1946	25,473	1,255					NIE 1956 page 2	1,133
1947	25,583	1,340					NIE 1956 page 2	1,209
1948	25,791	1,175	964				NIE 1959 page 23 and NIE 1956 page 2	1,060
1949	25,900		978				NIE 1960 page 23	1,076
1950	25,767		1,001				NIE 1961 page 23	1,101
1951	25,633		1,045	984			NIE 1962 page 27 and NIE 1961 page 23	1,149
1952	25,500			964			NIE 1963 page 27	1,126
1953	25,300			1,054			NIE 1964 page 29	1,231
1954	26,250			1,095			NIE 1965 page 32	1,279
1955	26,200			1,198			NIE 1965 page 32	1,399
1956	26,150			1,219			NIE 1967 page 31	1,424
1957	26,100			1,289			NIE 1967 page 31	1,506
1958	26,250			1,420			NIE 1969 page 26	1,659
1959	26,500			1,547			NIE 1969 page 26	1,807
1960	26,700			1,861			NIE 1971 page 32	2,174
1961	26,900			2,041			NIE 1972 page 30	2,384
1962	27,200			2,021			NIE 1973 page 30	2,361
1963	27,400			2,152			NIE 1974 page 32	2,514
1964	27,500			2,334			NIE 1974 page 32	2,726
1965	27,600			2,681			NIE 1974 page 32	3,132
1966	27,700			2,825	2,632		NIE 1977 page 32 and NIE 1974 page 32	3,300
1967	27,800				2,642		NIE 1978 page 36	3,312
1968	28,091				2,759		NIE 1979 p 36	3,459
1969	28,161				2,920		NIE 1980 page 30	3,661
1970	28,206				2,809		NIE 1981 page 30	3,522
1971	28,240				2,897		NIE 1982 page 30	3,632
1972	28,351				2,958		NIE 1983 page 27	3,709
1973	28,123				3,751		NIE 1984 page 39	4,703
1974	28,274				4,755		NIE 1985 page 39	5,962
1975	28,341				5,271		NIE 1986 page 39	6,609
1976	28,549				5,963		NIE 1986 page 39	7,476
1977	28,892				6,386		NIE 1986 page 39	8,006
1978	29,076				6,227		NIE 1989 page 46	7,807
1979	29,390				9,328		NIE 1990 page 44	11,695
1980	29,704				12,515		NIE 1991 page 44	15,691
1981	30,018				13,333		NIE 1992 page 44	16,716
1982	30,484				14,276		NIE 1993 page 50	17,899
1983	30,950				14,521		NIE 1993 page 50	18,206
1984	31,416				18,656		NIE 1995 page 52	23,390
1985	31,743				23,550		Nie 1996 page 82	29,526
1986	31,998				24,044		NIE 1997 page 83	30,145
1987	32,249				25,601		NIE 1997 page 83, and Blue Book 2013	32,097
1988	32,507				28,708	31,939	NIE 1997 page 83, and Blue Book 2013	38,652
1989	32,788				39,164	38,461	NIE 1997 page 83, and Blue Book 2013	53,337
1990	44,284	44,094			47,343	53,074	NIE 1997 page 83, and Blue Book 2013	66,071
1991	44,474				46,606	65,745	NIE 1997 page 83, and Blue Book 2013	61,805
1992	44,765				45,985	61,500	NIE 1997 page 83, and Blue Book 2013	58,687
1993	44,897				36,921	58,398	NIE 1997 page 83, and Blue Book 2013	49,216
1994	45,007				37,041	48,973	NIE 1997 page 83, and Blue Book 2013	51,364
1995	45,121				42,975	51,111	NIE 1997 page 83, and Blue Book 2013	60,787
1996	45,191				44,307	60,487	NIE 1997 page 83, and Blue Book 2013	60,686
1997	45,422					60,387	NIE 1997 page 83, and Blue Book 2013	65,132
1998	45,654					68,430	Blue Book 2013, and Blue Book 2014	62,899
1999	45,086					71,690	Blue Book 2013, and Blue Book 2014	65,820
2000	45,263					68,601	Blue Book 2013, and Blue Book 2014	71,137
2001	45,756					63,598	Blue Book 2013, and Blue Book 2014	64,823
2002	46,048					72,138	Blue Book 2013, and Blue Book 2014	62,710
2003	46,354					77,912	Blue Book 2013, and Blue Book 2014	67,272
2004	46,689					63,104	Blue Book 2013, and Blue Book 2014	74,565
2005	47,163					60,955	Blue Book 2013, and Blue Book 2014	80,135
2006	47,592					72,883	Blue Book 2013, and Blue Book 2014	87,598
2007	48,043					81,081	Blue Book 2013, and Blue Book 2014	86,440
2008	48,499					85,801	Blue Book 2013, and Blue Book 2014	76,649
2009	48,910					90,954	Blue Book 2013, and Blue Book 2014	76,671
2010	49,371					89,568	Blue Book 2013, and Blue Book 2014	79,808
2011	49,839					67,000	Blue Book 2013, and Blue Book 2014	79,493
2012	50,181					70,458	Blue Book 2013, and Blue Book 2014	
2013	50,502					75,520	Blue Book 2013, and Blue Book 2014	
						76,082	Blue Book 2013, and Blue Book 2014	
							Blue Book 2014	

Table L3. Rates of surtax in the UK 1948-49 to 1972-73

1948-59 to 1964-65 and 1966-67 to 1971-72		1965-66 and 1972-33	
Bands of surtaxable income	Rate of surtax	Bands of surtaxable income	Rate of surtax
£	%	£	%
up to 2,000	Nil	up to 2,000	Nil
2,000-2,500	10.00 (1, 2)	2,000-2,500	11.00 (2)
2,500-3,000	12.50 (1, 2)	2,500-3,000	13.75 (2)
3,000-4,000	17.50 (2)	3,000-4,000	19.25 (2)
4,000-5,000	22.5	4,000-5,000	24.75
5,000-6,000	27.5	5,000-6,000	30.25
6,000-8,000	32.5	6,000-8,000	35.75
8,000-10,000	37.5	8,000-10,000	41.25
10,000-12,000	42.5	10,000-12,000	46.75
12,000-15,000	47.5	12,000-15,000	52.25
15,000-20,000	50	Above 15,000	55
Above 20,000	50.00 (3)		

Notes:

(1) For 1969-70 and 1970-71 surtaxable incomes below £2,500 were exempt from surtax but above that level the whole schedule applied so that tax was paid on all surtaxable income above £2,000. However, marginal relief was available to prevent a large jump in taxable liability at £2,300 whereby incomes between £2,500 and £2,681 were charged at 40% of the excess over £2,500.

(2) For 1971-72 and 1972-73 incomes below £3,000 were exempt from surtax. Marginal relief was available for surtaxable incomes in the range £3,000 to £3,499 whereby tax was only charged at 40 per cent (44 per cent in 1972-73) of the excess over £3,000.

(3) 52.5% 1948-49 to 1950-51.

Source: <https://www.gov.uk/government/statistics/rates-of-surtax-1948-to-1973>.

Table L4. Rate of return implied by the comparison of top wealth levels (excluding housing wealth) and top investment incomes

	Top 1%			Top 10%		
	Mean investment income £	Mean wealth excl. housing assets £	implied rate of return %	Mean investment income £	Mean wealth excl. housing assets £	implied rate of return %
1995	28,508	522,637	5.5	5,707	135,177	4.2
1996	32,932	518,715	6.3	6,020	138,189	4.4
1997	39,432	635,338	6.2	7,238	155,154	4.7
1998	42,492			8,246		
1999	43,431			8,339		
2000	39,622			8,288		
2001	42,566	1,006,984	4.2	8,162	224,353	3.6
2002	43,607	966,084	4.5	8,017	236,996	3.4
2003	50,611	904,690	5.6	9,050	231,903	3.9
2004	54,583			10,627		
2005	65,373	1,142,146	5.7	12,257	256,637	4.8
2006	71,201	1,284,517	5.5	13,520	262,117	5.2
2007	80,362			15,560		
2008						
2009	90,265	1,343,869	6.7	14,899	285,802	5.2
2010	60,573			11,534		
Average excluding 2009			5.5			4.3

Table M1. Wealth share of the top based on The Sunday Times Rich List

	Share of 0.001%	# of cases	P99.999	average wealth	Inverted Pareto-Lorenz	Share of 0.002%	# of cases	P99.998	average wealth	Inverted Pareto-Lorenz
	per cent		(£ million)	(£ million)	coefficient	per cent		(£ million)	(£ million)	coefficient
1989	2.44	428	30	91.2	3.0					
1990	2.92	430	50	112.5	2.3					
1991	2.77	431	50	109.0	2.2					
1992	2.83	432	35	110.9	3.2					
1993	2.84	433	41	113.4	2.8					
1994	3.16	434	60	130.5	2.2	3.63	868	25	75	3.0
1995	2.38	434	55	103.2	1.9	2.83	868	30	61	2.0
1996	2.99	435	70	131.5	1.9	3.57	870	40	78	2.0
1997	3.49	436	90	162.7	1.8	4.14	872	45	97	2.1
1998	3.21	438	100	171.9	1.7	3.72	874	50	100	2.0
1999	3.20	440	110	182.2	1.7	3.86	880	57	110	1.9
2000	3.56	443	140	222.6	1.6	4.34	886	72	136	1.9
2001										
2002										
2003	2.81	451	147	234.6	1.6	3.41	898	75	143	1.9
2004	3.52	454	180	313.7	1.7	4.22	904	90	189	2.1
2005										
2006	4.81	463	272	476.8	1.8	5.74	920	125	286	2.3
2007	5.26	467	314	549.5	1.8	6.29	928	150	330	2.2
2008	6.63	472	380	626.4	1.6	7.93	936	175	377	2.2
2009	3.77	475	235	374.2	1.6	4.59	942	115	230	2.0
2010	4.74	480	300	503.2	1.7	5.66	948	135	304	2.3
2011	4.51	485	325	498.4	1.5	6.42	954	150	360	2.4
2012	4.33	488	343	495.0	1.4	6.45	960	155	375	2.4
2013	5.88	491	350	686.2	2.0	6.87	966	160	407	2.5

Table O1. Sources of tabulated data on the distribution of estates in the US 1920-2013

Year	Sources	
1920	SOI 1920	p. 41
1921	SOI 1921	pp. 27-30
1922	SOI 1922	pp. 58-63
1923	SOI 1923	pp. 36-42
1924	SOI 1924	pp. 78-84
1925	SOI 1925	pp. 72-78
1926	SOI 1926	pp. 52-57, 66
1927	SOI 1927	pp. 48-55, 62
1928	SOI 1928	pp. 54-59, 68
1929	SOI 1929	pp. 46-51, 54
1930	SOI 1930	pp. 54-59, 62
1931	SOI 1931	pp. 50-53
1932	SOI 1932	pp. 52-55
1933		
1934		
1935		
1936		
1937	SOI 1937	pp. 76-79, 88-89
1938	SOI 1938	pp. 237-247
1939	SOI 1939	pp. 262-269
1940	SOI 1940	pp. 212-219
1941	SOI 1941	pp. 258-265
1942	SOI 1942	pp. 284-291
1943	SOI 1943	pp. 312-319
1944	SOI 1944	pp. 316-323
1945		
1946	SOI 1946	pp. 360-367
1947	SOI 1947	pp. 380-387
1948	SOI 1948	pp. 342-349
1949	SOI 1949	pp. 362-369
1950	SOI 1950	pp. 237, 239
1951		
1952		
1953	SOI 1953	p. 74
1954	SOI 1954 Estate tax returns	pp. 17-18
1955		
1956	SOI 1956 Estate and gift tax returns	p. 7
1957		
1958	SOI 1958 Fiduciary, gift, and estate tax returns	pp. 59-60
1959		
1960	SOI 1960 Fiduciary, gift, and estate tax returns	p. 47-48
1961		
1962	SOI 1962 Fiduciary, gift, and estate tax returns	p. 60
1963		
1964		
1965	SOI 1965 Fiduciary, gift, and estate tax returns	p. 71
1966		
1967		
1968		
1969	SOI 1969 Estate tax returns	p. 11
1970		
1971		
1972	SOI 1972 Estate tax returns	p. 12
1973		
1974		
1975		
1976	SOI 1976 Estate tax returns	p. 15, Table 1
1977		
1978		
1979		
1980		
1981		
1982		
1983		
1984		
1985		
1986		
1987		
1988		
1989	IRS website	
1990		
1991		
1992	IRS website	
1993		
1994	IRS website	
1995	IRS website	
1996	IRS website	
1997	IRS website	
1998	IRS website	
1999	IRS website	
2000	IRS website	
2001	IRS website	
2002	IRS website	
2003	IRS website	
2004	IRS website	
2005	IRS website	
2006	IRS website	
2007	IRS website	
2008	IRS website	
2009	IRS website	
2010	IRS website	
2011	IRS website	
2012	IRS website	
2013	IRS website	

Notes: SOI denotes Statistics of Income published by the Internal Revenue Service (IRS)

Table O2. Control totals for the distribution of estates in the US 1921-2013

	Adult decedents aged 20 and over	Adult population aged 20 and over	Adult mortality rate	Total personal wealth	Total personal wealth passed at death
	000	000	per cent	billion USD	billion USD
1920					
1921	940	63,898	1.47	276	5.94
1922	955	64,769	1.48	281	6.07
1923	976	66,021	1.48	296	6.44
1924	1,000	67,457	1.48	310	6.78
1925	1,037	68,641	1.51	335	7.48
1926	1,130	69,843	1.62	356	8.53
1927	1,089	71,101	1.53	382	8.69
1928	1,138	72,359	1.57	428	10.04
1929	1,154	73,580	1.57	474	11.10
1930	1,138	74,963	1.52	414	9.43
1931	1,116	76,070	1.47	343	7.55
1932	1,126	77,125	1.46	281	6.13
1933	1,117	78,198	1.43	284	6.06
1934	1,159	79,362	1.46	304	6.62
1935	1,172	80,508	1.46	323	6.99
1936	1,257	81,625	1.54	365	8.34
1937	1,237	82,683	1.50	368	8.16
1938	1,181	83,769	1.41	357	7.44
1939	1,205	84,920	1.42	368	7.72
1940	1,237	86,118	1.44	376	7.98
1941	1,217	87,365	1.39	394	8.08
1942	1,211	88,393	1.37	430	8.67
1943	1,277	88,839	1.44	488	10.30
1944	1,239	88,258	1.40	552	11.35
1945	1,240	87,375	1.42	629	13.05
1946	1,232	90,619	1.36	705	13.99
1947	1,279	94,946	1.35	767	15.05
1948	1,283	96,467	1.33	822	15.91
1949	1,286	97,860	1.31	862	16.45
1950	1,304	99,223	1.31	917	17.48
1951	1,330	100,261	1.33	1,000	19.21
1952	1,340	101,048	1.33	1,067	20.45
1953	1,364	101,898	1.34	1,103	21.29
1954	1,332	102,868	1.30	1,160	21.63
1955	1,380	104,109	1.33	1,249	23.80
1956	1,414	105,351	1.34	1,338	25.77
1957	1,476	106,422	1.39	1,393	27.67
1958	1,488	107,448	1.38	1,471	29.12
1959	1,502	108,498	1.38	1,574	31.10
1960	1,555	110,080	1.41	1,637	32.95
1961	1,549	111,249	1.39	1,732	34.30
1962	1,606	112,475	1.43	1,822	36.94
1963	1,663	113,887	1.46	1,885	39.25
1964	1,650	115,376	1.43	1,999	40.92
1965	1,687	116,753	1.44	2,148	44.60
1966	1,727	117,983	1.46	2,253	47.58
1967	1,724	119,594	1.44	2,407	50.26
1968	1,804	121,591	1.48	2,694	58.11
1969	1,796	123,551	1.45	2,861	60.73
1970	1,797	125,666	1.43	2,936	61.52
1971	1,810	128,066	1.41	3,157	65.66
1972	1,854	130,636	1.42	3,546	74.35
1973	1,868	133,213	1.40	3,838	79.80
1974	1,835	135,757	1.35	3,885	78.18
1975	1,799	138,398	1.30	4,132	80.24
1976	1,819	141,174	1.29	4,670	90.26
1977	1,810	144,077	1.26	5,167	97.76
1978	1,840	147,093	1.25	5,726	108.27
1979	1,828	150,161	1.22	6,539	120.75
1980	1,905	153,197	1.24	7,509	142.17
1981	1,898	156,305	1.21	8,303	154.11
1982	1,898	159,053	1.19	8,853	162.07
1983	1,946	161,681	1.20	9,409	174.40
1984	1,968	164,179	1.20	10,093	185.71
1985	2,015	166,591	1.21	11,058	204.64
1986	2,034	168,745	1.21	12,222	224.66
1987	2,053	170,752	1.20	13,247	242.10
1988	2,097	172,634	1.21	14,350	264.04
1989	2,078	174,480	1.19	15,639	281.31
1990	2,079	176,422	1.18	16,371	288.67
1991	2,101	178,968	1.17	17,092	297.68
1992	2,111	181,706	1.16	18,057	308.43
1993	2,204	184,172	1.20	18,843	336.03
1994	2,217	186,277	1.19	19,455	349.58
1995	2,252	188,402	1.20	20,696	378.56
1996	2,257	190,500	1.18	22,684	397.79
1997	2,258	192,695	1.17	25,012	419.18
1998	2,282	195,144	1.17	27,740	447.66
1999	2,337	197,473	1.18	31,134	510.89
2000	2,349	199,878	1.18	32,936	539.40
2001	2,363	202,446	1.17	32,407	529.58
2002	2,390	204,943	1.17	31,544	518.59
2003	2,395	207,272	1.16	34,094	559.35
2004	2,344	209,606	1.12	39,338	629.16
2005	2,394	212,106	1.13	44,794	728.19
2006	2,373	214,634	1.11	49,178	788.45
2007	2,370	217,164	1.09	50,725	808.37
2008	2,421	219,668	1.10	45,194	742.20
2009	2,389	222,199	1.08	40,883	668.16
2010	2,423	224,830	1.08	43,375	724.66
2011	2,471	227,481	1.09	45,278	754.21
2012	2,500	230,100	1.09	48,235	794.88
2013	2,555	232,656	1.10	53,061	873.94

