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Concentration among the Rich

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Abstract

The aim of this paper is to examine the concentration of wealth among the group of top wealth holders, defined as those with wealth in excess of a high cut off. The paper begins by considering the definition of this cut off, analogous to the definition of a poverty line at the other end of the distribution. It then considers what can be learned about the proportion classified as 'rich' and about the concentration among the rich from four non-survey sources: journalists' lists, estate data, wealth tax data, and investment income tax data. It starts off from the world's billionaires in 2006, but is particularly concerned with changes over time within countries, taking France, Germany, the UK, and the USA, to illustrate the different sources.

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Acknowledgements

Introduction

The aim of this paper is to examine the degree of wealth concentration among the very rich and how it has changed over the twentieth century. I ask, not what has happened to the share of the top 1 per cent, say, in total wealth, but about the size of the group defined as rich and about what has happened *within* this group of rich wealth-holders. The definition of 'the rich' adopted in this paper, which is the subject of Section 1, typically identifies a small group of the population above a wealth cut off. In this respect, it differs from many wealth studies. The annual study of wealth by Statistics Sweden (for example, 2004) gives results by decile groups, whereas I am interested here in a much smaller, and richer, group. My concern is with the very top of the distribution, and in how the *shape of the distribution* at the top has changed over time.

The paper focuses on the concentration of wealth for a positive reason and for a negative reason. The positive reason is that it helps us understand what is happening to top shares. In most advanced countries, changes over the past century in the wealth distribution have reflected two major factors. The *first factor* is the growth of 'popular wealth': consumer durables, houses, and small savings. Tawney remarked of the soldiers of the First World War that most of them went off to war with their possessions on their back. Today, most households in OECD countries have significant assets, even if debts and mortgages are also large. The growth of popular wealth has been a major element reducing the relative share of the top wealth groups (Atkinson and Harrison 1978). The *second factor* is the change in the shape of the distribution at the top. A number of studies have found that the downward trend in wealth shares over much of the twentieth century has been limited to the top: for example, in Britain the results of Atkinson and Harrison (1978: chapter 6) for the period 1923-72 show a clear downward trend for the share of the top 1 per cent, but no significant trend for the next 4 per cent. The estimates of wealth concentration in France by Piketty et al. (2006) show that between 1947 and 1994 the share of the top 1 per cent fell by 8 percentage points but that of the next 4 per cent was virtually unaltered. Progressive inheritance taxation and other forces have been reducing the top fortunes relative to those just below them. By focusing on the concentration among the rich, the paper singles out this changing shape.

The negative reason is that we can study concentration among the rich without needing to make estimates of total wealth. We do not require figures for the wealth of people below the cut off that defines 'rich'. This is important since the sources used, discussed in Section 2, are all partial in their coverage of wealth: wealth tax data are limited to those above the tax threshold, estate data do not cover those dying with wealth insufficient to be recorded, investment income data are typically limited to those in the upper ranges, and *Forbes Magazine* and other journalistic sources are only interested in the really rich. The advantage of focusing on the upper part of the distribution may also apply to survey data where there are differences in the treatment or coverage of smaller

wealth-holdings. The α-version of the Luxembourg Wealth Study, for example, shows a Gini coefficient for household net worth for Sweden that is 20 percentage points higher than for Finland, 14 points higher than Canada, and even 5 points higher than the USA (Brandolini et al. 2006: table 4). This high value for the Swedish Gini reflects, among other factors, the high proportion of households with negative net worth. On the other hand, if we focus just on the top of the distribution, the picture looks different. From the reported shares of the top 1 percent and top 10 percent, we can calculate the Pareto-Lorenz coefficient as higher (i.e., less concentrated) in Sweden (2.03) than in Canada (1.84) and the USA (1.48), and not much lower than Finland (2.17) and Italy (2.39).[1]

To illustrate what can be learned by focusing on the top of the distribution, I present in Section 3 results for four countries: France, Germany, the UK, and the USA. They are derived from sources that differ, and they cover different periods, so that cross-country comparisons are not possible.[2] My emphasis is rather on the changes within countries over time. This is a further reason why I concentrate on non-survey evidence. While wealth surveys have a distinguished record, they are best in the most recent period, and cannot typically take us far back in the past. Nor can they always provide the frequent observations necessary if one is to avoid being unduly influenced by years in which valuations are particularly high or low. The main findings are summarized in the concluding Section 4, where I speculate about their explanation, taking account of both 'new' wealth, created by today's self-made rich, and wealth inherited from previous generations.

1   Definition of the 'rich'

The group of 'rich' with whom I am concerned could be defined in a number of different ways. The definition closest to the existing literature would specify a percentage of the total (adult) population, like the top 1 per cent or 0.5 per cent. Or the definition could take the top N persons, as in the *Sunday Times Rich List* in the UK. Such approaches do however miss the possibility, indeed probability, that the rich are a changing proportion of the population, which is one of the questions I wish to explore. Moreover, the arbitrary nature of the choice of percentage (why 1 per cent?) serves to underscore the point made by Shorrocks (1987: 46) that studies of wealth often fail to make clear their rationale.

A different approach, suggested by Stark (1972) in the context of high incomes, is to define an upper cut off analogously to the definition of a poverty line. This could be a 'focal' value, as with the $1 billion cut off for the *Forbes* list used below. Or, as with the definition of poverty, the cut off could be a relative line. As was noted long ago by

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[1] The Pareto-Lorenz coefficient is a measure of the concentration of wealth among the rich; the larger the coefficient, the less the concentration—see below.

[2] For an international comparison covering 8 countries, including the 4 studied here, see Wolff (1996).

Watkins, 'the "large fortune" is a more or less relative quantity … The rich of former days would not even be "respectably poor" in New York City today' (1907: 3-4). This may lead us to define as 'rich' those who have more than x times the median wealth. This does not however resolve the question of arbitrariness. Moreover, it has the practical problem that we need to know enough about the distribution to be able to estimate the median, which is often not the case with the sources used here. For example, the wealth tax returns may only cover a small percentage of the population. The median could be replaced by the mean but this requires knowledge of total wealth (and could be unduly influenced by the upper tail).

Instead, I employ here a definition based on a multiple of mean income per person (or per tax unit). Mean income has also to be estimated, and figures are not always easy to obtain for earlier periods, but we are better placed than seeking to estimate total wealth, in view of the guidance provided by national income accounts.[3] What multiple do we choose? The definition adopted here treats as rich those *individuals whose wealth exceeds 30 times mean income*. The wealth cut off per person is referred to below as W*. So that in the UK in 2000, when mean income per person was around £14,000, the cut off is £420,000 per person. In the USA in the same year the mean income per tax unit was $42,500. In what follows, I apply a simple adjustment of 1.5 to convert tax units to adult population, which implies a cut off for the USA in 2000 of some $850,000 per person. What is the rationale for a multiple of 30? The choice of 30 is based on the fact that at a real yield of 3⅓ per annum this level of wealth generates an amount equal to mean income per person. A person with W* could live off the interest at an average standard of living. An assumed return of 3⅓ per cent does not seem unreasonable as a measure of the long-run real return. While a higher rate of 4 per cent is used by some institutions as a measure of the long-run sustainable expenditure while maintaining the real value of their endowment (USA charitable foundations are required to take the still higher rate of 5 per cent), I have applied a lower figure to take account of the importance of owner-occupied housing and its incomplete representation in personal income. The cut off is not dissimilar to the Cap Gemini definition of High Net Worth Individuals, which in 2006 is $1 million excluding home real estate.[4] On the other hand, it is considerably higher than the level taken for the US by Danziger et al. (1989) to define 'rich' in their article 'How the Rich Have Fared, 1973-87', where the cut off was nine times the poverty line, or $95,000 for a family of four in 1987 dollars (my definition would have yielded a figure around $475,000).

In addition to the above definition of 'the rich', I also define 'super rich' to be those individuals with 30 x 30 times mean income per person, and the 'mega rich' as those with 30 x 30 x 30 times mean income per person. For the USA in 2000 these cut offs are

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[3] The estimation of total individual income is discussed in Atkinson (2007), drawing on a number of studies for different countries.

[4] Website of Capgemini, 21 February 2006.

approximately (per individual) $25 million, and $0.75 billion, respectively (billions in this paper are American billions). So that most of the mega rich should feature on the *Forbes* list of billionaires. If the rich are those who could live off their interest, the super rich are those who could live off the interest on their interest, and the mega rich are those who could live off the interest on the interest on their interest. (J. P. Getty once complained that he could not, even when giving the most lavish party, spend all the income that accrued while it was taking place.)

1.1 Methods of analysis

As has been set out clearly by Sen (1988), the measurement of wealth, or 'affluence' in the case of income, can proceed along the same lines as the measurement of poverty, with indicators such as the proportion rich (headcount) and the concentration of wealth among the rich (parallel to the Sen poverty index).[5] The first indicator used here is indeed the headcount: the proportion of the adult population classified as rich or super rich. (It should be noted that, while this does not require a control total for total wealth, it does require a control total for the adult population.) The proportion is not of course sensitive to the extent to which people surpass the cut off. Just as with the measurement of poverty, we may want to take account of the distribution beyond the cut off. Following the parallel with the literature on industrial concentration, I examine, as a second indicator, the 'market share' of the top 25 per cent of wealthy individuals. How much does the top quarter own of the total wealth of this group?

The third indicator involves the shape of the distribution above the wealth cut off. It is widely believed that the upper tail of the wealth distribution has a Pareto form, which can be fitted without reference to total wealth or total population. In this case, the number of people with wealth in excess of W is given by $N = A W^{-\alpha}$, where α is the Pareto exponent and A is a constant. If we then plot the logarithm of the rank of billionaires (their number in the *Forbes* list) as a function of the logarithm of their wealth, we should observe a downward sloping line with slope α. Alternatively, we may note that the mean wealth of people above W is given by, where the Pareto distribution holds for all wealth levels above W, a multiple $\alpha/(\alpha-1)$ of W. The 'mean wealth above' (MWA) ratio is constant. So $\alpha = 3$ implies that people above you have on average a wealth 50 per cent higher than yours; $\alpha = 2$ implies that people above you have on average a wealth twice yours. In this sense, a higher value of α corresponds to less concentration. In the same way, the 'incomplete' Gini coefficient measured considering only the rich is equal to $1/(2\alpha-1)$, so that a value of 2 implies a Gini coefficient of a third. The coefficient can also be related to the share of the top quarter. Where the Pareto formula applies, the within-group share of the top quarter is given by $(0.25)^{(1-1/\alpha)}$. A share of 50 per cent for the top quarter implies a value for α of 2, a share of 60 per

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[5] I am most grateful to S. Subramanian for drawing my attention to this reference.

cent implies a value for α of around 1.6.[6] The third indicator of concentration used here is therefore the Pareto exponent, α, measured in one of these ways. However, one of the questions considered in Section 3 is the extent to which the Pareto distribution does indeed provide a reasonable fit to the observed data. If we plot the *Forbes* billionaires by rank in a double logarithmic diagram, do we find a straight line? Does the MWA ratio change with wealth?

With the exception of the journalist lists, I do not use microdata (although microdata exist for certain recent years in some countries and are being collected in other countries from archives; see Piketty et al. 2006). The typical data therefore consist of the number of people (or tax units) with wealth in excess of W and the amount of their wealth, for a range of values of W above my cut off to define 'the rich'. This has therefore involved interpolation, where I have applied a logarithmic (Pareto) interpolation to either cumulative numbers or cumulative amounts.[7]

2   Sources of data on the rich

Sources of data on the distribution of wealth are extensively described by Davies and Shorrocks (2000: section 3), who identify five main types. The most widely used today are sample surveys, but the group of the population with whom I am concerned here is that typically least well covered. Considerable efforts are made to ensure good coverage of wealthy individuals in surveys, for example, by over-sampling of those with high incomes. But coverage of the very wealthy remains problematic. Nor does survey evidence typically provide a long run of data. The first survey for the USA cited by Davies and Shorrocks (2000) is for 1962; the first Canadian survey provides information for 1964. In the UK, the Oxford Savings Surveys provided information on net worth for the early 1950s (Straw 1956), but the surveys were not continued. I shall therefore concentrate here on four other sources of evidence: lists of named wealth-holders constructed by journalists, wealth tax data, estate tax data, and investment income tax data.

2.1 Lists of named wealth-holders

As described by Davies and Shorrocks (2000: 642) in the US for many years, *Forbes Magazine* and *Fortune* have provided lists of the very wealthy,[8] and this practice has

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[6] This method of estimating the Pareto coefficient was proposed by Macgregor (1936), who noted that it made a bridge between Pareto and Lorenz. For this reason, to draw a distinction from other methods of estimating the Pareto coefficient, I refer to it as the Pareto-Lorenz coefficient.

[7] The validity of this method of interpolation does not depend on the Pareto distribution providing a good fit to the upper part of the distribution. The logarithmic interpolation in effect fits a Pareto curve to each interval, so that the implied Pareto exponent varies from interval to interval.

[8] Such lists go back at least to 1892, when the New York *Tribune* published a list of 4,047 American millionaires (Watkins 1907: note to chapter III).

spread to other countries, examples being the *Sunday Times Rich List* in the UK (Beresford 1990, 1991) and *Business Review Weekly* in Australia (Shann 1998). As Davies and Shorrocks make clear, this source has considerable interest, and it has been used to augment information from other sources, as in the estimates for Canada produced by Davies (1993). These lists do however suffer from several disadvantages:

1. The validity of the list depends on the extent to which wealth holdings are public knowledge, which is likely to vary across countries and over time, and on the efforts made by the investigators to obtain adequate coverage. As survey researchers in the USA have noted (see Kennickell 2003), their interviews have thrown up people missing from the journalist lists.

2. Many of the assets may be difficult to value, such as holdings in unquoted companies, or collections of art (well illustrated by the difficulty in predicting the price that works will fetch at auction).

3. The lists often combine individual wealth-holdings, those of couples, and those of 'families', where the last of these extends beyond the immediate nuclear family; it may therefore be difficult to reduce them to a common basis. For example, in the 2006 *Forbes* list of world billionaires, number 8 is 'Kenneth Thomson and family', whereas numbers 17 to 21 are five people with the surname 'Walton'. If the wealth of the latter were added, it would put them at the top of the list.

4. Assets may be more visible than debts, causing net worth to be overstated. Davies and Shorrocks (2000) cite the example of the UK publisher, Robert Maxwell, who appeared in the *Sunday Times* list of top wealth holders shortly before his death revealed massive debts.

5. The coverage of national lists is affected by the geographic criteria for the inclusion of individuals. For example, in the 2006 *Forbes* list of world billionaires, number 11 is Roman Abramovich, shown as having Russian citizenship but UK residence.

2.2 Wealth tax data

In a number of European countries there are annual taxes on wealth that may be used to derive statistics about the distribution of wealth (for a recent review, see Hansson 2002). There has been some tendency to dismiss these data. Harrison (1979: 51), in his valuable survey of the distribution of wealth in ten countries, says simply of the German wealth tax data used below that they 'are widely recognised as being of little value'. He equally deems the Norwegian estimates based on wealth tax returns to be so unreliable as not to warrant inclusion. He noted that total recorded personal wealth in the Norwegian case was less than total personal income. This does not however mean that the data cannot be employed to throw light on the upper tail of the distribution. Indeed, as Spånt (1987) has shown for Sweden, they can be used to construct long-run series (covering the period 1920-83). Tuomala and Vilmunen (1988) have used the wealth tax

data for Finland. Ohlsson et al. (2006) have extended the series for Sweden and used similar data for Denmark and Norway to produce long-run series for those countries.

The wealth tax data have the advantage, compared with the two methods that follow (the estate method and the investment income method), of measuring directly the variable and the population with which we are concerned. At the same time, there are several problems that limit use of wealth tax data:

1. The definition of wealth follows the wealth tax law, so that the data omit classes of assets that are not taxable, and classes of liabilities that are not allowed against taxable wealth. Variations in the tax law across countries limit the extent of comparability across countries and changes over time limit the extent of consistency over time.

2. The valuation of assets follows the wealth tax law, and this may be below the market valuation, as a result of tax concessions (such as those for certain business assets under the German wealth tax).[9]

3. Tax evasion means that wealth holdings are understated. In the case of Sweden, Spånt (1987: 53) notes that 'a major problem with tax return data is the extent of under-reporting and avoidance through evasion and legal tax exemptions'.

2.3 Estate data

One of the oldest methods of obtaining information about the distribution of individual; wealth is to use the dead as a sample of living. If we assume that those persons dying in a particular year are representative of the living population, the overall distribution may be obtained by 'blowing up' the estate data by an appropriate mortality multiplier, equal to the reciprocal of the mortality rate. So if the mortality rate is 2 per cent, we multiply by 50. In the earliest calculations, a single multiplier was applied to all estates, but this led, as described by Mallet (1908: 66), to 'the most disquieting discrepancies', since both wealth and mortality tend to increase with age. Following the suggestion of the Australian statistician, Coghlan (1906), Mallet used multipliers that varied with age at death, and this has now become standard practice (see for example Lampman 1962 for the USA and Lydall and Tipping 1961 for the UK).[10] Restriction to data giving the distribution by age of estates limits the time period that can be covered. In the UK, data are only available for the distribution of estates classified by age and gender from 1923.

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[9] Although it may be noted that a study for Finland of wealth tax data concludes that 'the share of the top wealth holders (in 1981) is practically speaking invariant with respect to the transformation of tax values to market values' (Tuomala and Vilmunen 1988: 185).

[10] Moreover, most studies allow for the fact that mortality is lower for higher social classes (with more wealth). In England and Wales in 1968, the social class multiplier for men aged 35-44 was 43 per cent higher than for the general population (Atkinson and Harrison 1978: 65).

The fact that small estates are not liable for estate tax, and that small wealth holdings are therefore missing, is not a problem for the present application. At the same time, the estate multiplier method has the following disadvantages:

1. Those dying in a given year are not necessarily representative of the living population. For example, those dying are likely to have had below-average health, which would have affected their wealth accumulation (for example they may have stopped work sooner). Those with shorter life expectancy may have taken steps to avoid estate tax, for instance by making transfers of property.

2. The 'predictability' of death may have changed over time, affecting the scope for estate tax planning.

3. The war years are unrepresentative.

4. The valuation for estate tax purposes (a 'sell up' value) may be different from, typically lower than the valuation on a 'going concern' basis (an exception is of course the value of life assurance policies).

5. Typically estate tax law exempts certain types of property, such as that settled in certain types of trust, or applies a discount to the value of certain types of property.

In recent years, a number of studies have used estate data without mortality multipliers, and this is true of the estimates for France used below, based on the work of Piketty (2001). From the examination of the theory of mortality multipliers by Atkinson and Harrison (1975), it is clear that the implications of making no adjustment for differential mortality depend on the end-statistics in which one is interested. The finding of Mallet (1908) was that total wealth would be significantly over-stated.[11] The impact on the *distribution* of wealth is however less straightforward. When Young argued in 1917 that 'statistics of the sizes of estates admitted to probate are nearly worthless unless they are accompanied by statistics of the ages of the decedents', he had in mind that 'not only do many rich men grow richer as they grow older, but some men grow rich faster than others, while some men, especially among those with little property, grow poorer as they grow older. It follows that the inequality of possessions among persons at the end of life must be very much greater than among the living population' (1917: 483). But this argument does not take account of the fact that differential mortality leads the surviving population to be more highly selected and hence less unequal. Piketty et al. (2006) compare the results for wealth in Paris obtained with and without multipliers

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[11] Mallet estimated total wealth among the living as around £6 billion in England in 1905-06, whereas the lowest previous figure cited was close to £8 billion. As was noted by Bowley, 'most people, when they first saw this paper [of Mallet], must have felt that somebody had robbed them of at least £2 billion' (discussion of Mallet 1908: 88-89).

from 1807 to 1902, and show that the estimates obtained without multipliers gave higher shares for the top 1 per cent but that the overall upward trend is similar.[12]

2.4 Investment income data

Estimation of wealth holdings via the capitalization of investment income as declared for income tax was much used in early studies of total national wealth, and the method is particularly associated with Sir Robert Giffen (in the UK, it is known as the *Giffen method*). In the USA, it was used before the Second World War by Lehmann (1937) and Stewart (1939) to estimate the size distribution of wealth. Since then, it has been little used, perhaps in part because the tabulated income tax data in the US do not provide a size distribution of investment income (as opposed to amounts of investment income classified according to ranges of total income). (The necessary investment income data could be obtained from the US microdata, which are available from 1960.) The method has been used in Australia, employing investment income data from household surveys, by Dilnot (1990), Baekgaard and King (1996) and Kelly (2001).

The essence of the investment income method is to apply a yield multiplier to work back from the distribution of taxable investment income to the distribution of wealth. If the yield on all wealth were x per cent, then we would simply multiply up the recorded investment income by 100/x. In reality, the yield varies with the form in which wealth is held, and the multiplier varies by range. Where, as is the case below, the investment income data come from income tax records, the multiplier has to be based on taxable yield. This means that the yield is typically the money yield, with no adjustment for inflation, but that it excludes capital gains (in most countries) and that we have to take account of assets whose yield is not taxed, such as (commonly) owner-occupied housing or tax exempt bonds. The methods used in a UK context are described in Atkinson and Harrison (1978: chapter 7). The calculated yield in 1968-69 was 3.1 per cent on wealth of £100,000 and 2.8 per cent on wealth of £500,000.

The investment income data cover the living population, but they provide only indirect evidence about wealth, causing several problems in their use:

1. The method allows for variation in asset composition by wealth level, but not for the possibility that yields vary with the level of the holding. For example, banks commonly pay higher rates of interest on larger accounts. In the opposite direction, those with a higher marginal tax rate are likely to choose asset vehicles with a lower taxable component.

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[12] The earlier study by Fouquet and Strauss-Kahn (1984) for one year (1977) showed that moving from general mortality multipliers to social class multipliers had the effect of reducing the share of the top 1 per cent in France from 22.9 per cent to 19.1 per cent.

2.   Corresponding to any portfolio there will be a distribution of ex post returns: income y is the product of the return, R, and the wealth, w. Where R and w are independently distributed, the coefficient of variation of y exceeds that of w, so that the investment income method overstates the dispersion of wealth holdings (Atkinson and Harrison 1978: appendix VII).

3.   Applied to tabulated data, the method does not allow for variation in portfolio choices by individuals with the same level of wealth, such as those due to differences in the degree of risk aversion.

2.5 Conclusion

The non-survey data on the distribution of wealth described in this section are subject to a number of qualifications. None of the sources is ideal. Nonetheless, they all seem well worth investigation. If, as in this paper, we are interested in the concentration of wealth among the rich, then they may be more informative than household surveys. Davies and Shorrocks (2000: 664), in their review of alternative data sources, conclude that 'estate and wealth tax data probably yield more reliable information on the upper tail of the distribution'.

3   The rich in the twentieth century

I now consider what can be learned about the rich from these four sources, referring first to the global distribution, and then to the distributions in individual countries, evidence being presented for the USA, Germany, France, and the UK. It should be noted that we do not have statistics for all four countries from all four sources, and that no cross-country comparison is possible of the levels of concentration. At the country level, the paper focuses on the changes over time.

3.1 Evidence from lists of named wealth holders: the world and the USA

It is natural to start with the *Forbes Magazine* list of 'The World's Richest People' (Kroll and Fass 2006). By taking the global population, we avoid the problems associated with identifying the geographical location of the rich. At the same time, as noted earlier, one of the problems in using this list is that, in some cases, family holdings are reported, rather than individual holdings. In what follows, no correction is made. In February 2006, this list consisted of 793 billionaires, with net worth of $1 billion or more. The total wealth of $2,645 billion is itself quite concentrated. A quarter of the 793 own 59.9 per cent of the wealth of the group; and just 42 own a quarter of the total. The Gini coefficient for the population of billionaires is 46 per cent.

Figure 1 shows the cumulative distribution, with the logarithm of rank on the vertical and the logarithm of wealth (in billions) on the horizontal. The right hand part reflects the sparseness of the data. Bill Gates and Warren Buffett (number 2) stand out. If the distribution were exactly Pareto type I, there would be a linear relation, with downward

slope given by the Pareto coefficient. Judged by eye, the fit does not appear good. The partisans of the Pareto distribution may reasonably say that it cannot be expected to fit well where people are sparse. On the other hand, if we exclude the top 50 (broadly above $10 billion), as indicated by the vertical line in Figure 1, there remains a distinct downward curvature of the line. Such a downward curvature has been found in other wealth studies: see, for example, the UK estate data in Shorrocks (1975: figure 1). If, however, we consider only US billionaires in the *Forbes* list, then the downward curvature is not observed.[13]

Figure 1: The world's billionaires (*Forbes Magazine*) 2006
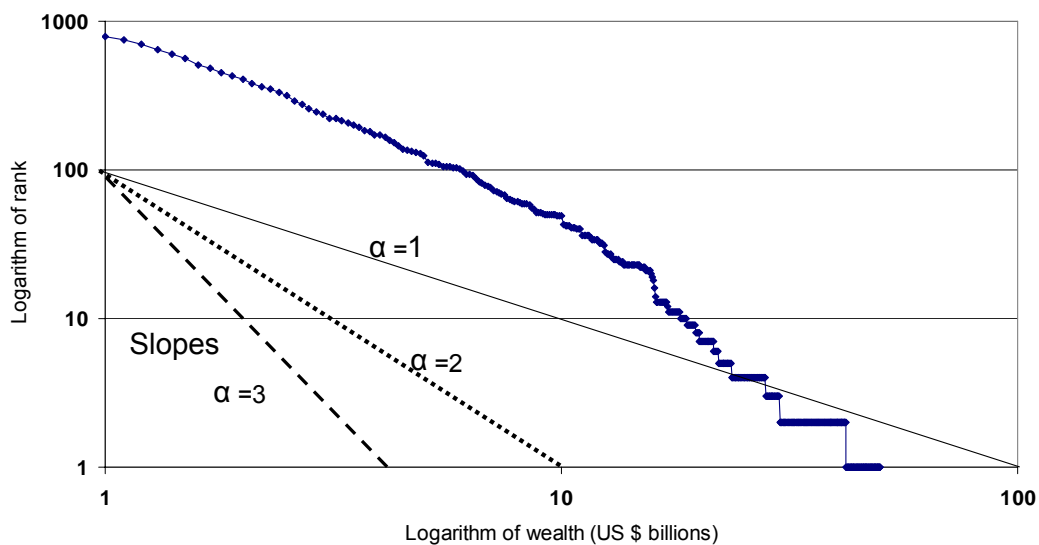
An alternative representation is provided by Figure 2, which shows the mean wealth above (MWA) ratio curve, where attention is restricted to those with $20 billion or less (this means that the top 7 people are not shown, although their wealth is included in the calculation). The ratio is not constant but falls with wealth. Starting from a value of around 3.3, corresponding to a Pareto coefficient of 1.43, the ratio converges downwards to a value around 1.5, which corresponds to a Pareto coefficient around 3. In other words, the implied Pareto coefficient rises. One obvious first approach to modelling this convergence is to take the Pareto Type II distribution, where the ratio is given by the limiting value times $(1+ B/W)$, where B is a constant.[14] As however is shown by the illustrative curve in Figure 2, a value of B that is consistent with the initial values implies a faster initial convergence than observed in the data.

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13 I owe this point to Tony Shorrocks.

14 For references to Pareto distributions Types I and II, see Atkinson and Harrison (1978: 314-15).

Figure 2: Ration to W of mean wealth above W among world billionaires 2006
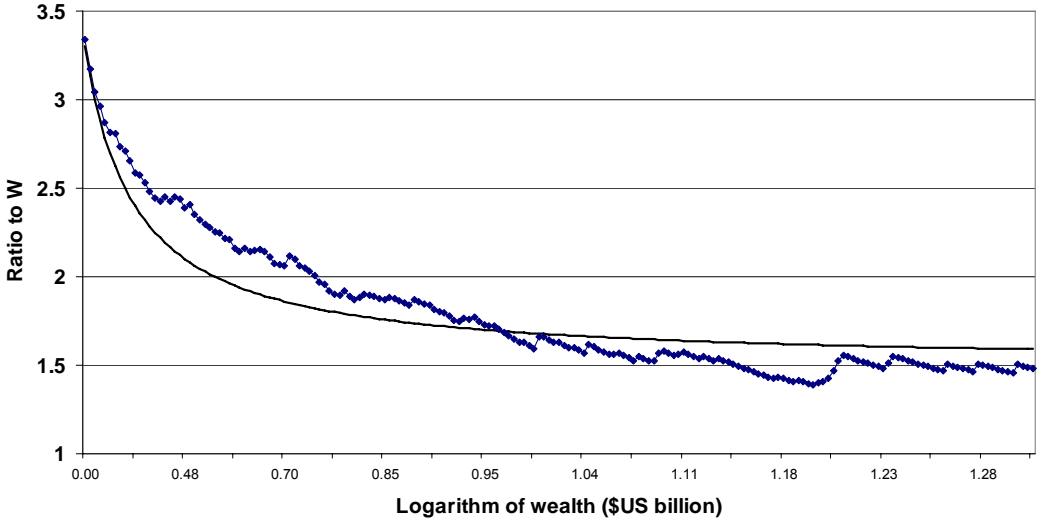
One of the attractions of the journalists' lists is that we can see who is who in the upper tail. Inspection of the *Forbes* list of world billionaires suggests that those at the very top are largely self-made. Bill Gates has topped the list for twelve years, and others in the top 25 in 2006 include Paul Allen, Steven Ballmer, Michael Dell and Lawrence Ellison, with Sergey Brin and Larry Page of Google at numbers 26 and 27. But also near the top is Lakshmi Mittal, whose father was also a successful businessman, and the Thomson and Walton families, the Rausing daughters, and the Duke of Westminster, where wealth was inherited. In the latter case, the origins of the family's wealth date back to the sixteenth century. While self-made fortunes may appear to dominate the list, and while some of those at the top have given away substantial parts of their fortunes to charitable foundations, inheritance remains an important mechanism.

Nearly half of the world's billionaires are USA residents, and they correspond quite closely to the 400 richest Americans who feature on another *Forbes* list (*400 Richest Americans*) that has been published annually since 1982. These data have been considered in a number of US studies to examine their coherence with other sources of evidence. Here I simply consider the list on its own terms. To this end, I make use of the table prepared by Kopczuk and Saez (2004a: table C2), where they calculate the shares in total USA wealth of the top 100 and top 400. Here I am interested not in their shares of total wealth, but in their *relative* shares; i.e., the degree of concentration within the very rich. Figure 3 shows the change over the past 20 years in the share of the top quarter of the 400 richest Americans—their share rose from around a half at the start of the 1980s to around two-thirds today. As Kopczuk and Saez bring out (2004a: 31), the top 100 have pulled ahead quite markedly. The implied Pareto coefficient has fallen from around 2 to around 1.4.

Figure 3: Relative share of top 100 in wealth of top 400 richest Americans
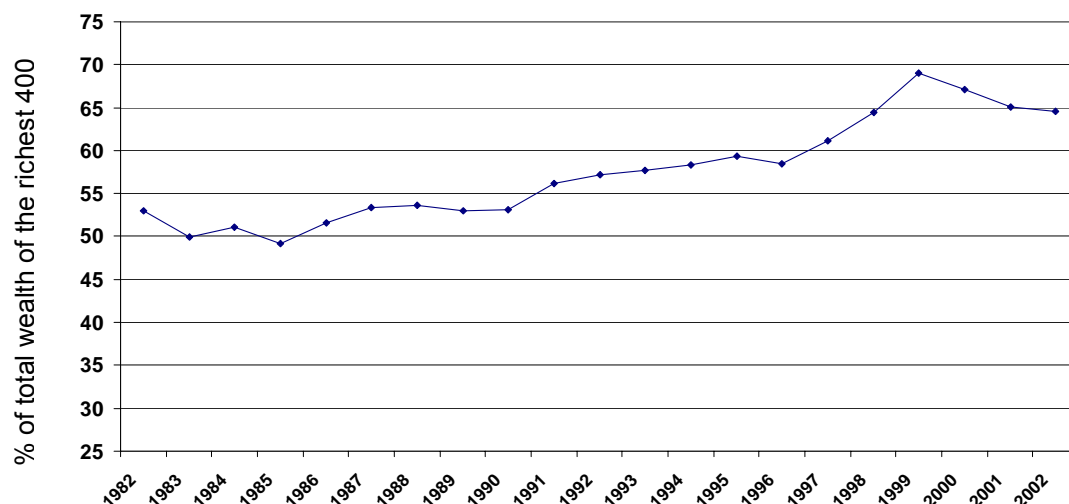
3.2 Evidence from wealth tax data in Germany

Those in the *Forbes* list for the US are mostly 'mega rich' on my definition and all are 'super rich'. I now descend to the level of the merely rich, defined as having more than 30 times mean income per person, and consider the evidence from the wealth tax data for Germany, covering the former German Reich 1924-35 and West Germany for the period 1953-95.

Wealth tax data, as noted in Section 2, are subject to a number of shortcomings. In the case of Germany, the merits of the wealth tax data have been extensively reviewed by Ring (1998), who draws a careful comparison with other sources, notably the income and expenditure survey: the Einkommens- und Verbrauchsstichprobe (EVS).[15] The wealth tax data cover only a small fraction of the population: the official estimate is that in 1989 the statistics covered 3.4 per cent of households (Schöffel 1993: 752).[16] As noted by Föhl (1964: 44), this limits any analysis of the wealth tax data to larger wealth holdings, but this is precisely the group with whom I am concerned in this paper. The wealth tax data have the advantage of being readily available: the German data used below are published in the *Statistisches Jahrbuch,* or in *Wirtschaft und Statistik,* or in the special series of *Finanzen und Steuern* dealing with the wealth tax (Fachserie 14).

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[15] The EVS data on wealth are used by Hauser and Stein (2003) in their study of the distribution of wealth in Germany for the period 1973-98.

[16] The comparison is with the Mikrozensus of April 1989. Ring (1998: 166) gives the percentage covered from 1953 to 1993. The lowest value is 1.85 per cent in 1974; the highest 3.84 per cent in 1993.

Furthermore, the data require no further manipulation to arrive at estimates of the distribution of wealth.[17]

Figure 4: Wealth concentration in Germany 1924-95
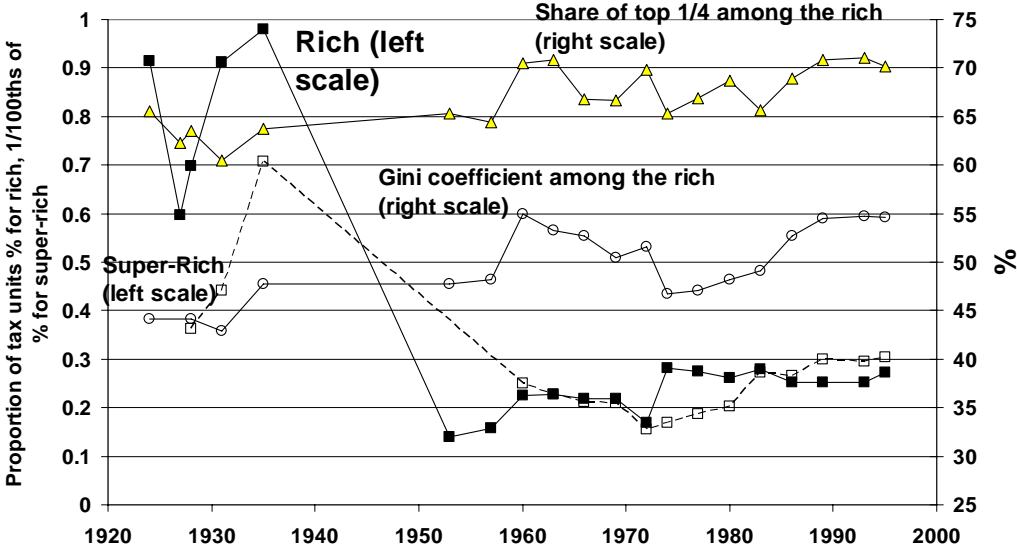
The wealth cut off applied to the German data in this paper is 30 times the mean income per tax unit. For 1995, the last year for which the data exist, the cut off is around €700,000 DM per tax unit.[18] In 1924, the first year for which data are used below, it meant wealth in excess of some 50,000 Reichsmark. For the super rich, the cut off is thirty times these figures. Figure 4 shows on the left hand axis the proportions of rich and super rich in Germany, the latter being measured in 1/100ths of per cent (basis points), and two measures of concentration, measured on the right hand axis. The proportions of rich and super rich were higher in the pre-war period, although it should be noted that this covered a different geographical entity. At that time, the rich constituted about 1 per cent of tax units. In 1953, the proportion classified was 'rich' was under 0.15 per cent, but the figure increased over the next 40 years to approximately 0.3 per cent. The main increase took place in the 1950s and up to 1974; after 1974 the proportion rich remained broadly stable.

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[17] Apart from interpolation In the case of the super-rich calculations, this has in some cases involved extrapolating the top open interval; this has only been done where the cut off is less than 50 per cent higher than the starting point of this interval. The Gini coefficient is not calculated where there are fewer than 4 points.

[18] The mean income per tax unit is taken from Dell (2007). The figures for West Germany for 1993 and 1995 are extrapolated from the growth over time in those for unified Germany.

The scale for the proportion of super rich is 100 times that for the rich, and the closeness of the graphs indicates that the super rich were about 1 in 100 of the rich. With a wealth difference by a factor of 30, this would be consistent with a Pareto distribution with exponent about 1.35, indicating a high degree of concentration. The share of the top 25 per cent, and the Gini coefficient among the rich (calculated where there are 5 or more points on the Lorenz curve), shown in Figure 4 bear out that there was a high level of concentration. A Gini coefficient of 55 per cent, as found for 1960 and 1989-95, corresponds, with a Pareto upper tail, to a Pareto coefficient of 1.4. The share of the top quarter is around 70 per cent. Over time, there have been clear changes. Concentration in the early 1950s was similar to that in the German Reich. It then rose up to 1960; it fell in the 1960s and early 1970s, before rising again over the last 20 years.

Figure 5: Mean wealth above ratio Germany 1928-95
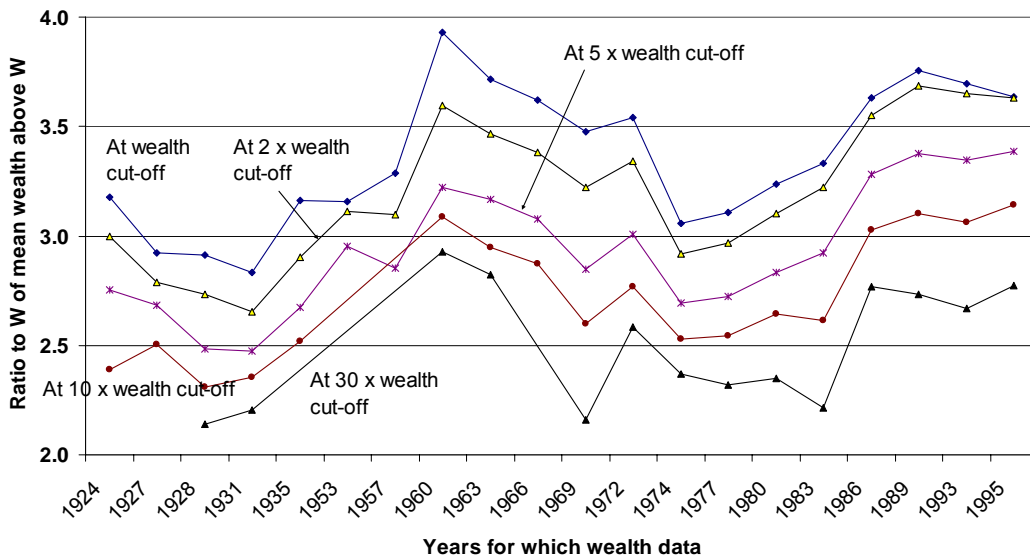
The distribution is not necessarily closely approximated by the Pareto distribution. An indication of the closeness of fit is provided in Figure 5 by the ratio to W of mean wealth above (MWA) at different values of W: the cut off W*, 2W*, 5W*, etc. Reading the curves vertically, we can see that the MWA ratio falls steadily as we move to higher levels of wealth. The implied Pareto coefficient rises. For example, in 1980, the ratio is 3.23 at W*, corresponding to a Pareto coefficient of 1.45, whereas at 30 times W* (the threshold to be super rich), the ratio is 2.35, corresponding to a Pareto coefficient of 1.75. Reading Figure 5 horizontally, we can see even more clearly the wave-like motion. Up to 1960, there was a rise in concentration; there was then a reversal up to 1974, after which concentration again increased. It may also be noted that concentration, measured this way, is higher in the 1990s than in 1953 and higher than for the German Reich.

It is interesting to compare these findings with those of earlier studies for Germany using the wealth tax and other data. Ring, who provides a summary of studies up to 1992 (1998: 209), shows a graph (p. 233) for the shares of the top 0.5 per cent, 1 per cent, 1.5 per cent and 1.7 per cent that moves over time in the same wave-like fashion as Figure 5.[19] As he notes, in the decades after the Second World War, Germany did not exhibit the decline in wealth concentration observed in other countries. There was a decline from 1960, followed by a rise after 1972. On the other hand, the total shares, influenced by the spread of popular wealth arising from increased prosperity, end up at around their 1953 level, whereas our measures of wealth concentration among the rich are distinctly higher.

3.3 Evidence from estate data

Use of estate data to estimate the distribution of wealth involves additional assumptions, but the method has long been applied successfully. In the USA and the UK, it provides one of the major sources of evidence about the distribution of wealth, in that the estimates cover a long run of years. The recent study by Kopczuk and Saez (2004a, b) for the USA covers the period 1916 to 2000; the estimates of Atkinson and Harrison (1978) for the UK start in 1923. Here I make use of the Kopczuk and Saez estimates for the US, concentrating on the period since 1945 (the coverage of the estate data before then is less extensive, and does not extend to all the group defined as 'rich' according to the criterion adopted in this paper).

The estimates of Kopczuk and Saez show that the share of the top 1 per cent in total wealth declined up to 1949, when it was around 22.5 per cent. It then recovered slightly, reaching 25 per cent in the 1960s, before falling to less than 20 per cent in 1976. It then rises again back to around 22 per cent in the early 1980s, but after that remains 'remarkably stable' in the 1990s (Kopczuk and Saez 2004a: 8). It is indeed remarkable, since the top *income* shares rose substantially over this period. Part of the explanation is, however, to be found in the fact that wealth-holdings as a whole have increased, relative to total personal income. This is picked up by the measure adopted in this paper, since it is based on a wealth cut off defined relative to mean income. If all wealth holdings are increasing faster than income, then the shares may remain constant, while the proportion of rich, and super rich, is increasing.

As may be seen from Figure 6, this is what appears to be happening. Figure 6 shows the proportions of rich and super rich in the USA,[20] the former being shown by the solid

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[19] Hauser and Stein show results for 1973-98, but these do not cover groups smaller than the top 10 per cent.

[20] The mean income per tax unit is taken from Piketty and Saez (2007: Table A.0), divided by 1.5 to give an individual income figure used here. The definition of income excludes capital gains and is expressed in 2000 prices. The wealth data are interpolated from Table B2 in Kopczuk and Saez (2004a); i.e., using the thresholds 2 per cent, 1 per cent, 0.5 per cent, etc. and the mean values implied by the wealth shares. The

squares and lines, and the latter by hollow squares and dashed lines. As for Figure 5, the scale for the proportion of super rich is 100 times that for the rich, and the position of the graphs indicates that the super rich were about 1 in 200 of the rich. With a wealth difference by a factor of 30, this would be consistent with a Pareto distribution with exponent about 1.55. The percentages of rich and super rich behave rather differently from the top shares. The decline in the 1960s and 1970s is more evident. In 1960, some 1.75 per cent of US adults are classified as rich according to the criterion adopted here; by 1982, this had fallen to 1.25 per cent. The super rich had fallen from 1 in 12,000 in 1960 to 1 in 25,000 in 1982. In the recent period, there is the same rise in the 1980s, but it continues in the 1990s. At the beginning of the 1990s, the super rich were 1 in 14,000; at the end of the decade, they were 1 in 11,000.

Figure 6: Wealth concentrations in the USA 1946-2000
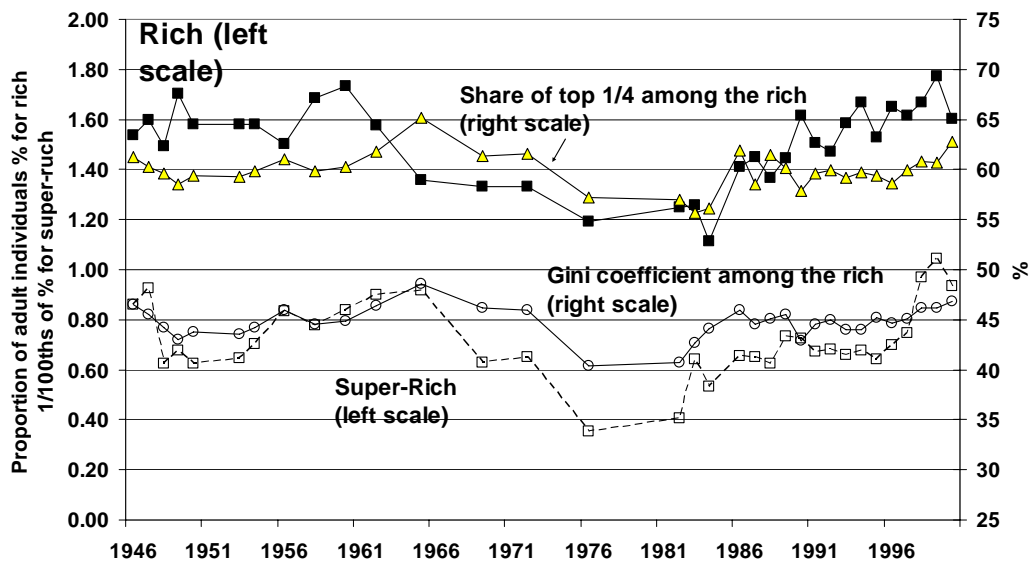
Judged in relation to the aggregate economy, top wealth holdings have been becoming more dominant in the USA. Moreover, as noted by Kopczuk and Saez (2004a, b) and shown by the *Forbes* evidence, among the rich, wealth is becoming more concentrated. Figure 6 shows on the right hand axis the percentage of the wealth of the rich owned by the top quarter. This began around 60 per cent, and rose from 1950 up to the mid 1960s; there was then a fall in concentration, reversed from 1982. The Gini coefficient among the rich shows a similar pattern. In 1965, the Gini was 48.6 per cent; it fell to 40.4 per cent in 1976, and then rose, reaching 46.9 per cent in 2000. This may not seem a large rise, but it means that the implied Pareto coefficient fell from 1.74 to 1.57.

numbers of rich and super rich are expressed relative to the population of adults (defined as aged 20 plus). The data for 1985 are not used as they appear to lead to implausible results.

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In the German wealth tax data, we saw the distinct tendency for the Pareto exponent to rise with W, or for the mean wealth above W to fall with W. The mean wealth above ratio for the USA is shown in Figure 7. This demonstrates the same movement over time in concentration, with the ratio tending to rise in the 1950s and the first part of the 1960s, and then to fall. From 1982, there is an upward trend, indicating increased concentration. On the other hand, the evidence obtained by reading the graph vertically is different. It is true that in the early period, there is a definite downward movement as we move to higher wealth levels (for example comparing those above the wealth cut off, with the mean wealth above 20 times the cut off), but this ceases to be the case as we move to later years. In the recent period the lines are much closer together and cross. In this period, the Pareto distribution appears to provide a better fit than in the German case. The mean wealth above ratio is close to 2.7, corresponding to a Pareto coefficient of 1.6.

Figure 7: Mean wealth above ratio USA 1946-2000
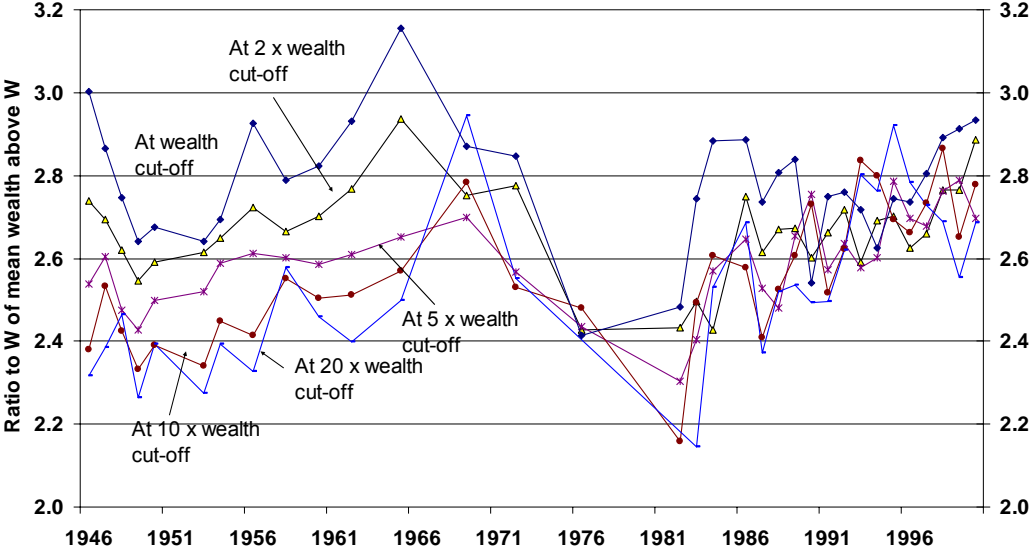
I turn now to the evidence for France. As noted earlier, these estimates relate to *estates* rather than wealth holdings. They are limited in their coverage of the period since 1964 and are also limited in the number of ranges for certain years, which means that neither the proportion super rich nor the Gini coefficient can be calculated for those years. The data are used are those published by Piketty (2001), although I have used the total decedents aged 20 plus from Piketty et al. (2006). The wealth cut off is based on mean 'revenue fiscal' per tax unit, divided by 1.5, and adjusted by a factor 1/0.8 to convert from a net to gross basis. In 1994, most recent year covered, the cut off was FF3.2 million per person, or around €500,000 per person.

One of the advantages of the estate data for France is that they allow us to go back to the beginning of the twentieth century. Figure 8 shows how different was the period before the First World War with regard to the proportions rich and super rich, which

were much higher (above 3 per cent in the rich category) before 1913. Moreover, the super rich line was about twice as high as that for the rich, which, allowing for the scale being different by a factor of 100, means that the super rich were 2 per cent of the rich. After the First World War, they were reduced to 1 in a 100. In order to accommodate these larger differences, the scale in Figure 8 is smaller, ands it should be noted that the changes over time in more recent years in the proportion rich are quite large. The proportion recovered a part of the lost ground after the First World War, but then fell sharply again after the Second World War. During the 1950s and early 1960s, there was a further recovery. The degree of concentration, shown on the right hand axis of Figure 8, was much higher before the First World War. A situation where the top quarter of the rich own three-quarters of their wealth corresponds to a Pareto coefficient of around 1.25.

Figure 8: Concentration of estates in France 1902-94
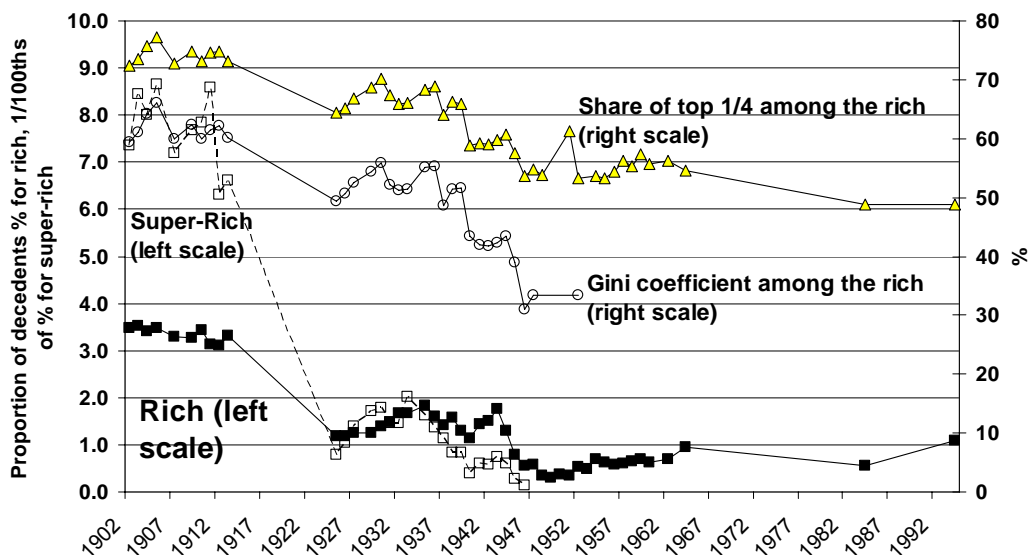
The shape of the distribution of estates in France is shown in Figure 9. This again shows the overall downward trend in concentration, with limited periods of recovery. When viewing the results vertically, the scale has to be borne in mind. There appears to have been convergence between the different MAR (mean above ratio) values but the differences remain much larger than in the US wealth data. In 1958, for example, the MAR values for 1 to 5 times the wealth cut off correspond to Pareto coefficients ranging from 1.7 to 2.1.

Figure 9: Mean estate above ratio France 1902-94
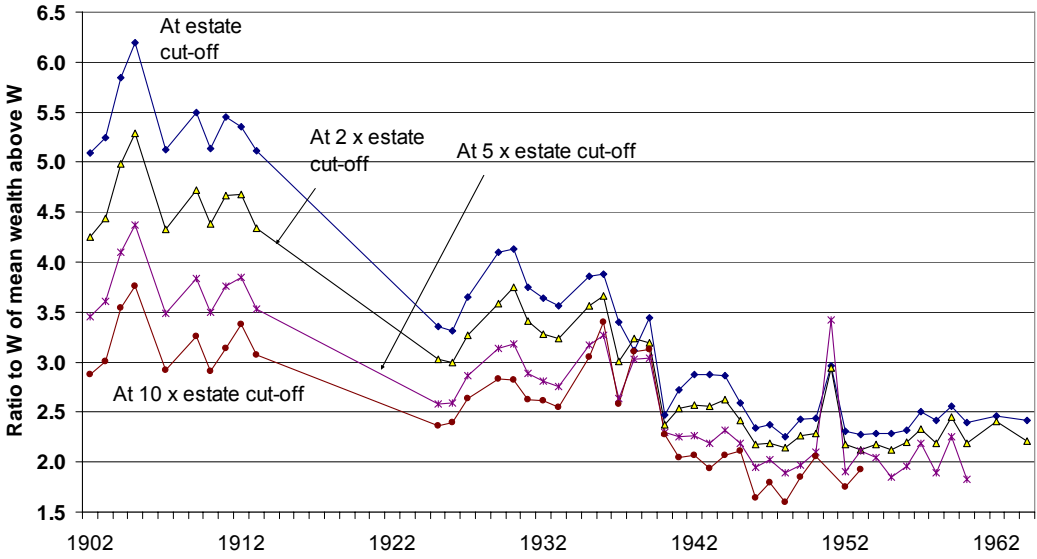
One merit of the estate data is that, coupled with the French inheritance laws restricting disposal of estates outside the family, we can see that substantial inheritances must have been taking place. In 1902, for example, there were 27 estates with mean wealth more than 9 times the threshold for the super rich category. Even allowing for equal division among several heirs, such sums allow a considerable role for inheritance.[21] Moreover, the estate documents have been preserved as microdata, a fact that has been exploited by Piketty et al. (2006) to explore the causes of wealth concentration from 1807 to 1994. They find that concentration increased until the First World War, largely driven after 1860 by the growth of large industrial and financial estates, accompanying a decline of aristocratic fortunes. The subsequent decline was caused by the First World War and the ensuing shocks. In the UK, there has been a long tradition of using the estate records to examine the sources of individual fortunes, dating back to Wedgwood (1928, 1929). Given the freedom of bequest in the UK, particular attention focused on the division of estates. Wedgwood found that 'among the very wealthy, equal division … is not the general rule' (1928: 48). On the other hand, Menchik (1980) found in the USA that in most cases there was equal division. The same source allows the pattern of marriage to be investigated. In the UK, Harbury and Hitchens (1979: 96) found that 'approximately 60 per cent of rich sons (daughters) of rich fathers marry daughters (sons) from wealthy families'.

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[21] See Piketty (2001: appendix J) for references to the (limited) statistical information on the division of estates by parts.

3.4 Evidence from investment income data

Investment income data have been relatively little used for the purposes of estimating the distribution of wealth. In part, this reflects the paucity of such data. The UK is one of the few countries to have published distributions of investment income over a long run of years. These data, which start in 1948, come from the surtax data and from the Survey of Personal Incomes (SPI). The surtax data have the advantage of being annual, but they end in 1972 with the merging of surtax into the general income tax; the SPI is a survey of all income tax records, but was only carried out every 5 years before 1962 (when it became annual) and tabulations of investment income have not been published since the 1970s. The two sources also differ in the extent of detail provided. The SPI do not typically provide a great deal of detail on the upper ranges. On the other hand, the surtax data relate only to those tax units assessed to surtax, so that we can only 'read back' to the distribution of investment income for those people with total income above the surtax threshold. To be eligible to pay surtax in 1948-49, when the investment income figures were first published, a tax unit had to have total income in excess of £2,000 a year (some six times average income). This means that, although ranges are given for investment income of, say, £500-£1,000, this information is incomplete, since there were people with investment incomes in this range who did not pay surtax. In what follows, I use the surtax data, but only consider ranges of investment income in excess of £2,000 per year (or the appropriate figure in other years).[22]

In part, the relatively little use of the investment income method reflects the problems described in Section 2. Davies and Shorrocks (2000: 642) emphasise the sensitivity of the resulting distributional estimates to the coverage of assets and the underlying assumptions. We need however to distinguish between, on the one hand, the sensitivity of the overall wealth shares or the proportions rich, and, on the other hand, the concentration among the wealthy, which is the principal concern of this paper. Taking the UK results of Atkinson and Harrison (1978: table 7.3a) for those with investment income in excess of £3,000 (approximately five times mean tax unit income), we can examine the sensitivity of the ratio of concentration by comparing the findings with their estimated yield multipliers and those applying a common multiplier. For 1968, the top quarter of this group are estimated to own 51.2 per cent of total wealth using the varying yield multipliers and 49.2 per cent with a common multiplier. These appear close.

For the present application, we have also to bear in mind that the selected cut off for the rich population was motivated by reference to mean income. This means that a different

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[22] The threshold for paying surtax was £2,000 per year in 1948-49 and remained at this level until 1969-70, when it effectively became £2,500, raised to £3,000 in 1971-72. There were changes in the allowances that could be set against taxable income before calculating surtax liability. From 1956-57, taxpayers could deduct the excess of certain personal allowances over the single person's allowance, so that for a married couple the effective threshold was raised to £2,100. This was treated as sufficiently small not to be taken into account.

choice of level for the yield multiplier could also be construed as implying a correspondingly different cut off. In the light of these considerations, I have opted here to work directly in terms of investment income, sidestepping the problems associated with the choice of yield multiplier. The 'rich' are taken to be those that have investment income in excess of mean income. Although, given that the surtax data cover only a fraction of the population defined as 'rich' according to the criterion adopted in this paper, I work with a 'rich plus' group, defined as tax units who have investment income in excess of 7½ times the mean overall income.

Figure 10: UK concentration of wealth 1949-60: investment income method
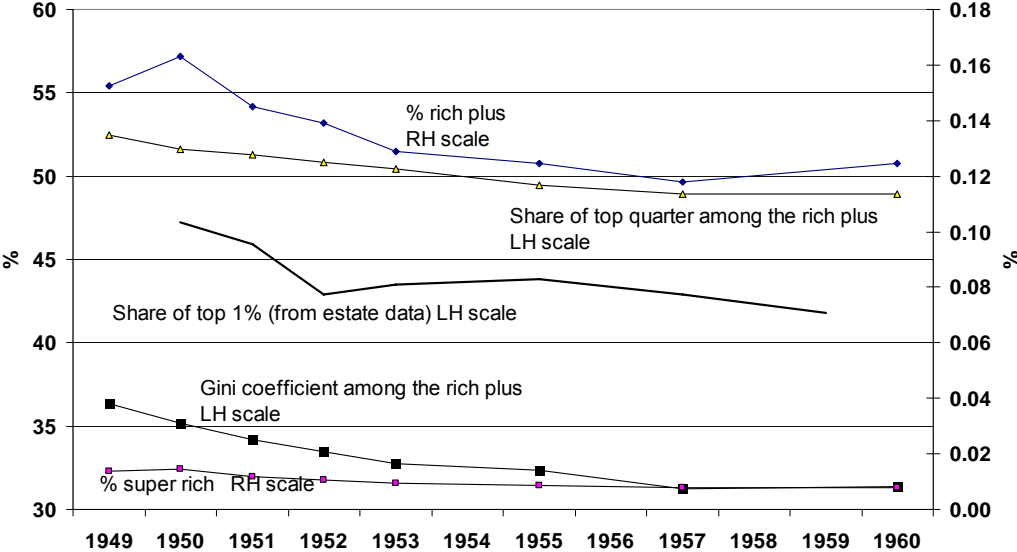
The surtax data provide evidence for the period 1949-72.[23] Here I consider 1949 to 1960. This period is of interest, since top wealth shares in the UK fell considerably—the estimates of Atkinson et al. (1989: table 1) show a fall from 1950 to 1959 of more than 5 percentage points (see the line without markers in Figure 10). It is therefore interesting to ask whether there was a comparable fall in the degree of concentration among the rich. Was the falling share of the top 1 per cent simply a reflection of the increased post-war affluence of the remaining 99 per cent? Figure 10 shows the estimated proportions of 'rich plus' (those with investment income more than 7½ times overall mean income) and super rich (defined as before). Both of these fell quite markedly: the proportion super rich nearly halved. Figure 10 also shows that the degree of concentration among the 'rich plus' fell over the period. The Gini coefficient, calculated just for this group, was around 36 per cent at the beginning of the 1950s but had fallen by 5 percentage points by 1960. The limiting value of the Pareto coefficient had been around 2 but rose to 2.2 by 1960. There was definite a reduction in

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23 Data exist for the tax year 1948-49, but there appears to be a problem with the classification by ranges, as the implied means lie outside the ranges below £4,000. I have therefore used the data from the tax year 1949-50. In each case, the tax year 19xx-19xx+1, starting in April 19xx, is referred to as 19xx.

concentration among the rich plus group during this period of progressive income and estate taxation.

4   Summary of evidence and towards explanations

In this paper, I have looked at the distribution of wealth through a particular lens, focused on those with wealth sufficient to place them in a very advantageous position relative to the average income recipient. I have presented evidence, not in the form of the more usual analysis of the share of the top x per cent in total wealth, but in terms of the proportion 'rich' and 'super rich', defined as having wealth at least 30 times, or 30 x 30 times, average income. Moreover, I have considered not just the number of rich, but also the distribution *within* this group: for example, the Gini coefficient among the rich. For this purpose, household survey are of limited use, and I have concentrated on what can be learned from wealth tax data, estate data, investment income data, and from journalists' lists. These sources are subject to a number of qualifications, which have been summarized in Section 2, and they are not easy to compare across countries, but the data seem well worth investigation, and allow a long-run perspective.

The first finding is that wealth among the rich is indeed highly concentrated. Of the 793 world billionaires on the 2006 *Forbes* list, just 42 own a quarter of the total wealth of this group. The Gini coefficient for the population of billionaires is 46 per cent. Within individual countries, the Gini coefficient among the rich is close to 50 per cent in Germany (wealth tax data) and the USA (estate data based estimates of wealth). Among estates in France, the share of the top quarter was around half, and the same was true in the UK in 1960 for the share of investment income received by the top quarter.

The second finding is that there have been major changes over time. The estate data for France show that the rich constituted a much larger fraction of the population before the First World War, and that the concentration within this group fell. The same French data show that there was equally a major decline between the 1930s and the period after the Second World War. For Germany, there was a fall in the proportion rich, but no apparent decline in concentration, between the German Reich of the 1930s and the post-war Bundesrepublik. The changes over time are not indeed the same across the four countries. The 1950s saw, in the UK investment income data, a fall in the proportions rich plus and super rich, and a decline in concentration. The other three countries saw a rise in these proportions and in wealth concentration. In the past two decades, the (limited) evidence for France does not suggest a rise in the proportion rich or in concentration. In contrast, in the USA there has been a clear rise in the proportions rich and super rich, and a rise in the Gini coefficient among the rich. This casts a rather different light on the evidence of stability in top wealth shares described by Kopczuk and Saez (2004a) as 'remarkable'. It reflects the fact that we are here defining the cut off in relation to average incomes, and, judged in relation to the aggregate economy,

wealth holdings are becoming more important. Moreover, as these authors note, using the *Forbes* list, the degree of concentration among the rich has increased.

The third main finding concerns the shape of the distribution. While it is certainly reasonable to treat the distribution as having a Pareto upper tail, it is not necessarily a good approximation for the group of rich wealth holders considered here. The mean wealth above curves drawn for France and Germany indicate an increasing Pareto exponent (declining concentration) as we move to higher wealth levels. Even with the mega rich group of world billionaires in the *Forbes* list, the distribution only approaches the Pareto distribution in the limit. However, the USA has become an exception in recent decades, in that the Pareto distribution provides a better approximation. It may be the case, as noted for the *Forbes* list of billionaires, that the US distribution has acquired a different shape.

The fourth, suggestive, finding is that the upper part of the wealth distribution appears to be a subtle blend of self-made fortunes and those acquired through inheritance or marriage. This can be seen from the *Forbes* lists and from microdata studies based on estate records. These sources would repay further investigation.

4.1 Towards explanations

In 1907, the American Economic Association published a study 'The Growth of Large Fortunes' (Watkins 1907: 1). The author noted that 'The nature and causes of the wealth of nations' have long been subjects of scientific interest … But it is time that the causes of the welfare and "fortune" of individuals should receive a share of attention … No thorough study of the general subject of large fortunes has yet been made. It is necessary, therefore, to study not merely concrete conditions, but also general causes and underlying general principles'.[24]

Watkins goes on to argue that 'ours is an age of new and striking characteristics' in that the origin of large fortunes, in contrast to the past, are economic rather than political: 'modern great fortunes … have come as a phase of a beneficent process of industrial and commercial development … It is an obvious inference that their appearance is probably correlated with our modern developments in technology and industrial organization' (1907: 3). In an analysis that has many resonances today, he cites the impact of world trade 'formerly isolated and outlying communities and countries, from Ceylon to the edge of the one-time "great American desert", have been drawn into the swirl of exchange … The opportunity of the business man in any line to profit by value-increase is multiplied by the increase in the breadth and in the number of exchanges' (1907: 62-63). Watkins similarly identifies the role of technological progress: 'prices of products do not fall so promptly as cost of production, and their tardier fall gives the

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[24] For more recent reviews of the literature on the explanation of the distribution of wealth, see Jenkins (1990) and Davies and Shorrocks (2000).

gain, in the first instance, to the entrepreneur. The consumer and labourer come in for their share later, meanwhile often leaving a very great margin of profit to the entrepreneur, which he gives up only gradually, as forced to by competition. Or monopolistic devices may sometimes enable him to retain it indefinitely. Thus great advances in production are favourable to the acquisition of riches' (1907: 107).

These forces of technological change and globalisation may be expected to have left their mark on the distribution of self-made fortunes. The list of the rich is in part a mirror of economic history: railway and steel magnates and brewers were replaced by people like Henry Ford, Lord Nuffield, and John Paul Getty, who have in turn been replaced by those who made their money as a result of the ICT revolution. Rubinstein (1971) classified the industrial origins of British fortunes as 'old' (agriculture, textiles, etc.), 'intermediate' (brewing, engineering, etc.) and 'new' (retail, newspapers, property, etc.), and showed how there had been a steady shift towards industries that were growing more rapidly.

How can these mechanisms be formalized? Consideration of the origins of such fortunes suggests that many are made in 'winner take all' markets (as is evidenced by the fact that I am writing this paper using Microsoft Word, not WordPerfect which I used ten years ago). A natural starting point is therefore to model them as an extreme value distribution. If we consider only values that exceed some threshold, then, for sufficiently high values of the threshold, the extreme value distribution has the generalized Pareto form (see, for example, Coles 2001: 75). But this in turn needs to be related to the underlying micro-economics of entrepreneurship. The distribution of prizes is not necessarily exogenous, and may be influenced by the number of incipient entrepreneurs and the degree to which they pool their activities. A promising model of this kind has been proposed by Shorrocks (1988), who distinguishes two stages of entrepreneurship (low and high risk), where success at the first stage is necessary to enter the high stakes stage. The relationship between self-employment and wealth inequality is examined empirically for Sweden by Lindh and Ohlsson (1998).

When, to the distribution of current self-made fortunes, we add those created in previous generations, we have to allow for accumulation and decumulation. Self-made fortunes do not simply continue unchanged. From the total stock of those created in the past, we have to subtract those that have disappeared completely, as with the collapse of a business empire or where a fortune is left at death to charity. People may build on the fortune through further accumulation or entrepreneurial activity. Their capacity to do so depends on the extent and effectiveness of progressive income and wealth taxation. Fortunes may be eroded through division among a number of heirs, or augmented through marriage. Again, progressive estate or inheritance taxation may cut wealth transmission, or provide incentives to distribute wealth more widely. These factors are investigated by, among others, Meade (1964) and Blinder (1973). The resulting distribution depends on the balance of these influences. They are not however

necessarily exogenous. There may be feedback from the distribution of wealth to the aggregate economy, affecting the rate of return and the growth rate. The model of Stiglitz (1969) provides an example. He assumes that 'new' wealth is created each generation and that all estates are equally divided. The evolution of inherited wealth then depends on whether the rate of accumulation (which depends on the rate of return) less the rate of division is greater or less than the rate of growth of the economy. He shows that, with a standard aggregate production function, aggregate wealth converges to a level where savings out of inherited wealth cannot keep up. We would then observe a distribution where inherited wealth became progressively less important as we move up the rich list.

Appendix

Table A1: Sources of wealth tax data: Germany

Year	Source
1924	SJ 1927: 477
1927	W+S 1929: 765
1928	SJ 1932: 508-9
1931	SJ 1936: 490
1935	W+S 1937: 692
1953	SJ 1959: 388
1957	W+S 1960: 642
1960	SJ 1963: 440-1
1963	SJ 1966: 458
1966	SJ 1969: 408
1969	F+S 1972: 60-61
1972	F+S 1972: 22-3
1974	F+S 1974: 26-7
1977	F+S 1977: 24-5
1980	F+S 1980: 21
1983	F+S 1983: 21
1986	F+S 1986: 23
1989	F+S 1989: 23
1993	SJ 1997: 550-1
1995	F+S 1995: 21
	SJ denotes Statistisches Jahrbuch, W+S denotes Wirtschaft und Statistik, and F+S denotes Finanzen und Steuern Fachserie 14.

Table A2: Sources of investment income data UK 1949-1960

Year	Source
1949-50	AR 1950-51: 139
1950-51	AR 1951-52: 157
1951-52	AR 1952-53: 87
1952-53	AR 1953-54: 85
1953-54	AR 1954-55: 82
1955-56	AR 1956-57: 148
1957-58	AR 1958-59: 85
1960-61	AR 1961-62: 209
AR denotes *Annual Report of the Commissioners of the Inland Revenue*	

Data sources

World Billionaires (Figures 1 and 2): website of *Forbes Magazine*, downloaded 22 March 2006.

Richest Americans (Figure 3): Kopczuk and Saez (2004a: table C2).

Germany Wealth Estimates (Figures 4 and 5): wealth tax data from sources listed in Table A1.

United States Wealth Estimates (Figures 6 and 7): Kopczuk and Saez (2004a: table B2).

France Estate Estimates (Figures 8 and 9): Number of decedents aged 20+ from Piketty et al. (2006: table A5). Estate data from Piketty (2001: table J1). Average income per tax unit from Piketty (2001: table G2, col. 6).

United Kingdom Investment Income Data (Figure 10): investment income data from sources listed in Table A2.

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