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IZA DP No. 17389

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ABSTRACT

Evidence from the Dead: New Estimates of Wealth Inequality Using the Distribution of Estates*

This paper examines the estimation of the distribution of wealth using estates left at death. We establish formal conditions for implementing a simplified version of the classic estate multiplier method, relying solely on minimal information about estates and mortality. These conditions are empirically validated, and the simplified approach is applied to produce new long-run top wealth share series for Belgium, Japan, and South Africa, where estate data have previously been underutilized. This method holds potential for expanding the range of countries and years in which wealth concentration can be estimated, especially where estate data exist but the standard method with heterogeneous multipliers is inapplicable.

JEL Classification: D3, H2

Keywords: wealth inequality, estate tax, mortality rates, public economics

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1 Introduction

"Statistics on wealth distribution," wrote Atkinson (1978), "play a key political role" and they are "as sensitive an issue as the balance of payments or unemployment figures." However, from a quantitative perspective, our knowledge about the inequality of wealth at a global level is severely limited: individual or household data on private wealth holdings over reasonably long—or even short—periods of time are rare. In recent decades scholars have devoted major efforts to generate incremental methodological improvements and to get access to better data, thereby expanding coverage across countries and years. However, the overall picture remains highly incomplete, as reliable estimates are still predominantly limited to a few developed nations. As a result, directly estimating wealth inequality (that is, based on sources from personal wealth themselves) is often missing and judged unfeasible for many countries and years. Nevertheless, such estimates, particularly concerning top wealth shares, are increasingly important from both a normative perspective and for policy considerations, especially in light of recent debates and proposals regarding wealth taxation (Saez and Zucman, 2019; Advani, Chamberlain and Summers, 2020; Landais, Saez and Zucman, 2020; Guvenen et al., 2023; Jakobsen et al., 2024).[1]

Traditionally, five main sources of evidence have been used to examine the distribution of wealth: (i) household surveys, such as the Survey of Consumer Finances in the United States, or the Wealth and Asset Survey in the United Kingdom;[2] (ii) administrative data on personal wealth derived from wealth registers or wealth taxes;[3] (iii) administrative data on investment income, capitalized to yield estimates of the underlying wealth;[4] (iv) lists of large wealth-holders, such as the Forbes 400 list;[5] and (v) administrative data on individual estates at death, multiplied-up to yield estimates of wealth among the living through the estate multiplier method.[6]

Sample surveys, the first source, are a relatively recent development. While the earliest surveys of household finances in the United Kingdom and the United States were conducted in the 1950s, and in the 1960s in Italy, the Household Finance and Consumption Surveys (HFCS) of the European Union only began fieldwork in most member countries around 2010. This was also the case in a few middle-income countries (*e.g.*, Chile and Mexico). The second source relies on the existence of broad-based wealth taxes, which have always been infrequent. Where they have existed, they have often been progressively repealed. The third source, investment income data from income taxes, requires comprehensive taxation on capital incomes and the availability of compatible data formats; however, these conditions are currently met just in a few cases, such as the United States, France, or the Nordic countries. The fourth source, rich lists, is even more recent: the Sunday Times Rich List in the United Kingdom dates back to 1989, while the Forbes list in the United States began in 1982, for example. These lists are based on journalistic estimates, which can be prone to various errors, and the methodologies employed are typically not transparent and not subject to independent

[1] A number of open access databases, such as the UBS (formerly the Credit Suisse) Global Wealth Report and Databook, and the World Inequality Database, provide estimates of the distribution of personal wealth for most countries and over many years. It should be stressed, however, that the vast majority of these figures are not based on direct data from the distribution of wealth, but rather on correlations and imputations derived from income or even consumption data, or from neighboring countries and regions.

[2] See, *e.g.*, Kennickell (2019) and Kuhn, Schularick and Steins (2020) for the United States, Nolan (1991) for Ireland, and Pfeffer and Waitkus (2021) for 15 countries included in the Luxembourg Wealth Study (LWS).

[3] Examples include Alvaredo and Saez (2009) for Spain, and Epland and Kirkeberg (2012) for Norway.

[4] Examples are Saez and Zucman (2016) and Smith, Zidar and Zwick (2023) for the United States.

[5] See, for instance, Klass et al. (2006), Baselgia and Martínez (2024).

[6] Examples are Kopczuk and Saez (2004) for the United States, Atkinson and Harrison (1978), Atkinson, Gordon and Harrison (1989), and Alvaredo, Atkinson and Morelli (2018) for the United Kingdom, and Acciari, Alvaredo and Morelli (2024) for Italy.

evaluation.

The final source, individual estates (the net value of worldwide real and financial property of a deceased person) from inheritance and estate taxes, deserves particular attention. Given the scarcity of fundamental data from the other options, this source is the most widely available from a historical perspective: inheritance or estate taxes have been implemented at some point in a majority of countries worldwide since the 19th century, although the past decades have seen a shift away from them, especially in advanced economies.[7] As such, estate data have played a crucial role in expanding the scope of observation on the distribution of wealth through the estate multiplier method.

The rationale of the method is straightforward: the set of decedents is treated as a sample of the living, with each estate expanded by a multiplier (weight) equal to the inverse probability of death. This multiplier represents the number of living individuals who share the decedent's characteristics that determine mortality. Early works by Mallet (1908) and Mallet and Strutt (1915) were among the first to use this method to analyze wealth inequality in the United Kingdom at the beginning of the 20th century. In these early papers, applying multipliers differentiated by age and gender was seen as overcoming a "fatal" flaw of earlier analyses that had ignored mortality heterogeneity, since "the accumulated wealth of an individual increases with years [...] and is usually greatest when a man dies" (Mallet (1908), p. 67).[8] More recently, Saez and Zucman (2016) revisited this issue, and insisted on the fact that failure to properly account for the lower mortality of wealthier individuals may lead to significant underestimation of top wealth shares, a point already raised by Revell (1967), Atkinson and Harrison (1978), and others.

Indeed, because wealthy individuals tend to live relatively longer, higher multipliers have typically been applied to the upper estate ranges in the literature. The higher multipliers, resulting from *differential adjustments*, seem essential to avoid an under-representation of the number of the very rich as well as their wealth. Those differential adjustments have been based on social class, occupation, education, or housing wealth, but this is only an intermediate route to the variation of final concern: that with estate size.

This means that the application of the estate multiplier method requires the availability of detailed mortality data and comprehensive estate tables or microdata that, in addition to providing the distributional information, are differentiated by demographic characteristics (age, gender, *etc.*). Nonetheless, such granular data are uncommon. In most cases, estate data as produced and published by official bodies (an output of the administrative taxation process) are presented as simple tables organized by ranges of estate values, with no accompanying demographic covariates.[9] Likewise, mortality data are typically segmented only by age and gender alone, without incorporating other socioeconomic factors. These data limitations and requirements have significantly restricted the empirical application of the method to a small number of countries, in principle rendering much of the available information on the distribution of wealth and estates unusable.

From a theoretical standpoint, applying multipliers that adjust for differential mortality based on age, gender, and wealth may either increase or decrease wealth shares relative to estate shares. These adjustments can also influence the dynamics of the distribution of wealth, with the extent of these changes depending on how demographic and wealth profiles evolve over time. Recent research, however, has highlighted an important empirical and apparently counter-intuitive finding, indicating that the effect of differential multipliers is

[7] See, for instance, Scheve and Stasavage (2016) and Seelkopf et al. (2019).

[8] To be precise, here Mallet (1908) is citing Coghlan (1906) from a previous discussion at the Royal Statistical Society.

[9] Appendix A provides examples of published tables from the administration of estate and inheritance taxes in England, where data are broken down by age and gender; and in Belgium, Japan and South Africa, where only the distribution of frequencies and amounts by estate ranges is provided.

less straightforward than commonly assumed: estimates of wealth concentration among the living, derived through the mortality multipliers (even when including differential adjustments), neither significantly alter nor differ from the corresponding estimates of estates concentration obtained prior to the multiplication process required by the method (Alvaredo, Atkinson and Morelli, 2018).

This paper investigates why applying heterogeneous mortality multipliers may not significantly alter estimates of top estate shares, as usually assumed, and establishes the general conditions under which this holds true. We demonstrate that these conditions depend on two key factors, which are ultimately empirical: the correlation between wealth and mortality *at the top of the estate distribution*, and the distance between the population average multiplier and the mean multiplier *also at the top of the distribution*. When both factors are low (or compensate each other), the levels of wealth concentration among the living are expected to closely align with the levels of estate concentration (and thus the respective top shares). This allows for a simplified approach that relies only on average multipliers, even in the absence of decedents' demographic characteristics and detailed mortality rates.

We confirm that these conditions hold when analyzing existing series and reworking raw data for Australia, France, Italy, South Korea, the United Kingdom, and the United States, where inequality series from the estate multiplier method with heterogeneous multipliers are shown to be similar to those from the simplified approach with average multipliers. Subsequently, by means of the simplified approach, we produce new long-run top wealth share series for Belgium, Japan, and South Africa, as examples of the many cases where estate data have yet to be fully utilized due to the mentioned limitations of the statistics.

This paper contributes to different strands of the literature on wealth inequality. Concerning measurement, the potential of a simplified estate multiplier approach, when no other viable alternatives exist to produce estimates of the concentration of wealth, should not be understated. It unlocks a wide array of existing and so-far unexploited data on wealth holdings that do not allow for the application of the standard estate multiplier method. This, in turn, expands the range of countries and periods for which the concentration of wealth can be estimated—not only in past centuries but also in more recent decades. According to the data warehouse of the GC Wealth Project (Morelli et al., 2023), 56 countries around the world had a form of inheritance or estate tax in 2008, out of which 15 are low income and lower middle income countries (see also Asher et al. (2024) for more details). Given its modest data requirements, the simplified approach can thus be effectively implemented in such cases to estimate historical trends of wealth concentration. This paper makes explicit the assumptions underlying those applications, providing transparency for practical implementation and future research.

Empirically, we demonstrate the potential to significantly broaden the scope of wealth inequality estimation across countries and time periods. The new series for Belgium, Japan, and South Africa exhume valuable data previously considered ill-suited for such analysis.

The paper also contributes to a better understanding of the relationship between mortality and wealth. While the links between mortality and income has been studied extensively in some countries (Chetty et al., 2016), much less is known about how wealth influences mortality. Better understanding this relationship is crucial not only for the application of the method but also for informing policy decisions.

There is no perfect data source. Information about the estates left at death bears several problems and limitations, many of which are common to other administrative sources. These records are affected by tax avoidance, evasion, tax planning, different and varying valuation rules across assets, and the growing significance of gifts made before death (driven both by tax incentives and non-fiscal reasons, plausibly

including the rise in life expectancy, which may lead wealthy parents to transfer assets to heirs earlier). Acknowledging these limitations, this paper abstracts from them for three reasons: they have already been taken into account in the time series we borrow from existing empirical work; they affect all methods and can (and should) be addressed with ex-post adjustments, as is typically done in the literature; and they do not impact the main point under investigation.

The rest of the paper is organized as follows. Section 2 outlines the estate multiplier method, and compares it to the simplified approach both theoretically and empirically, using examples from Australia, France, Italy, South Korea, the United Kingdom and the United States. Section 3 establishes the formal conditions under which the estate multiplier method with heterogeneous multipliers produce similar estimates to the simplified approach with average multipliers, and we empirically test these conditions. Section 4 uses the simplified approach to produce new top wealth share series in Belgium, Japan, and South Africa. Section 5 concludes.

2 Estimating top wealth shares

2.1 The estate multiplier method

Detailed information on estates (the net value of worldwide real and financial property of a deceased person) has long been used to estimate wealth inequality. However, the distribution of the wealth of the living is conceptually different from that of the decedents. Death does not "sample" randomly the population: older individuals, males, and those from poorer backgrounds generally have higher mortality risks, all else being equal. Therefore, differential mortality multipliers should be used to convert the estate data into estimates of wealth among the living. Under the assumption that death is random within specific cells of observed demographic and social strata, it can be viewed as an effective sampling mechanism for the population.

The estate multiplier method (Mallet, 1908; Revell, 1967; Atkinson and Harrison, 1978) uses information on the wealth and the demographic characteristics of decedents reported to the tax authorities for the administration of inheritance or estate taxes. By re-weighting the decedent population with the inverse of mortality rates, it is possible to estimate the distribution of wealth of the living.[10]

Expressed in mathematical notation, we consider the population of N_E decedents and the total value of their estates, W_E, in a given year, obtained as the summation of all individual estates $w_{E,i}$ (arranged, for simplicity, in descending order, *i.e.*, $w_{E,i} \geq w_{E,j}$, if $i < j$).

We denote by $m_i \equiv \frac{1}{p_i}$ the mortality multiplier of decedent i, equal to the inverse of the individual mortality rate, p_i. Denoting the total (living) population as N, it follows that $N = \sum_{i=1}^{N_E} m_i$. Intuitively, m_i represents the number of living individuals corresponding to decedent i.

The average mortality multiplier, $\bar{m}$, is equal to the arithmetic mean of individual multipliers, and, naturally, it is also equal to N/N_E. Thus $\bar{m} = \frac{1}{N_E} \sum_{i=1}^{N_E} m_i = \frac{N}{N_E}$.

We aim to estimate the wealth share of the top quantile $0 < q < 1$. For instance, $q = 0.1$ corresponds to the top 10%, $q = 0.01$ corresponds to the top 1%, *etc.* The top q wealth share is then the share of the richest qN living individuals. To account for the total wealth of these qN individuals, we need to multiply up the estates of a certain number of the richest decedents by their respective multipliers. The value of these

[10] For a comprehensive presentation of the method, see Atkinson and Harrison (1978), chapters 3–6.

multipliers, however, determines the number of decedents required to account for the top q quantile among the living. For example, if the multipliers of wealthy decedents are higher relative to the average multiplier in the population, fewer decedents are needed to account for the top qN living individuals. Conversely, if the multipliers of wealthy decedents are lower, more decedents are required. The number of required decedents is represented by the index I_q, such that $\sum_{i=1}^{I_q} m_i = qN$.[11]

Under these assumptions, we define the top q wealth share (and the Lorenz curve from the very top to the top q percentile) as

$$Sh_q^W \equiv (1 - L_q)^W = \frac{\sum_{i=1}^{I_q} m_i w_{E,i}}{W}, \tag{2.1}$$

where W is the total worth owned by the living population.

Equation (2.1) represents the key expression of the method. It shows how knowledge of decedents' estates and their respective multipliers can be used to estimate the shares of wealth accrued by the top groups among the living.

Establishing W is not a minor matter. It can be either known from other sources (as an *external total*, *e.g.*, from national accounting), or estimated endogenously as $W = \sum_{i=1}^{N_E} m_i w_{E,i}$ (*internal total*), or determined in a hybrid way between internal information (by means of the estates identified in the data) and external information (to account for the 'excluded estates') if—as it is typical in empirical applications—only a fraction of decedents and estates are observed. The total wealth of the living and the aggregate estates are linked by the accounting identity $W \equiv \bar{m}\frac{1}{\mu}W_E$, where μ is the ratio between the average wealth of the deceased and the average wealth of the living.[12]

In practice, the universe of individual estates is rarely observed, as the coverage of estate and inheritance taxes is limited to a fraction of decedents. For example, in the United States, in 1921, the estate data covered 1% of adult deaths. By 1976 this had risen to 7.6%, and by 2000 it had fallen back to 0.5%. Today only about 0.4% of deaths are captured, half of which are taxable returns, *i.e.*, 2 out of 1,000 estates owe some tax. In the United Kingdom, the data for 1895 covered some 13% of decedents; 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. This figure is 10% in Japan, and 60% in Italy. The upshot is that those who are captured in the data are the richest among the deceased.

2.2 A simplified estate multiplier approach

The application of the estate multiplier method, as described above, depends on the availability of detailed mortality data. It also requires comprehensive estate tabulations or microdata differentiated by demographic characteristics (age, gender, *etc.*). That said, such detailed data are rare. In most cases, the distribution of estates is given only by ranges lacking additional demographic information (see examples in Appendix A). Similarly, mortality data are often categorized solely by age and gender, abstracting from all other socioeconomic factors, and thus limiting the method's applicability, or requiring assumptions about the mortality-wealth gradient.

In this scenario, we can derive the top wealth shares using the average multiplier $m_i = \bar{m}$. This is what we call a *simplified estate multiplier approach* in the context of the estimation of wealth inequality.[13]

[11] If there is no equality, I_q is defined as the smallest index such that $\sum_{i=1}^{I_q} m_i > qN$.

[12] *e.g.*, μ=2 means that the average wealth of the decedents is twice the average wealth of the living.

[13] The use of a constant number for the multiplier can be traced back to the works of Giffen (1893) and de Foville (1893),

When using the average multiplier, the top q quantile among decedents represents exactly the top q quantile of the living, *i.e.*, $qN_E = I_q$:

$$Sh^W_{q,simp} = (1 - L_q)^W_{simp} = \frac{\sum_{i=1}^{I_q} m_i w_{E,i}}{W} = \bar{m}\frac{\sum_{i=1}^{qN_E} w_{E,i}}{W} = \bar{m}\frac{\sum_{i=1}^{I_q} w_{E,i}}{W}\,. \tag{2.2}$$

Since $W \equiv \bar{m}\frac{1}{\mu}W_E$, the ratio between the top wealth shares based on the average multiplier, $Sh^W_{q,simp}$, and the top estate shares, Sh^E_q, equals μ:

$$\frac{Sh^W_{q,simp}}{Sh^E_q} = \frac{(1 - L_q)^W_{simp}}{(1 - L_q)^E} = \bar{m}\frac{\sum_{i=1}^{I_q} w_{E,i}}{W} \Big/ \frac{\sum_{i=1}^{qN_E} w_{E,i}}{W_E} = \mu\,.$$

2.3 A comparison of existing series

There is no a priori reason for the top wealth shares estimated as in Equation (2.1) to match or align with the estimates obtained through the simplified approach in Equation (2.2). Quite the opposite: the estate multiplier method was specifically designed with the expectation that they should differ. However, in practice, they are remarkably close in levels and trends in most countries and years where a comparison is possible. To illustrate this, we examine the top wealth shares derived through the simplified multiplier approach alongside existing series for six countries: Australia, France, Italy, South Korea, the United Kingdom, and the United States. We take the data and series from Katic and Leigh (2016) for Australia; Garbinti, Goupille-Lebret and Piketty (2021) for France; Acciari, Alvaredo and Morelli (2024) for Italy; Kim (2018) for South Korea; Alvaredo, Atkinson and Morelli (2018) for the United Kingdom; and Smith, Zidar and Zwick (2023) and IRS (2022) for the United States.

For the series based on the simplified approach, the average mortality multiplier $\bar{m}$ is calculated as the ratio between the number of living adults aged 20 and above to the number of adult deaths. This information is taken from the Human Mortality Database (2022). The total personal wealth in each country and every year was taken from the World Inequality Database (2022) (apart from the case of Australia, where the external total was taken from Katic and Leigh, 2016).

Figure 1 presents the results of this comparison for the top 1% wealth share, with the exception of the United States which shows the top 0.1% due to the lower population coverage of the estate tax (shown in Figure 2). It highlights that in all countries the top wealth shares estimated with the simplified approach strongly co-move with those reported in the literature and are similar in level.

but in the context of the estimation of national wealth in relation to aggregate inheritance flows, thus unrelated to mortality.

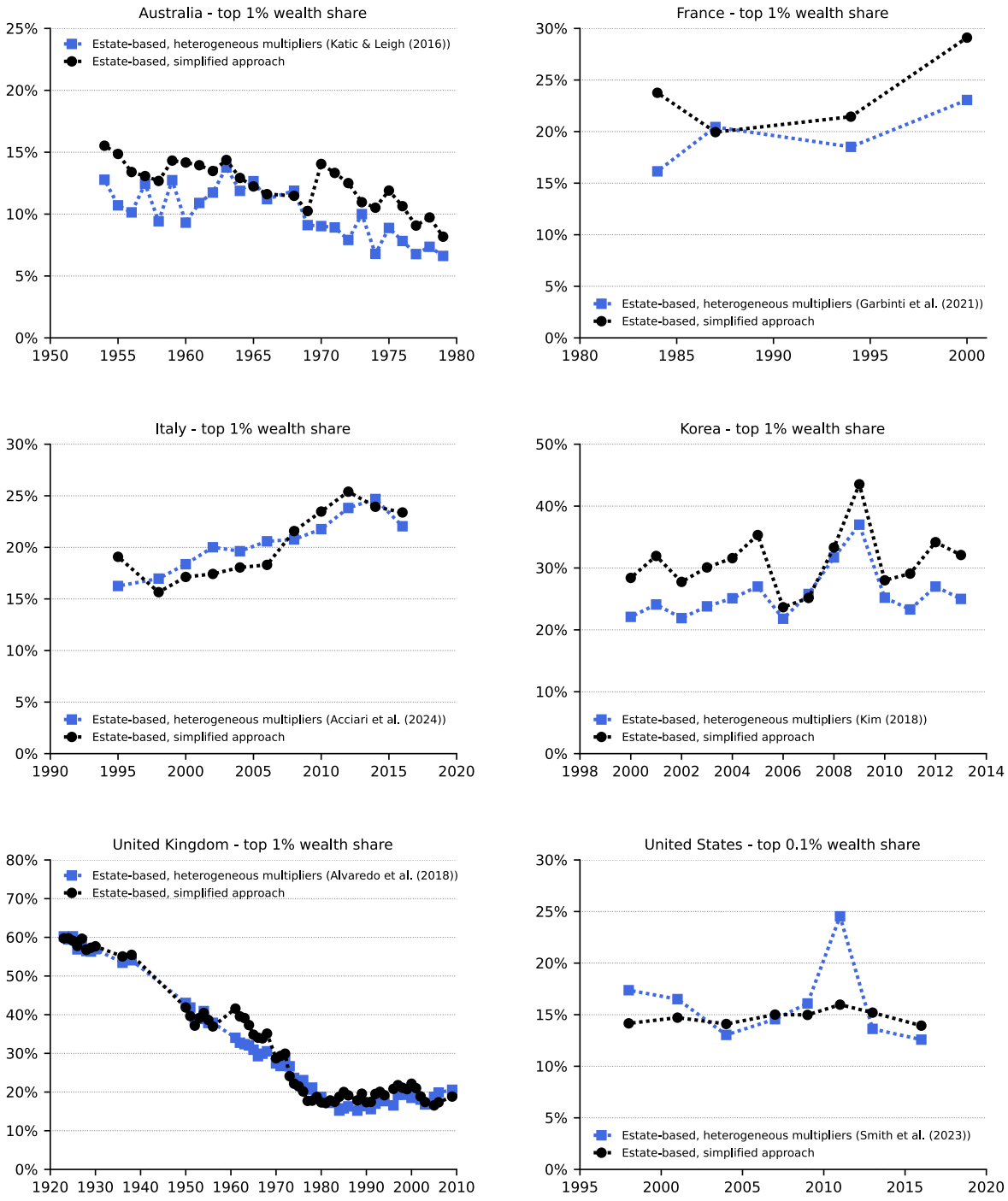

Figure 1: Top wealth shares in Australia, France, Italy, South Korea, the United Kingdom, and the United States based on estates.

Notes: Estate tabulations and top wealth shares were taken from Katic and Leigh (2016) (Australia), Garbinti, Goupille-Lebret and Piketty (2021) (France), Acciari, Alvaredo and Morelli (2024) (Italy), Kim (2018) (Korea), Alvaredo, Atkinson and Morelli (2018) (United Kingdom), and Smith, Zidar and Zwick (2023) (United States, their *preferred* series), respectively. The estimated top wealth shares in the simplified approach are based on our calculations. Mortality data were taken from the Human Mortality Database (2022).

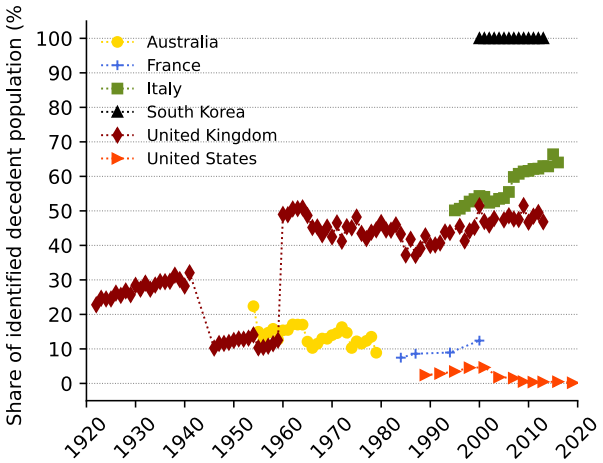

Figure 2: Coverage of estate data in Australia, France, South Korea, the United Kingdom, and the United States.

Notes: The figure shows the number of observed estates N_E^* as a fraction of total decedents N_E. Information taken from Katic and Leigh (2016) for Australia, Garbinti, Goupille-Lebret and Piketty (2021) for France, Acciari, Alvaredo and Morelli (2024) for Italy, Kim (2018) for South Korea, Alvaredo, Atkinson and Morelli (2018) for the United Kingdom, and IRS (2022) for the United States, and combined with mortality data from the Human Mortality Database (2022).

The estimates borrowed from the literature are all based on estate and inheritance tax data using the multiplier method with heterogeneous multipliers. These estimates also incorporate differential mortality adjustments for wealth. In the case of the United Kingdom, the mortality-wealth gradient has not been assumed constant over time: the adjustment varies over the years. Mortality ratios of specific wealth groups with respect to the non-wealth-specific population already appear to indicate a pronounced wealth gradient. For instance, males aged 65–75 in the top 30, top 20 and top 10% of the distribution of housing wealth (on which the differential adjustments rely) in 2008–2010 have a mortality rate of 81%, 75%, and 69% of the population rate for the same age class. In particular, Alvaredo, Atkinson and Morelli (2018) note that the potential downward bias of their 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% wealth share of 1950 or 1960, one would need to adjust wealth differentials by an implausible amount."

For Australia, Katic and Leigh (2016) take the social differential mortality factors from Clarke and Leigh (2011). For France, Garbinti, Goupille-Lebret and Piketty (2021) make use of adjustments that are based on INSEE (2016). These factors also appear to indicate a steep wealth gradient. For instance, in 1991–1999, males aged 70–79 in the top 10% had a mortality rate that was 62% of the population rate for the same age class (68% in 2000–2008). Such longevity advantages are comparable to those of US males aged 65–79 in 2004–2008, as estimated in Saez and Zucman (2016), and to those observed in the United Kingdom. Indeed, in all cases, accounting for the mortality advantage of wealth brings the adjusted multipliers closer to the average multiplier.

A notable exception to the pattern of similarity in the series is evident in the 2011 observations for the United States. The top 0.1% wealth share is significantly higher in the analysis by Smith, Zidar and Zwick (2023), which relies on confidential microdata. This discrepancy likely stems from the method assigning a very high multiplier to a relatively young and exceptionally wealthy decedent (Apple's CEO Steve Jobs), resulting in an overstated wealth concentration for that year. This suggests that the simplified approach, by

using a homogeneous average multiplier, is less sensitive to such anomalies and therefore less volatile.

The estimates taken from the literature incorporate various adjustments to account for under-reporting, tax avoidance, and evasion, which should be very well added to the simplified results. For the United States, Kopczuk and Saez (2004) and Smith, Zidar and Zwick (2023) include estimates of wealth held in trusts and the cash surrender value of pensions and life insurance assets. In France, Garbinti, Goupille-Lebret and Piketty (2021) impute 'missing' net wealth for consistency with the national balance sheet of the household sector. For Italy, Acciari, Alvaredo and Morelli (2024) provide adjusted, unadjusted, and imputed series. Since we have access to the full set of raw data in this case, we focus on Italy to further investigate the relationship between estates and wealth in Section 3.

There has been a heated debate over the level and dynamics of wealth inequality in the United States in recent decades.[14] One reason for this controversy is that four of the five data sources listed in the introduction—surveys, capital incomes, rich lists, and estate data—are available.[15] Each source provides a distinct perspective on the phenomenon and requires different methods, with each method introducing its own considerations and limitations. Furthermore, within each method, researchers' choices, judgment and decisions in application contribute further to the discrepancies, sometimes significantly. Here, we will compare the results from the simplified approach to some of the existing series.

Both Saez and Zucman (2016) and Smith, Zidar and Zwick (2023) used income tax data as the primary source for estimating top wealth shares through the capitalization method. In this approach, capital incomes are multiplied by the inverse rate of return to yield the stock and distribution of wealth. The differences between the series produced by these two research groups primarily stem from how they account for heterogeneity in the rates of return. They also rework and extend, in their own way, series based on the estate multiplier method in Kopczuk and Saez (2004). In addition, wealth inequality can be estimated using the Survey of Consumer Finances (SCF). The SCF is a triennial cross-sectional survey, conducted in cooperation between the Federal Reserve Board and the Statistics of Income Division of the Internal Revenue Service. The SCF pays particular attention to the top 1% group, by means of over-sampling likely high new-worth households identified through individual income tax returns and capitalization techniques (Kennickell, 2017). There have also been attempts to "augment" the SCF with the Forbes 400 list.

Figure 3 presents a comparison between the most recent estimates using the capitalization method from Saez and Zucman (2020b, 2022) and Smith, Zidar and Zwick (2023)), the SCF, the SCF augmented with Forbes 400 data (from Smith, Zidar and Zwick (2023)), and the results of the simplified multiplier approach.

For the simplified approach results, the total personal worth is taken from Saez and Zucman (2020b)); the average mortality multiplier, from the Human Mortality Database (2022); and estate tax tabulations by year of death from the IRS (2022). Given the limited coverage of the estate tax data in the United States, we focus on the top 0.01% and 0.001% wealth shares in Figure 3.

The comparison shows that the results from the simplified approach are very close in levels to both series that used capitalized income tax data. In fact, the distance metric (sum of squared differences) between the simplified approach series to each of the Saez and Zucman (2020b) and Smith, Zidar and Zwick (2023) series is lower than the distance between these latter two series themselves. The simplified approach results are also close to the results based on the SCF augmented with Forbes 400. It is important to note that estimates

[14] Research works participating in this debate include Kopczuk and Saez (2004), Kopczuk (2015), Bricker et al. (2016), Saez and Zucman (2016, 2020a,b), Smith, Zidar and Zwick (2023).

[15] The United States does not levy a wealth tax.

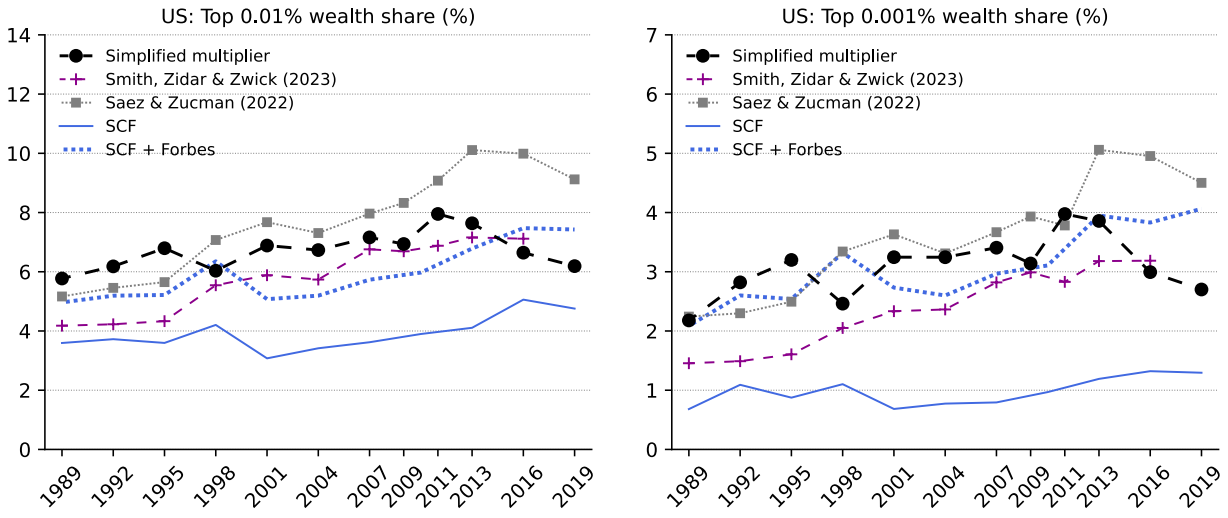

Figure 3: Top wealth shares in the United States.

Notes: The figure presents a comparison between the simplified multiplier approach (black) and the results using the capitalization method (Saez and Zucman, 2016, 2020b, 2022; Smith, Zidar and Zwick, 2023), the Survey of Consumer Finances (SCF), and the SCF augmented with Forbes 400 (from Smith, Zidar and Zwick, 2023).

from the simplified approach are not intended as an alternative to the higher-quality series where these can be estimated. Rather, this comparison illustrates their performance, offering a meaningful interpretation in contexts where other methods or sources are unavailable.

3 The relationship between the estate multiplier method and the simplified approach

3.1 Understanding the relationship

Figure 1 demonstrates that the simplified multiplier approach provides estimates of top wealth shares that closely align with wealth inequality estimates obtained using the standard estate multiplier method with differential adjustments, as reported in the literature. We now turn to the formal understanding of these findings. First, we compare wealth inequality estimates derived using the simplified approach with those obtained through the classic multiplier method.

To determine how sensitive the results can be to the choice of multipliers, and the bias implied by average multipliers, we need establish the conditions for Equation (2.1) to be equivalent to Equation (2.2).

$$Sh_q^W = Sh_{q,simp}^W \iff \frac{\sum_{i=1}^{I_q} m_i w_{E,i}}{W} = \bar{m}\frac{\sum_{i=1}^{qN_E} w_{E,i}}{W} \iff \sum_{i=1}^{I_q} \frac{m_i}{\bar{m}} w_{E,i} = \sum_{i=1}^{qN_E} w_{E,i} \ . \tag{3.1}$$

Rearranging terms, it is possible to explicitly express the difference between the top wealth shares in the simplified approach and in the classic method. Via the above notation and using the same expansion we

obtain

$$\begin{aligned} Sh_q^W - Sh_{q,simp}^W &= \frac{\bar{m}qN_E}{W}\left(\bar{w}_{I_q} - \bar{w}_{qN_E}\right) + \frac{I_q}{W}\text{Cov}\left[m_i, w_{E,i}\right] \\ &= \frac{I_q}{W}\left[\bar{m}_{I_q}\left(\bar{w}_{I_q} - \bar{w}_{qN_E}\right) + \text{Cov}\left[m_i, w_{E,i}\right]\right] ; \end{aligned} \tag{3.2}$$

where

$$\bar{m}_{I_q} = \frac{\Sigma_{i=1}^{I_q} m_i}{I_q} ; \ \bar{w}_{qN_E} = \frac{\sum_{i=1}^{qN_E} w_{E,i}}{qN_E} ; \ \bar{w}_{I_q} = \frac{\sum_{i=1}^{I_q} w_{E,i}}{I_q} ;$$

$$\bar{w}_{qN_E} - \bar{w}_{I_q} = \frac{I_q}{\bar{m}qN_E}\text{Cov}\left[m_i, w_{E,i}\right] ;$$

and

$$\text{Cov}\left[m_i, w_{E,i}\right] = \frac{1}{I_q}\sum_{i=1}^{I_q}\left(m_i - \frac{1}{I_q}\sum_{j=1}^{I_q} m_j\right)\left(w_{E,i} - \bar{w}_{I_q}\right) .$$

$\bar{m}_{I_q}$ is the average multiplier at the top q of the distribution ($\Sigma_{i=1}^{I_q} m_i / I_q$). $\bar{w}_{qN_E}$ is the average estate of the top q of decedents. $\bar{w}_{I_q}$ is the average estate of the top quantile I_q of decedents that make up—after taking multipliers into account—the top q of the living.

Equation (3.2) demonstrates that the difference in top shares depends on two factors: (i) an average level effect of the multipliers, $\bar{m}_{I_q}\left(\bar{w}_{I_q} - \bar{w}_{qN_E}\right)$, and (ii) the covariance between multipliers and estate values *within the considered top group*, $\text{Cov}\left[m_i, w_{E,i}\right]$. When both factors are low, or offset each other, the wealth concentration levels among the living closely align in the two estimation strategies.

There are several reasons why these conditions are likely to hold. Let us examine each factor in turn.

The average level effect is such that the closer the average multiplier at the top is to the mean multiplier, the closer the index I_q is to qN_E, and hence, the closer the difference $\bar{w}_{I_q} - \bar{w}_{qN_E}$ is to zero. The top of the estate distribution is largely composed of relatively older individuals. Age-wise, this makes their mortality risk higher than average, an outcome largely due to life cycle effects, since mortality is primarily influenced by age, and older individuals tend to have higher wealth (Shorrocks, 1975; Modigliani, 1986). However, the substantial wealth of the well-off may offset this increased risk, due to factors such as better nutrition, healthier lifestyle, and better access to specialized healthcare, elements captured in applications by the differential adjustments. This brings the average mortality multiplier at the top closer to the average multiplier of the entire adult population $\bar{m}$.

Within the top group of the wealth distribution, age matters less for wealth accumulation. This is because wealth typically accumulates up to a certain age, but no further (Jakobsen et al., 2020; Garbinti et al., 2023). As a result, the correlation between wealth and age—a key determinant of mortality risk—is low among the wealthiest individuals. Although mortality rates increase exponentially beyond the age of 40 (see Appendix B), wealth grows more weakly, and age variability within wealth groups is substantial. Consequently, the covariance between estates and multipliers at the top of the estate distribution ($\text{Cov}\left[m_i, w_{E,i}\right]$) is generally negative and close to zero.

Figure 4 illustrates this point for the United States, France, and Austria. The first panel (top left) shows the relationship between age and wealth from the SCF augmented with Forbes 400 for the top 1% of the distribution, pooling together all the observations between 1983 and 2016. The second panel (top right) refers to the top 1% of estates between 1989 and 2019, for which data are arranged by ranges. The third panel

(bottom left) depicts the relationship in France for years 1984–2000, based on Garbinti, Goupille-Lebret and Piketty (2021). Finally, the fourth panel (bottom right) concerns age and top 1% probates in Austria, for which we draw on the data from Disslbacher and Rapp (2024). In all cases, there is a very weak correlation between age and wealth both among the living and among rich decedents. The coefficient of determination of a linear best fit is very low, to the extent that age has no predictive power on wealth at the top. The consistency of this result in all years supports the stability of the low-covariance condition. Similarly, Garbinti et al. (2023) show that the average age among the richest individuals in France is essentially independent from wealth.

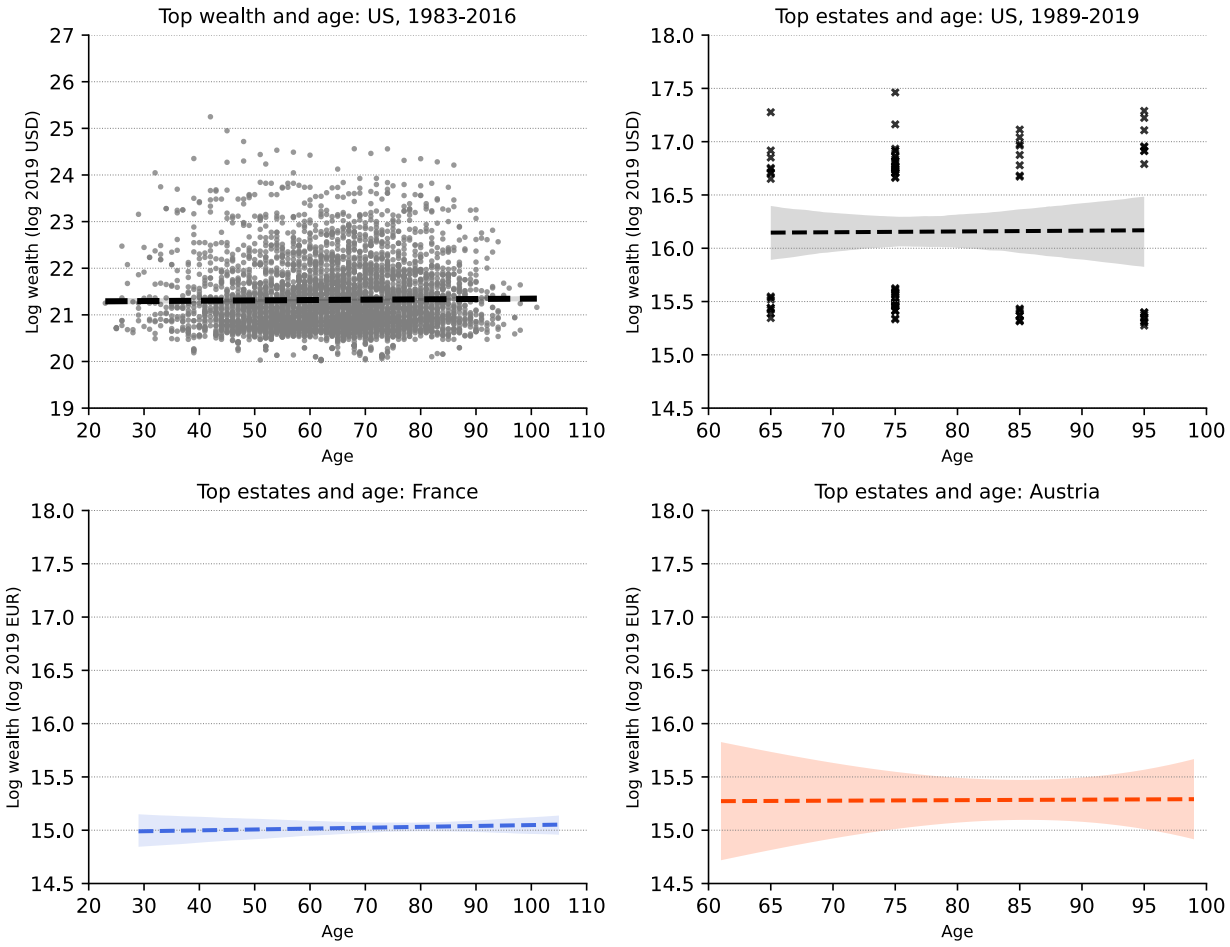

Figure 4: The relationship between age and wealth among the top 1% of the distribution of wealth and estates in the United States, France, and Austria.

Notes: The top left figure is a scatter plot of individual wealth (measured in log of 2019 US Dollars) and age from the SCF (Survey of Consumer Finances) augmented with Forbes 400. The top right figure is a scatter plot of estates (measured in log of 2019 US Dollars) against their age at death, from the estate tax (based on IRS tables by ranges of estates). The bottom left figure concerns the relation estate-age in France, 1984–2000. The bottom right panel shows relationship between probates and age at death in Austria, 2014–2019. In the four cases, the estimated coefficient of the regression line including gender and year fixed effects is shown, in addition to 95% confidence bounds.

Which average multiplier? It is important to emphasize that the analysis presented here, and formalized in Equation (3.2), applies exclusively to the upper segment of the distribution, rather than encompassing the entire range of its support. For our purposes, we continue our analysis with the average multiplier

$\bar{m} = N/N_E$, as it is the most apparent choice based on demographic statistics. Nonetheless, if specific information regarding a more appropriate average multiplier is known to apply to the considered top group, it can be employed accordingly, reducing the bias.

3.2 Accounting for multipliers graduated by wealth levels

Mortality rates are clearly influenced by demographic factors, such as gender and age. However, social and economic conditions can also exert a substantial impact on the longevity of individuals (see Chetty et al. (2016) for a recent discussion). In particular, higher wealth levels may be systematically associated with lower mortality rates, over and above the effect of demographic influences. To further investigate the potential biases introduced by the simplified approach, we can quantify these effects in the case of Italy between 1994 and 2016, by re-assessing recent previous work by two of us (Acciari, Alvaredo and Morelli, 2024).

We begin by considering the use of heterogeneous mortality multipliers differentiated by demographic characteristics, specifically age and gender. This is an important starting point, as mortality rates by age and gender typically capture most of the variation in mortality. The resulting top share estimates may suffer from some degree of bias, as they do not account for heterogeneity in mortality driven by socio-economic characteristics, *i.e.*, the mortality-wealth gradient. In the second step, therefore, we apply the differential adjustment factors used by Garbinti, Goupille-Lebret and Piketty (2021) for France mentioned above.

Third and final, we have the top wealth share series resulting from the simplified approach with a homogeneous average multiplier.

The results are presented in Figure 5, which also reproduces the original estimates in Acciari, Alvaredo and Morelli (2024) based on demographic multipliers and further adjustments to take into account missing wealth. While the steep mortality-wealth gradients have a salient effect on levels, the series move together, and the top shares estimated through the simplified approach is a proxy of the more sophisticated estimates taking into account the effects of age, gender and wealth on mortality. The formalization in Equation (3.2) and the related Figure 6 are well suited to explain these findings. The covariance between multipliers and estates within the top 1% is small and generally negative.

The top left panel of Figure 6 displays $\frac{I_q}{W}\text{Cov}\left[m_i, w_{E,i}\right]$, the covariance component of Equation (3.2) between wealth at death and the multipliers among the top 1% of decedents in the three scenarios. This is zero when the homogeneous average multiplier is applied, as in the simplified approach. It is very small and generally negative in the case of demographic multipliers embedding gender and age. When differential adjustments for the mortality-wealth gradients are considered, the figures remain small and generally negative, fluctuating between -0.04 and 0.04. It averages at -0.008, with a standard deviation of 0.018 across years, showing no trend.

The top right panel in Figure 6 shows $\frac{I_q}{W}\left[\bar{m}_{I_q}\left(\bar{w}_{I_q} - \bar{w}_{qN_E}\right)\right]$, the average level effect of the multipliers in Equation (3.2). Again, the effect is zero for the average multipliers. As expected, the numbers are negative when heterogeneous multipliers are applied, being smaller when the mortality-wealth gradient is included.

The bottom panel in Figure 6 displays the average multiplier among the top 1%. In the simplified approach, this is simply $\bar{m}$, which changes only slightly over time. After accounting for both demographic and economic heterogeneity in mortality, the average multiplier among the top 1% is 0%–20% higher than the average multiplier for the adult population. However, when accounting only for age and gender, the average multiplier

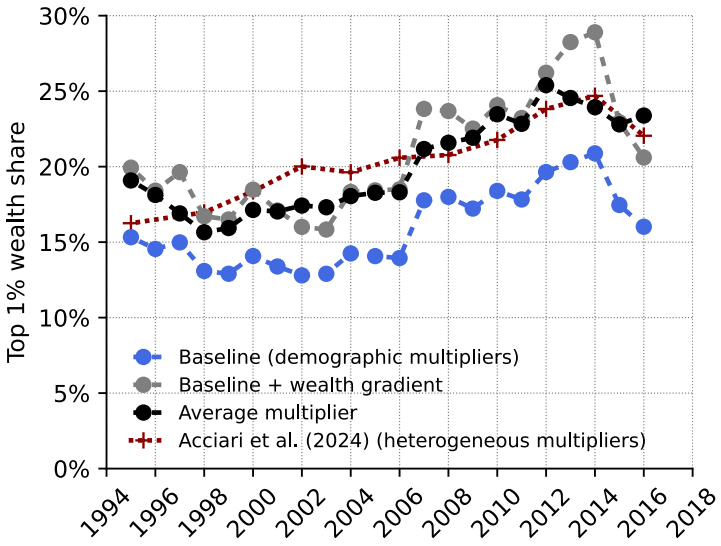

Figure 5: The top 1% wealth shares in Italy: The impact of different multiplier choices, 1995–2016.

Notes: Each series was estimated using a different choice of multipliers: (i) baseline with demographic multipliers depending on age and gender (blue); (ii) heterogeneous multipliers including differential adjustment to account for the mortality-wealth gradient (gray); (iii) average multiplier, *i.e.*, simplified multiplier approach (black); (iv) series from Acciari, Alvaredo and Morelli (2024), with baseline multipliers as in (i) plus additional adjustments.

among the top 1% is 30%–50% lower than that of the overall adult population. As expected, the wealth effect on mortality can counterbalance the demographics – the regularity that the wealthier individuals tend to be older on average.

3.3 The effects of wealth totals and the underlying distribution of estates

That a rise in the differential adjustments (*i.e.*, the mortality advantage of the rich) could significantly increase the top shares 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). The estimation of the wealth totals plays a role here too, both directly and indirectly.

In the simplest case where there are independent control totals for wealth (an *external total* built, for example, on the basis of the national stock accounts), variations in mortality multipliers or in the differential adjustments have no impact on mean wealth. Consequently, the effect on the share of the top q quantile depends solely 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 some value \$X. These extra people displace some of those with smaller estates who had previously just entered the top q quantile. The mean wealth of the top q quantile must therefore rise. The direction of the effect is therefore that expected: top shares rise. The magnitude of the effect, however, also depends on the underlying estate distribution. If those displaced are not 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 q quantile have the same wealth, in which case the displaced have wealth equal to that of the newly added.

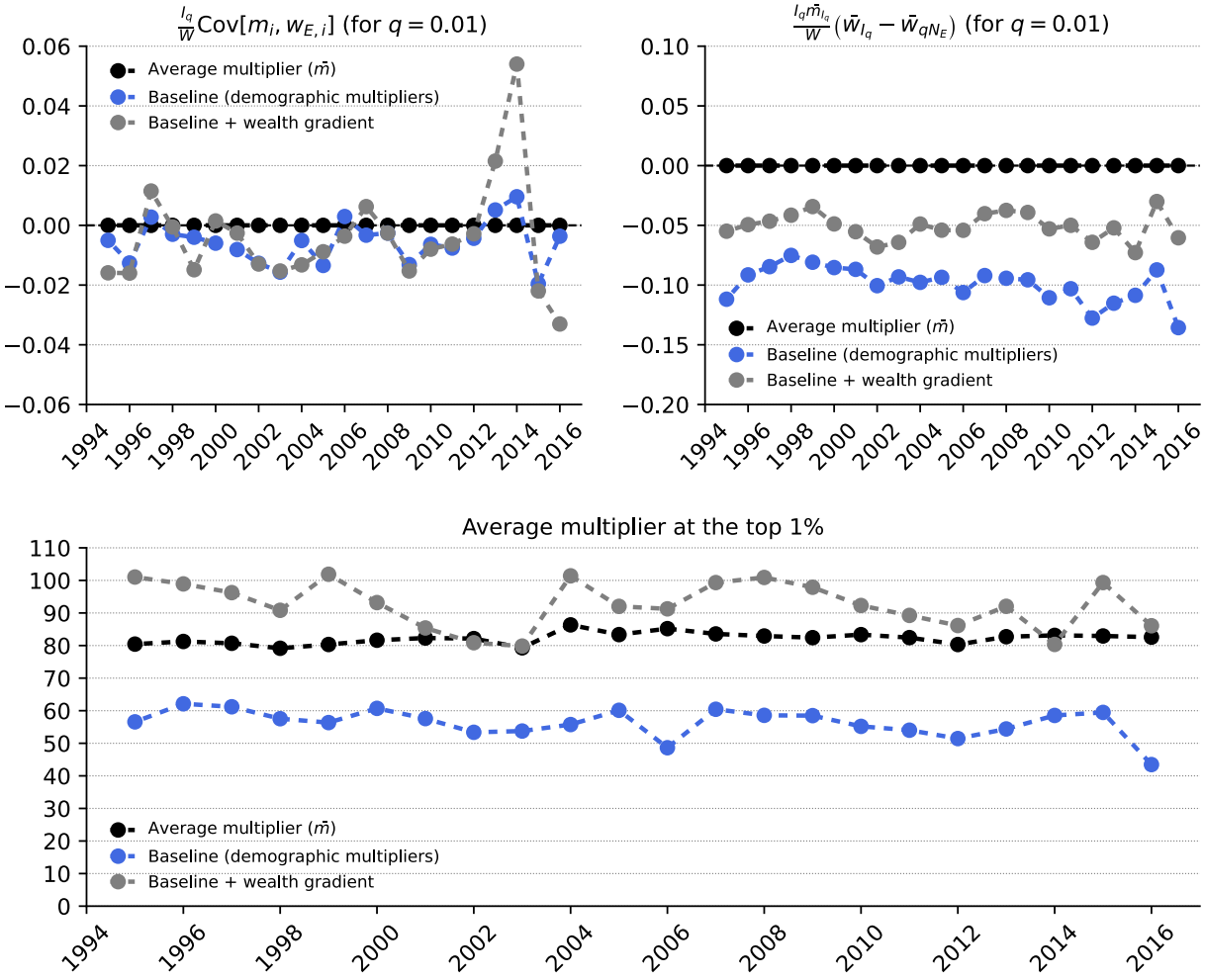

Figure 6: The relationship between wealth and multipliers. Italy, 1995–2016.

Notes: Top left panel: Covariance between multipliers and estates at the top 1%. Top right panel: Distance between the average wealth at the top. Bottom panel: Average multipliers at the top.

In the case of wealth totals estimated endogenously (as an *internal total*, *i.e.*, $W = \sum_{i=1}^{N_E} m_i w_{E,i}$), an increased multiplier at the top of the estate range raises both total wealth and the mean wealth. 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. Where the mean wealth of the next range down is lower, there can then be an intersection of the new and old Lorenz curves, and beyond a certain point the top shares are increased. Consequently, 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. This was implicitly noted by Cowell (1978), who, in his review of Atkinson and Harrison (1978), observed that

"though the particular refinement of mortality multiplier that is used considerably affects the calculation of total wealth, the resultant effect on top wealth shares is not all that great" (page 582).

Ultimately, therefore, the sensitivity of top wealth shares to different mortality-wealth gradients is an empirical matter, dependent not only on mortality rates, but also on the underlying distribution of estates. In the limiting case of a perfectly egalitarian distribution of estates, heterogeneous multipliers would play no role in the determination of the distribution of wealth among the living, which would also be perfectly egalitarian. In this example, no matter the multipliers, $\bar{m}_{I_q}(\bar{w}_{I_q} - \bar{w}_{qN_E}) = 0$ and $\text{Cov}[m_i, w_{E,i}] = 0$, and the equality in Eq. (3.2) is satisfied.

3.4 The coefficients of variation of estates and wealth

We have emphasized that the similarity between the shares estimated using the standard multiplier method and those resulting from the simplified approach pertains specifically to the top groups of the distribution, rather than to the entire wealth range. To further clarify this point, we can compare the coefficient of variation (CV) of the distribution of wealth and the distribution of estates. The CV is conceptually simpler, since the index I_q does not play a role in it, but it is not limited to a specific quantile q: it may refer to the entire distribution.

The coefficient of variation of estates, denoted Y_E, follows

$$Y_E^2 = \frac{\sigma_E^2}{\bar{w}_E^2};$$

in turn, the coefficient of variation of wealth (among the living), denoted Y_W, is

$$Y_W^2 = \frac{\sigma_W^2}{\bar{w}_W^2},$$

where σ_E^2 is the variance of estates, σ_W^2 is the variance of wealth, $\bar{w}_E$ is the average estate, and $\bar{w}_W$ is the average wealth.

In the context of the estate multiplier method, the relationship between the two is

$$Y_W^2 = Y_E^2 \left(1 + \frac{\frac{1}{N_E} \sum_{i=1}^{N_E} \left(\frac{\mu^2 m_i}{\bar{m}} - 1 \right) w_{E,i}^2}{\sigma_E^2} \right), \tag{3.3}$$

where μ is the ratio between the average wealth of the decedents and the average wealth of the living.[16]

This result leads to several observations. First, the distance between the CV of wealth and estates is mainly driven by the situation at the top. This is because the difference $\left(\frac{\mu^2 m_i}{\bar{m}} - 1 \right)$ in Equation (3.3) is weighted by the square of estates $w_{E,i}^2$. Second, there is a dampening effect that limits the extent to which Y_W and Y_E can differ: in the typical scenario, $\mu > 1$, while $m_i/\bar{m} < 1$ at the top populated by relatively older individuals, making $\left(\frac{\mu^2 m_i}{\bar{m}} - 1 \right)$ smaller than elsewhere in the distribution. However, the conditions discussed in Section 3 that ensure equality between the shares estimated using the standard multiplier method and those resulting from the simplified approach are not enough to guarantee equality between Y_E^2 and Y_W^2 when the coefficients of variation involve the whole support of the distribution.

[16] The formal derivation can be found in Appendix C.

Unsurprisingly, the relationship between the coefficient of variation of capital incomes and the coefficient of variation of wealth estimated via the capitalization method has a form similar to Eq. (3.3), as shown in Atkinson and Harrison (1978). In the case of capitalization, the inverted rates of return serve as weights.

4 New estimates of historical top wealth shares

We now make use of the simplified multiplier approach to produce new long-run series of top wealth shares. As explained above, no reliable administrative data on wealth other than estate and inheritance tax records can be found in many countries. In addition, the ability to obtain detailed heterogeneous mortality multipliers is often very limited. This is especially the case when only tabulated estate data exist.

We consider the cases of Belgium, Japan, and South Africa, as examples for which we estimate series for the top 10%, 1%, 0.1%, and 0.01% wealth shares. For Belgium, the calculations span over the years 1935–1994. For Japan, they cover the years 1970–2017.[17] For South Africa, the years 1924–1985. The estate tax tabulations were all collected from archives and yearbooks of the national and regional tax administrations. The mortality data were taken from the Human Mortality Database (2022) for Belgium and Japan, and from the UN World Population Prospects (2022) for South Africa.[18]

The three cases differ substantially in terms of data availability. In Belgium, the estate data cover 50%–70% of decedents, as shown in Figure 7. This is a substantial fraction, which translates into a very high coverage of total wealth, as the bottom half of the distribution usually owns very little. The underlying assumption is thus that $\bar{m} \sum_{i=1}^{N_E^*} w_{E,i}$ (where N_E^* is the number of observed estates) is the total personal wealth among the living, W. In this dimension, future work focusing on Belgium could refine and improve these numbers.

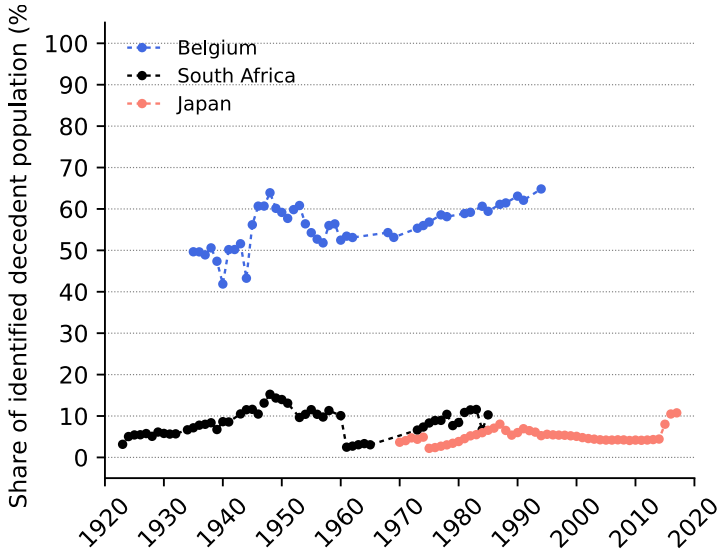

Figure 7: Coverage of estate data in Belgium, Japan and South Africa

Notes: The figure shows the number of observed estates N_E^* as a fraction of total decedents N_E.

In Japan and South Africa the coverage of estates ranges between 2% and 10% of all adult decedents.

[17] For Japan, we are extending the series backward to 1905 in ongoing work.
[18] The estimation results are detailed in Appendix D, and the sources are given in Appendix E.

For Japan, the series of total wealth is sourced from the World Inequality Database, allowing us to report estimates for the top 1%, 0.1%, 0.01% wealth shares for 1970–2017, when this total is available. However, estate data exist as far back as 1905. For South Africa, we produce two series: one based on an external total and another based on an internal total. The external total, also taken from the World Inequality Database from 1995 onward, is extrapolated backward using the ratio between aggregate wealth and national income. The internal total assumes that, despite the relatively low or modest coverage of the decedent population, the reported estates account for a substantial fraction of total wealth. This assumption is indeed supported by the comparison with the external total, which is only slightly higher.

Belgium. According to the results for Belgium (presented in Appendix Table D.1), wealth inequality decreased substantially during the course of the 20th century. The wealth share held by the top 10% dropped from around 80% in the late 1930s to 55% in the mid-1990s. Similar trends are observed for the top 1% and 0.1%, as shown in Figure 8. These levels and trends align closely with those found for France by Garbinti, Goupille-Lebret and Piketty (2021). The simplified multiplier approach estimates are compared with those for later years from Blanchet and Martínez-Toledano (2023), which are based on the Household Finance and Consumption Survey (for years 2010, 2014 and 2017) interpolated, extrapolated and upscaled to match distributional national stock accounts.

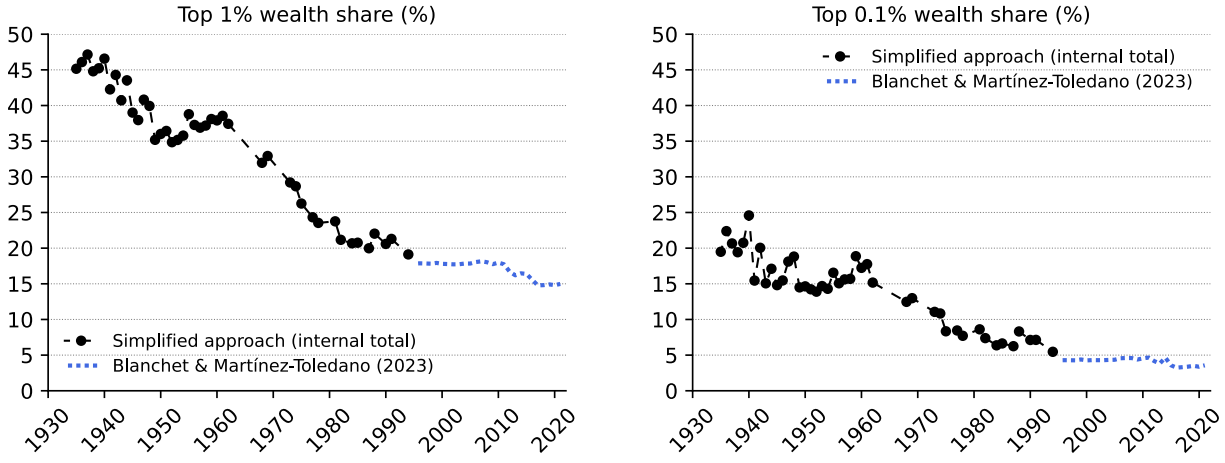

Figure 8: Top 1% and 0.1% wealth shares in Belgium.

Notes: The estimates are produced using the simplified multiplier approach based on estate tax data. Mortality rates come from the Human Mortality Database (2022). An internal total was used: the underlying assumption is that the identified wealth is $\bar{m} \sum_{i=1}^{N_E^*} w_{E,i}$ (where N_E^* represents the number of observed decedents) and constitutes a reasonable indicator of the total personal wealth among the living, W. The simplified multiplier approach estimates are compared to those for later years from Blanchet and Martínez-Toledano (2023), which are based on the Household Finance and Consumption Survey (for years 2010, 2014 and 2017) interpolated, extrapolated and upscaled to match distributional national stock accounts.

Japan. In Japan, the impact of the real estate and stock market bubble of the late 1980s and early 1990s is clearly evident. Wealth concentration surged to levels comparable to those currently observed in the United States, with the top 0.1% holding over 10% of total wealth. After the bubble burst in 1992, wealth concentration quickly returned to previous levels for the top 0.01%, and even stabilized at lower values for the top 0.1%–0.01% during the subsequent period of economic stagnation. Throughout the 2000s and 2010s, the wealth share of the top 10% in Japan ranged between 40% and 50%, which is relatively low compared to most developed countries. Figure 9 presents the wealth shares held by the top 0.1% and 0.01% groups. For

recent decades, our series are compared to those from the World Inequality Database, which are not directly based on wealth data or capitalized investment incomes but rather imputed from income inequality series.

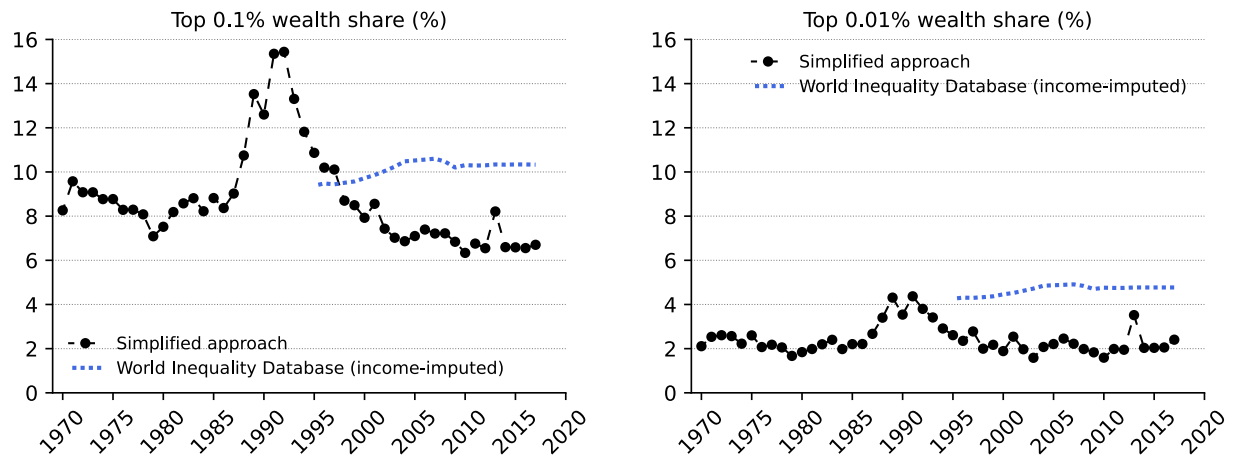

Figure 9: Top 0.1% and 0.01% wealth shares in Japan.

Notes: The estimates are generated using the simplified multiplier approach based on estate tax data. The mortality series are based on the Human Mortality Database (2022). An external total for wealth was taken from the World Inequality Database. The simplified multiplier approach estimates are compared to estimates from the World Inequality Database. It is important to note that the World Inequality Database estimates are not directly based on wealth distribution data or capitalized investment incomes but rather imputed from income inequality series.

South Africa. In South Africa, wealth concentration was unsurprisingly very high for international standards before the 1950s, and declined between the 1950s and the 1980s in parallel to the reduction in the concentration of incomes described in Alvaredo and Atkinson (2022). Figure 10 presents two series of estimates using the simplified approach, each based on a different control total. The top 0.1% wealth share decreased from levels of 25%–40% during the 1920s–1940s, to 10%–15% in the early 1980s. The top wealth share dynamics in South Africa resemble the dynamics found for the United States in the same years. Their level, however, is very high in comparison for most of the 20th century. Figure 10 also presents existing estimates for the last three decades, taken from Chatterjee, Czajka and Gethin (2022) and based on capitalized investment incomes.

Figure 11 provides an international comparison of the shares accrued by the top 1% and the top 0.1% in the discussed three countries with France, the United Kingdom and the United States.

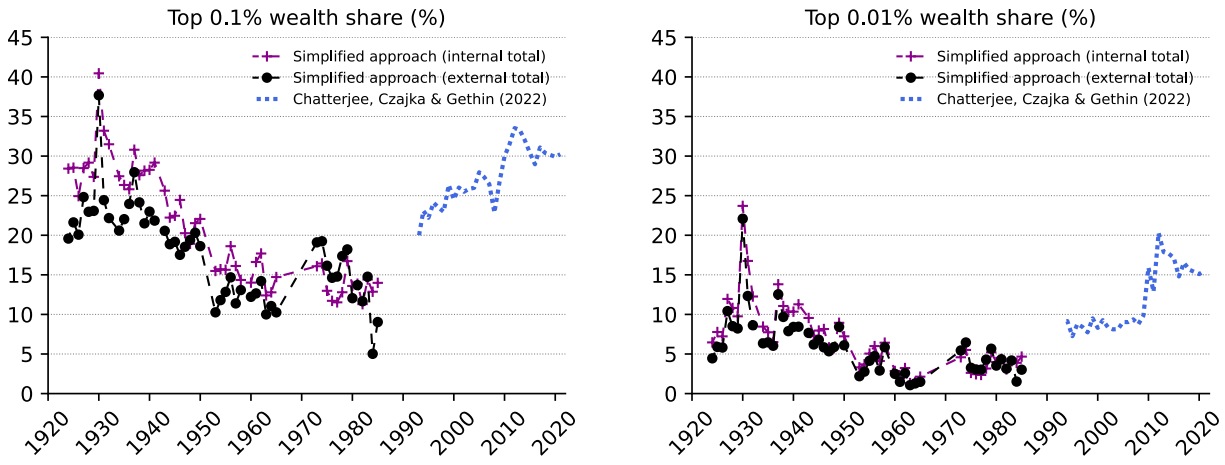

Figure 10: Top 0.1% and 0.01% wealth shares in South Africa.

Notes: The estimates are produced using the simplified multiplier approach based on data from estates. The mortality rates come from the UN World Population Prospects (2022). The simplified multiplier approach estimates are compared to estimates for later years from Chatterjee, Czajka and Gethin (2022), based on capitalized investment incomes.

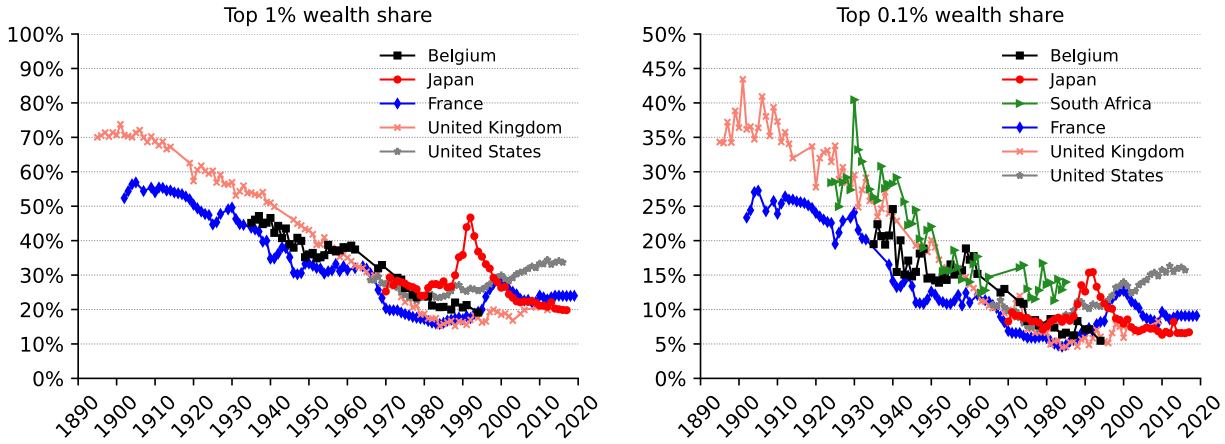

Figure 11: Top 1% and 0.1% wealth shares in Belgium, Japan, South Africa, France, the United Kingdom, and the United States.

Notes: The top shares are taken from the World Inequality Database (2022) for France, Alvaredo, Atkinson and Morelli (2018) for the United Kingdom, and Smith, Zidar and Zwick (2023) for the United States.

5 Conclusion

The study of the inequality of wealth holds a central place in the research and policy agendas today, for reasons that extend beyond fairness concerns. One factor is the recognition of the importance in macroeconomics of assets and liabilities, as demonstrated by recent investments in household financial surveys, and the renewed focus in balance sheets in national accounts. Another is the need and demand for empirical estimates to inform the current debates and proposals on wealth taxation at both national and global levels. However, as outlined in this paper, country coverage with wealth distribution information built directly from wealth data remains highly incomplete, especially when compared to income, and is largely limited to a few

countries that dominate these discussions.

Alvaredo, Atkinson and Morelli (2018) observed a striking similarity between the distribution of estates and the distribution of wealth among the living in the United Kingdom across the 20th and 21st centuries, using the estate multiplier method. Inspired by this finding, we showed that this similarity carries through to many other countries, including Italy, France, Australia, South Korea and the United States. Subsequently, we explained this similarity by establishing the formal conditions under which applying heterogeneous mortality multipliers (embedding differential adjustments to account for the age-wealth gradient) may not significantly alter estimates of top estate shares.

When these conditions are met, a simplified estate multiplier approach based on average multipliers can be used to estimate wealth concentration, particularly in contexts where detailed demographic data are unavailable. We have shown that this simplified methodology can approximate wealth concentration levels satisfactorily, even under data constraints. These findings have significant implications for the empirical and historical study of personal wealth concentration. The simplified approach provides a practical alternative for wealth concentration estimation, enabling estate-based methods to be incorporated into historical and cross-country analyses, where the standard estate multiplier method may be infeasible due to limited demographic information. This method enables the recovery of valuable data previously deemed unreliable or unusable. Such findings pave the way for expanding wealth inequality research, particularly in middle- and low-income countries, where data infrastructure is often limited. It should be emphasized that these conclusions apply specifically to the estimation of top wealth shares— as we have insisted throughout the paper—, and not to the whole distribution.

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 wealth based on heterogeneous and average multipliers. This indicates that the application of a sharper gradient to the mortality multipliers does not radically change the estimated degree of concentration for the top groups usually considered.

It is important to acknowledge the limitations inherent in the simplified estate multiplier approach. The method relies on assumptions regarding mortality differentials that may vary across contexts, and future research could benefit from refining the assumptions behind these mortality multipliers. Additionally, while this approach effectively addresses the absence of certain data, it does not substitute for the rich insights provided by more granular demographic and economic information when such data are available. Consequently, the simplified approach should not be used as an alternative when heterogeneous multipliers can be applied. However, it provides helpful information deemed higher quality than existing databases that rely on imputations and correlations. Most importantly, the assumptions on which the resulting estimates rely (concerning the interaction between multipliers and the covariance between multipliers and estate values *within the considered top group*) are clearly identified.

Future research directions include exploring the effect of applying this method to other countries with limited wealth data, to better understand how wealth concentration evolves in less-studied regions. Moreover, examining how estate-based methods interact with other indirect methods, such as capitalization and survey data, could shed further light on the robustness and limitations of each approach in capturing wealth concentration trends. Considering additional socio-economic factors that could influence top wealth shares, particularly in countries with developing data infrastructures, could help refine the methodology and enhance its adaptabil-

ity. Finally, there is also the margin of error inherent to any point estimate. This error is potentially very important when disparate datasets are combined, and calls for a systematic 'total error' approach in the measurement of inequality (that extends beyond statistical confidence intervals), as suggested in Atkinson (2019).

In conclusion, this study highlights the significant potential of the simplified approach as a framework for historical analysis and wealth concentration estimation in the absence of detailed mortality or survey data. Our findings provide a pathway for expanding wealth inequality research globally and contribute to a deeper understanding of wealth concentration dynamics across a wider range of countries and time periods.

References

Acciari, Paolo, Facundo Alvaredo, and Salvatore Morelli. 2024. "The Concentration of Personal Wealth in Italy 1995–2016." Journal of the European Economic Association, 22(3): 1228–1274.

Advani, Arun, Emma Chamberlain, and Andy Summers. 2020. "A Wealth Tax for the UK." Wealth Tax Commission Final Report.

Alvaredo, Facundo, and Anthony B. Atkinson. 2022. "Top Incomes in South Africa in the Twentieth Century." Cliometrica, 16: 477–546.

Alvaredo, Facundo, and Emmanuel Saez. 2009. "Income and Wealth Concentration in Spain from a Historical and Fiscal Perspective." Journal of the European Economic Association, 7(5): 1140–1167.

Alvaredo, Facundo, Anthony B. Atkinson, and Salvatore Morelli. 2018. "Top Wealth Shares in the UK Over More Than a Century." Journal of Public Economics, 162: 26–47.

Asher, Twisha, Luca Giangregorio, Salvatore Morelli, Manuel Schechtl, and Francesca Subioli. 2024. "Inheritance Taxation in a Global Perspective." Mimeo.

Atkinson, Anthony B. 1978. "The Concentration of Wealth in Britain." Challenge, 21(3): 38–42.

Atkinson, Anthony B. 2019. Measuring Poverty Around the World. Princeton University Press: Princeton, NJ.

Atkinson, Anthony B., and Allan J. Harrison. 1978. Distribution of Personal Wealth in Britain. Cambridge University Press.

Atkinson, Anthony B., James P. F. Gordon, and Alan Harrison. 1989. "Trends in the Shares of Top Wealth-Holders in Britain, 1923–1981." Oxford Bulletin of Economics and Statistics, 51: 315–332.

Baselgia, Enea, and Isabel Z. Martínez. 2024. "Using Rich Lists to Study the Super-Rich and Top Wealth Inequality: Insights from Switzerland." Review of Economics and Statistics, 1–45.

Blanchet, Thomas, and Clara Martínez-Toledano. 2023. "Wealth Inequality Dynamics in Europe and the United States: Understanding the Determinants." Journal of Monetary Economics, 133: 25–43.

Bricker, Jesse, Alice Henriques, Jakob Krimmel, and John Sabelhaus. 2016. "Measuring Income and Wealth at the Top Using Administrative and Survey Data." Brookings Papers on Economic Activity, 47: 261–331.

Chatterjee, Aroop, Léo Czajka, and Amory Gethin. 2022. "Wealth Inequality in South Africa, 1993–2017." World Bank Economic Review, 36(1): 19–36.

Chetty, Raj, Michael Stepner, Sarah Abraham, Shelby Lin, Benjamin Scuderi, Nicholas Turner, Augustin Bergeron, and Cutler David. 2016. "The Association Between Income and Life Expectancy in the United States, 2001–2014." JAMA, 315(16): 1750–1766.

Clarke, Philip, and Andrew Leigh. 2011. "Death, Dollars and Degrees: Socio-Economic Status and Longevity in Australia." Economic Papers, 30: 348–355.

Coghlan, T. 1906. "Discussion on Mr. W. J. Harris and the Rev. Kenneth A. Lake's Paper." Journal of the Royal Statistical Society, 69: 735–736.

Cowell, Frank A. 1978. "Review: Distribution of Personal Wealth in Britain by A. B. Atkinson, A. J. Harrison (1978)." Economic Journal, 88(351): 581–583.

de Foville, Alfred. 1893. La Richesse en France et à l'Étranger. Berger Levrault et Compagnie Libraires-Éditeurs.

Disslbacher, Franziska, and Severin Rapp. 2024. "Understanding the Distribution of Wealth at Death: A Probate Based Approach." WU Vienna University of Economics and Business Working Paper 31.

Epland, Jon, and Mads I. Kirkeberg. 2012. "Wealth Distribution in Norway: Evidence from a New Register-Based Data Source." Statistics Norway Report 35/2012.

Garbinti, Bertrand, Jonathan Goupille-Lebret, and Thomas Piketty. 2021. "Accounting for Wealth-Inequality Dynamics: Methods, Estimates, and Simulations for France." Journal of the European Economic Association, 19(1): 620–663.

Garbinti, Bertrand, Jonathan Goupille-Lebret, Mathilde Muñoz, Stefanie Stantcheva, and Gabriel Zucman. 2023. "Tax Design, Information, and Elasticities: Evidence From the French Wealth Tax." National Bureau of Economic Research Working Paper 31333.

Giffen, Robert. 1893. "Recent Accumulations of Capital in the United Kingdom." Journal of the Royal Statistical Society, 41: 1–39.

Guvenen, Fatih, Gueorgui Kambourov, Burhan Kuruscu, Sergio Ocampo, and Daphne Chen. 2023. "Use It or Lose It: Efficiency and Redistributional Effects of Wealth Taxation." Quarterly Journal of Economics, 138(2): 835–894.

Human Mortality Database. 2022. www.mortality.org.

INSEE. 2016. "Les Inégalités Sociales Face à la Mort." https://www.insee.fr/fr/statistiques/1893092?sommaire=1893101.

IRS. 2022. "SOI Tax Stats - Estate Tax Year of Death Tables." www.irs.gov/statistics/soi-tax-stats-estate-tax-year-of-death-tablesIRS.

Jakobsen, Katrine, Henrik Kleven, Jonas Kolsrud, Camille Landais, and Mathilde Muñoz. 2024. "Taxing Top Wealth: Migration Responses and their Aggregate Economic Implications." National Bureau of Economic Research Working Paper 32153.

Jakobsen, Katrine, Kristian Jakobsen, Henrik Kleven, and Gabriel Zucman. 2020. "Wealth Taxation and Wealth Accumulation: Theory and Evidence from Denmark." Quarterly Journal of Economics, 135(1): 329–388.

Katic, Pamela, and Andrew Leigh. 2016. "Top Wealth Shares in Australia 1915–2012." Review of Income and Wealth, 62(2): 209–222.

Kennickell, Arthur. 2017. "Lining up: Survey and Administrative Data Estimates of Wealth Concentration." Statistical Journal of the International Association for Official Statistics, 33: 59–79.

Kennickell, Arthur. 2019. "The Tail that Wags: Differences in Effective Right Tail Coverage and Estimates of Wealth Inequality." Journal of Economic Inequality, 17: 443–459.

Kim, Nak N. 2018. "Wealth Inequality in Korea, 2000–2013: Evidence from Inheritance Tax Statistics." Journal of the Korean Welfare State and Social Policy, 2(1): 26–57.

Klass, Oren S., Ofer Biham, Moshe Levy, Ofer Malcai, and Sorin Solomon. 2006. "The Forbes 400 and the Pareto Wealth Distribution." Economics Letters, 90(2): 290–295.

Kopczuk, Wojciech. 2015. "What Do We Know about the Evolution of Top Wealth Shares in the United States?" Journal of Economic Perspectives, 27: 47–66.

Kopczuk, Wojciech, and Emmanuel Saez. 2004. "Top Wealth Shares in the United States, 1916–2000: Evidence from Estate Tax Returns." National Tax Journal, 57(2): 445–488.

Kuhn, Moritz, Moritz Schularick, and Ulrike I. Steins. 2020. "Income and Wealth Inequality in America, 1949–2016." Journal of Political Economy, 128(9): 3469–3519.

Landais, Camille, Emmanuel Saez, and Gabriel Zucman. 2020. "A Progressive European Wealth Tax to Fund the European COVID Response." In Europe in the Time of Covid-19. , ed. Agnès Bénassy-Quéré and Beatrice Weder di Mauro, 113–118. VoxEU.org.

Mallet, Bernard. 1908. "A Method of Estimating Capital Wealth from the Estate Duty Statistics." Journal of the Royal Statistical Society, 71(1): 65–101.

Mallet, Bernard, and H. C. Strutt. 1915. "The Multiplier and Capital Wealth." Journal of the Royal Statistical Society, 78(4): 555–599.

Modigliani, Franco. 1986. "Life Cycle, Individual Thrift, and the Wealth of Nations." Science, 234(4777): 704–712.

Morelli, Salvatore, Twisha Asher, Frincasco Di Biase, Franziska Disslbacher, Ignacio Flores, Adam Rego Johnson, Giacomo Rella, Manuel Schechtl, Francesca Subioli, and Matteo Targa. 2023. "The GC Wealth Project Data Warehouse v.1 - Documentation." Stone Center on Socio-Economic Inequality Working Paper Series – N 75.

Nolan, Brian. 1991. The Wealth of Irish Households: What Can We Learn from Survey Data? Dublin: Combat Poverty Agency.

Pfeffer, Fabian T., and Nora Waitkus. 2021. "The Wealth Inequality of Nations." American Sociological Review, 86(4): 567–602.

Revell, Jack R. S. 1967. The Wealth of the Nation. Cambridge University Press.

Saez, Emmanuel, and Gabriel Zucman. 2016. "Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data." Quarterly Journal of Economics, 131(2): 519–578.

Saez, Emmanuel, and Gabriel Zucman. 2019. "Progressive Wealth Taxation." Brookings Papers on Economic Activity, 2019(2): 437–533.

Saez, Emmanuel, and Gabriel Zucman. 2020a. "The Rise of Income and Wealth Inequality in America: Evidence from Distributional Macroeconomic Accounts." Journal of Economic Perspectives, 34(4): 3–26.

Saez, Emmanuel, and Gabriel Zucman. 2020b. "Trends in US Income and Wealth Inequality: Revising After the Revisionists." National Bureau of Economic Research Working Paper 27921.

Saez, Emmanuel, and Gabriel Zucman. 2022. "Top Wealth in America: A Reexamination." National Bureau of Economic Research Working Paper 30396.

Scheve, Kenneth, and David Stasavage. 2016. Taxing the Rich: A History of Fiscal Fairness in the United States and Europe. Princeton University Press.

Seelkopf, Laura, Moritz Bubek, Edgars Eihmanis, Joseph Ganderson, Julian Limberg, Youssef Mnaili, Paula Zuluaga, and Philipp Genschel. 2019. "The Rise of Modern Taxation: A New Comprehensive Dataset of Tax Introductions Worldwide." Review of International Organizations, 16: 239–263.

Shorrocks, Anthony F. 1975. "The Age-Wealth Relationship: A Cross-Section and Cohort Analysis." Review of Economics and Statistics, 57(2): 155–163.

Smith, Matthew, Owen Zidar, and Eric Zwick. 2023. "Top Wealth in America: New Estimates under Heterogeneous Returns." Quarterly Journal of Economics, 138(1): 515–573.

UN World Population Prospects. 2022. population.un.org/wpp/.

World Inequality Database. 2022. wid.world.

A Examples of published statistical information from the administration of estate and inheritance taxes

Figure A.1: Published table from the administration of the estate duties. Frequencies. United Kingdom, 1924–1925.

TABLE 20.—Classification, according to the Aggregate Amount of the Estate and the Age and Sex of the Deceased, of the Number of Estates upon which Estate Duty was paid in 1924–25.

ENGLAND ONLY.

Class of Estate.		Age Groups.								Total Number of Estates.
		Under 25 years.	25 to 34.	35 to 44.	45 to 54.	55 to 64.	65 to 74.	75 to 84.	85 and upwards.	
MALES.										
Fixed duty Estates.		366	1,220	1,928	2,942	4,690	5,251	3,480	709	20,586
Exceeding £ net.	Not exceeding £ net.									
100	1,000	96	422	996	1,904	3,175	3,713	2,242	528	13,076
1,000	5,000	47	196	660	1,528	3,245	4,135	2,981	758	13,550
5,000	10,000	6	29	89	300	681	1,008	821	223	3,157
10,000	25,000	4	17	49	227	506	751	604	183	2,341
25,000	50,000	2	3	5	60	166	301	235	81	853
50,000	100,000	2	1	8	23	62	132	113	56	397
100,000	250,000	—	—	6	15	40	64	75	32	232
250,000	—	—	1	—	5	11	25	27	12	81
	Total ..	523	1,889	3,741	7,004	12,576	15,380	10,578	2,582	54,273
FEMALES.										
Fixed duty Estates.		152	533	1,152	2,149	3,454	4,547	3,461	939	16,387
Exceeding £ net.	Not exceeding £ net.									
100	1,000	26	134	509	1,130	2,015	2,828	2,385	794	9,821
1,000	5,000	20	90	298	789	1,642	2,720	2,608	908	9,075
5,000	10,000	1	11	36	138	280	533	568	283	1,850
10,000	25,000	2	3	13	88	159	275	431	243	1,214
25,000	50,000	—	2	4	22	35	85	138	57	343
50,000	100,000	—	—	4	6	15	30	42	38	135
100,000	250,000	—	—	1	4	5	11	9	14	44
250,000	—	—	—	1	2	1	6	1	1	12
	Total ..	201	773	2,018	4,328	7,606	11,035	9,643	3,277	38,881
	All Estates ..	724	2,662	5,759	11,332	20,182	26,415	20,221	5,859	93,154

Notes: In this case, the distribution of estates by age and gender is provided. *Source:* House of Commons Parliamentary Papers; Annual Report of the Inland Revenue 68.

Figure A.2: Table from the administration of estate duties. Amounts. United Kingdom, 1924–1925.

TABLE 21.—Classification, according to the Aggregate Amount of the Estate and the Age and Sex of the Deceased, of the Net Capital Value upon which Estate Duty was paid in 1924–25.

ENGLAND ONLY.

Class of Estate.	Age Groups.								Total Net Capital Value.
	Under 25 years.	25 to 34.	35 to 44.	45 to 54.	55 to 64.	65 to 74.	75 to 84.	85 and upwards.	
	£	£	£	£	£	£	£	£	£
MALES.									
Fixed duty Estates	84,225	307,520	496,000	808,492	1,328,827	1,487,193	946,551	188,733	5,641,541
Exceeding £ net. / Not exceeding £ net.									
100 1,000	57,371	253,417	576,200	1,177,087	2,051,807	2,426,764	1,478,937	346,461	8,368,034
1,000 5,000	88,589	428,132	1,593,184	3,653,254	7,936,804	10,324,940	7,528,045	2,034,029	33,586,977
5,000 10,000	47,551	217,734	688,156	2,344,809	5,432,651	7,960,158	6,459,745	1,745,306	24,896,110
10,000 25,000	84,947	286,490	879,246	3,875,645	8,815,591	13,264,331	11,186,609	3,481,440	41,874,299
25,000 50,000	87,103	161,923	278,201	2,312,296	6,974,644	12,230,501	9,086,644	3,479,118	34,610,430
50,000 100,000	121,117	65,490	593,440	1,443,261	4,679,460	9,985,217	9,107,004	4,731,675	30,726,664
100,000 250,000	188,274	46,948	1,124,274	3,696,532	7,641,377	12,215,655	14,684,082	5,542,891	45,140,033
250,000 —	96,662	292,822	877,640	3,597,295	9,160,251	15,002,801	19,193,035	11,660,829	59,881,335
Total ..	855,839	2,054,476	7,106,341	22,908,671	54,021,412	84,897,560	79,670,642	33,210,482	284,725,423
FEMALES.									
Fixed duty Estates	37,969	125,568	286,535	549,579	897,980	1,195,703	931,809	256,699	4,281,842
Exceeding £ net. / Not exceeding £ net.									
100 1,000	15,927	98,646	387,410	837,420	1,606,630	2,321,175	1,999,780	682,228	7,949,216
1,000 5,000	57,284	244,952	795,109	2,138,123	4,446,627	7,877,883	7,513,806	2,766,742	25,840,506
5,000 10,000	11,614	108,335	287,172	1,156,113	2,546,039	5,100,107	5,478,540	2,685,224	17,373,744
10,000 25,000	38,295	64,903	349,904	1,600,322	3,473,364	5,642,339	8,630,334	5,023,411	24,823,472
25,000 50,000	—	92,140	242,840	763,178	1,586,904	3,937,465	5,835,531	2,493,297	14,951,355
50,000 100,000	—	—	353,162	572,402	1,371,621	2,452,828	3,059,860	2,989,423	10,799,326
100,000 250,000	7,068	25	262,978	625,166	1,438,324	2,348,178	1,733,455	1,853,771	8,268,965
250,000 —	—	189,868	253,050	888,731	1,286,485	2,085,517	2,012,728	666,579	7,382,958
Total ..	168,137	925,037	3,218,160	9,131,034	18,654,574	32,961,195	37,195,873	19,417,374	121,671,384
All Estates ..	1,023,976	2,979,513	10,324,501	32,039,705	72,675,986	117,858,755	116,866,515	52,627,856	406,396,807

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Notes: In this case, the distribution of estates by age and gender is provided. *Source:* House of Commons Parliamentary Papers; Annual Report of the Inland Revenue 68.

Figure A.3: Table from the administration of the succession tax. Belgium, 1937–1938.

STATISTIQUE DES SUCCESSIONS D'APRÈS L'IMPORTANCE DE LEUR ACTIF NET.

STATISTIEK DER NALATENSCHAPPEN NAAR HET NETTO-BEDRAG DER ACTIVA.

(Source : Id.) (Bron :Id.)

SPÉCIFICATIONS / OPSOMMING	Nombre de déclarations Aantal aangiften		Montant net de l'actif Netto-bedrag der activa (1000 fr.)		SPÉCIFICATIONS / OPSOMMING	Nombre de déclarations Aantal aangiften		Montant net de l'actif Netto-bedrag der activa (1000 fr.)	
	1937	1938	1937	1938		1937	1938	1937	1938
Moins de 1,000 francs / Minder dan 1,000 fr.	1,652	1,682	913	1,086	500,000 fr. — 1,000,000	597	620	413,520	426,831
					1,000,000 fr. — 2,000,000	276	274	388,792	397,288
1,000 fr. — 5,000	4,453	4,701	13,775	14,211	2,000,000 fr. — 5,000,000	148	169	454,536	522,487
5,000 fr. — 10,000	5,382	5,481	40,214	41,140	5,000,000 fr. — 10,000,000	62	33	417,841	245,335
10,000 fr. — 25,000	12,146	12,609	204,480	214,753	10,000,000 fr. — 20,000,000	17	15	200,801	207,390
25,000 fr. — 50,000	9,048	9,339	322,652	337,238	plus de 20,000,000				
50,000 fr. — 100,000	6,157	6,605	430,251	457,719	Meer dan 20,000,000	8	6	231,980	209,993
100,000 fr. — 250,000	4,405	4,547	671,903	704,223					
250,000 fr. — 500,000	1,402	1,398	480,525	490,538	**Totaux . . . . . Totalen.**	**45,753**	**47,479**	**4,272,183**	**4,270,232**

(a) Les inscriptions hypothécaires renouvelées sont comptées comme nouvelles inscriptions.— De hernieuwde hypothecaire inschrijvingen zijn als nieuwe inschrijvingen geteld.

Source: Ministère des Affaires Économiques, Office Centrale de Statistique, Annuaire Statistique de la Belgique et du Congo Belge 1940. Volume LXII. page 162.

Figure A.4: Table from the administration of inheritance tax. Japan, 2017.

5－2　課税価格階級別
Breakdown of Taxable amount class

(1)　人員、課税価格、税額
Number of persons, Taxable amount, and Amount of tax

課税価格階級 Taxable amount class		申告状況 Statistics of filing returns					
		被相続人の数 Number of ancestors	課税価格 Taxable amount	うち相続時精算課税適用財産価額 Donated property value (taxation system for settlement at the time of inheritance) included in taxable value	うち暦年課税分贈与財産価額 Donated property value (calendar-year taxation) included in taxable value	納付税額 Amount of tax payment	法定相続人の数 Number of legal heirs
		人 Person	百万円 Million yen	百万円 Million yen	百万円 Million yen	百万円 Million yen	人 Person
5 千万円以下	Less than 50 million yen	30, 442	1, 162, 517	20, 043	7, 627	6, 379	74, 476
5 千万円 超	Over 50 million yen	65, 900	4, 652, 087	55, 065	37, 681	139, 245	185, 240
1 億 円 〃	100	31, 642	4, 310, 053	45, 613	38, 832	329, 048	98, 055
2 億 円 〃	200	7, 828	1, 884, 760	19, 492	16, 633	242, 758	25, 806
3 億 円 〃	300	4, 789	1, 807, 491	17, 272	15, 902	314, 578	16, 116
5 億 円 〃	500	1, 578	926, 129	10, 631	7, 582	202, 397	5, 414
7 億 円 〃	700	875	724, 225	6, 726	5, 546	178, 980	3, 032
10 億 円 〃	1 billion yen	633	844, 241	12, 139	6, 221	241, 879	2, 227
20 億 円 〃	2	114	273, 168	1, 555	1, 613	88, 222	417
30 億 円 〃	3	50	186, 757	11, 112	659	74, 459	162
50 億 円 〃	5	11	65, 252	3, 853	76	24, 759	43
70 億 円 〃	7	3	23, 758	－	10	12, 524	7
100 億 円 〃	10	16	381, 507	10, 998	11, 073	163, 293	52
合　計	**Total**	**143, 881**	**17, 241, 945**	**214, 499**	**149, 455**	**2, 018, 521**	**411, 047**

Notes: In this case, only the distribution of estates by ranges is available; no demographic information of age or gender is provided. *Source:* The 143rd National Tax Agency Annual Statistics Report.

Figure A.5: Table from the administration of estate duties. South Africa, 1962.

TABLE/TABEL 11 B T28 STATE/STAAT

ESTATE DUTY/BOEDELBELASTING

DUTIABLE VALUE/ BELASBARE WAARDE	NUMBER OF ESTATES / GETAL BOEDELS	NUMBER OF ESTATES WITH SURVIVING SPOUSE/ GETAL BOEDELS MET LANGSLEWENDE EGGENOOT	NUMBER OF CHILDREN/ GETAL KINDERS	TOTAL ASSETS SEE STATEMENT 11A TOTALE BATES KYK STAAT 11A R1,000
UNDER/ONDER R20,001	19,779	12,098	52,549	85,385
R20,001 - R22,000	208	118	464	5,441
R22,001 - R24,000	147	83	398	4,035
R24,001 - R26,000	152	79	374	4,435
R26,001 - R28,000	113	63	298	3,810
R28,001 - R30,000	93	52	175	3,481
R30,001 - R32,000	107	60	284	4,072
R32,001 - R34,000	78	48	213	2,961
R34,001 - R36,000	60	27	148	2,473
R36,001 - R38,000	91	48	250	4,171
R38,001 - R40,000	55	34	119	2,960
R40,001 - R44,000	111	64	283	5,987
R44,001 - R48,000	105	71	234	6,110
R48,001 - R52,000	90	60	209	5,570
R52,001 - R56,000	64	25	173	4,090
R56,001 - R60,000	55	36	154	3,888
R60,001 - R70,000	138	86	348	11,810
R70,001 - R80,000	104	62	265	9,459
R80,001 - R90,000	76	42	190	8,049
R90,001 - R100,000	48	31	124	5,315
OVER/BO R100,000	274	175	626	62,344
TOTALS / TOTALE	21,948	13,362	57,878	245,846

NOTE - THESE STATISTICS RELATE TO ESTATES OF PERSONS WHO DIED DURING THE 1962 CALENDER YEAR AND COVER ESTATES WHICH HAVE BEEN EXAMINED UP TO 30-6-1968.

Notes: In this case, only the distribution of estates by ranges is available; no demographic information of age or gender is provided. *Source:* Republic of South Africa. Report of the Secretary for Inland Revenue for the year 1966–1967.

B Mortality rates by age

Age is the most important statistical determinant of mortality. Figure B.1 shows the mortality rates in France, Italy, the United Kingdom, and the United States in 1950, 1970, 1990, and 2010, based on the Human Mortality Database (2022). It illustrates that mortality rates increase exponentially with age above the age of 40.

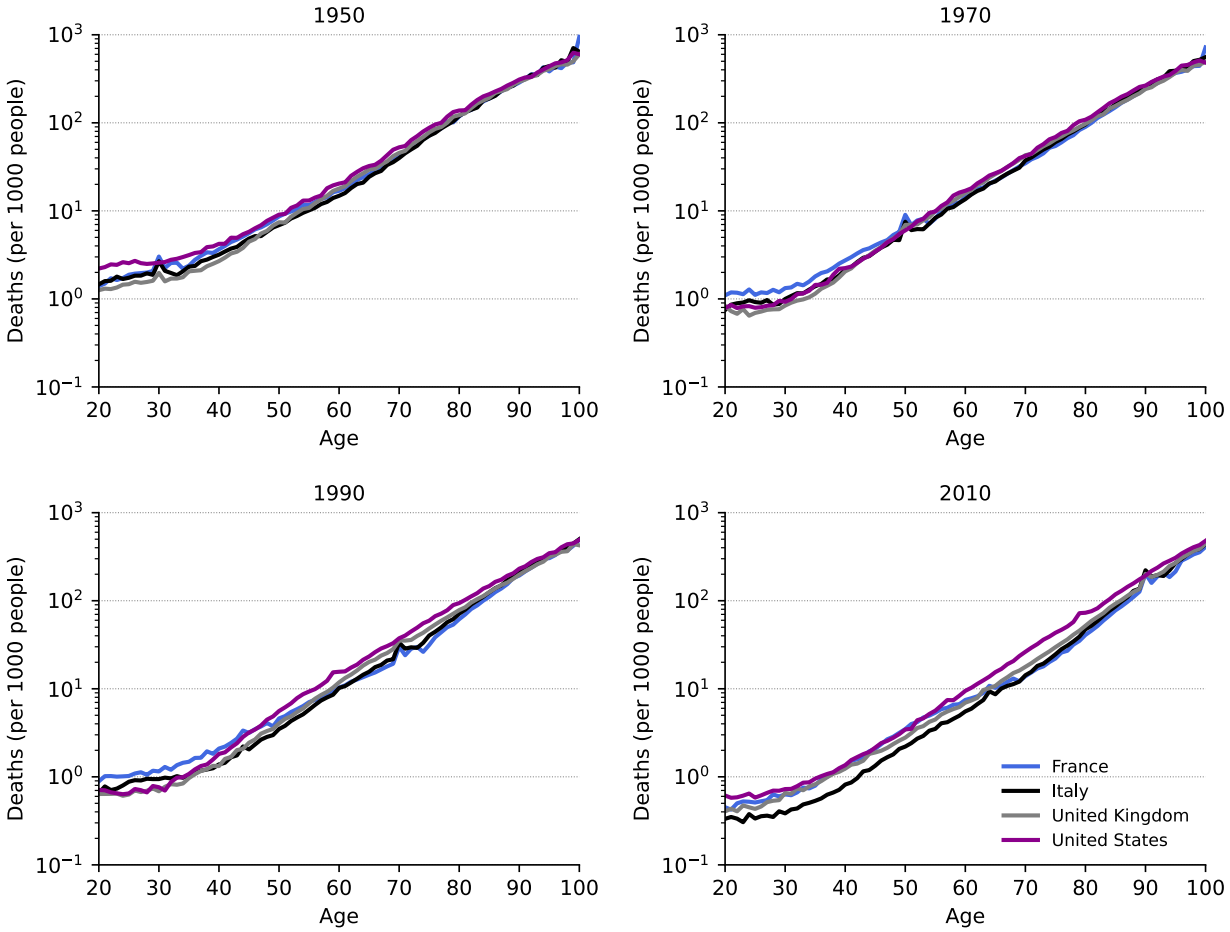

Figure B.1: Mortality rates in France, Italy, the United Kingdom, and the United States in 1950, 1970, 1990, and 2010.

Source: The Human Mortality Database (2022).

C The coefficients of variation of estates and wealth

To illustrate the similarity between the concentration of wealth and of estates it is possible to compare the coefficient of variation (CV) of the wealth distribution with and without multipliers. It clarifies the intuition for the result obtained for top shares discussed in the paper. Yet it is conceptually simpler, since the index I_q does not play a role in the CV. It is also not limited to a specific quantile q, but involves the entire distribution.

The coefficient of variation of estates, denoted Y_E, follows

$$Y_E^2 = \frac{\sigma_E^2}{\bar{w}_E^2}\,. \tag{C.1}$$

The coefficient of variation of wealth, denoted Y_W, follows

$$Y_W^2 = \frac{\sigma_W^2}{\bar{w}_W^2}\,, \tag{C.2}$$

where σ_E^2 is the variance of estates, σ_W^2 is the variance of wealth, $\bar{w}_E$ is the average estate, and $\bar{w}_W$ is the average wealth.

We begin by writing down expressions for the variance of estates and wealth:

$$\sigma_E^2 \quad = \tfrac{1}{N_E}\textstyle\sum_{i=1}^{N_E} w_{E,i}^2 - \tfrac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2; \tag{C.3}$$

$$\sigma_W^2 \quad = \tfrac{1}{N}\textstyle\sum_{i=1}^{N_E} m_i w_{E,i}^2 - \tfrac{1}{N^2}\left(\sum_{i=1}^{N_E} m_i w_{E,i}\right)^2. \tag{C.4}$$

Therefore we get

$$Y_E^2 = \frac{\frac{1}{N_E}\sum_{i=1}^{N_E} w_{E,i}^2 - \frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2}{\frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2}\,, \tag{C.5}$$

and

$$Y_W^2 = \frac{\frac{1}{N}\sum_{i=1}^{N_E} m_i w_{E,i}^2 - \frac{1}{N^2}\left(\sum_{i=1}^{N_E} m_i w_{E,i}\right)^2}{\frac{1}{N^2}\left(\sum_{i=1}^{N_E} m_i w_{E,i}\right)^2}\,. \tag{C.6}$$

Denoting μ the ratio between the average estate and the average wealth (*i.e.*, the average wealth of the decedents divided by the average wealth of the living)

$$\mu = \frac{\frac{1}{N_E}\sum_{i=1}^{N_E} w_{E,i}}{\frac{1}{N}\sum_{i=1}^{N_E} m_i w_{E,i}} = \bar{m}\frac{\sum_{i=1}^{N_E} w_{E,i}}{\sum_{i=1}^{N_E} m_i w_{E,i}}\,, \tag{C.7}$$

then

$$\frac{1}{N^2}\left(\sum_{i=1}^{N_E} m_i w_{E,i}\right)^2 = \frac{1}{\mu^2}\cdot\frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2\,, \tag{C.8}$$

Therefore

$$Y_W^2 = \frac{\frac{1}{N}\sum_{i=1}^{N_E} \mu^2 m_i w_{E,i}^2 - \frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2}{\frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2}\,. \tag{C.9}$$

We can then rearrange Y_W^2 and get

$$Y_W^2 = Y_E^2 - \frac{\frac{1}{N_E}\sum_{i=1}^{N_E} w_{E,i}^2}{\frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2} + \frac{\frac{1}{N}\sum_{i=1}^{N_E} \mu^2 m_i w_{E,i}^2}{\frac{1}{N_E^2}\left(\sum_{i=1}^{N_E} w_{E,i}\right)^2}\,. \tag{C.10}$$

Taking $N = \bar{m}N_E$ we get

$$Y_W^2 = Y_E^2\left(1 + \frac{\frac{1}{N_E}\sum_{i=1}^{N_E}\left(\frac{\mu^2 m_i}{\bar{m}} - 1\right) w_{E,i}^2}{\sigma_E^2}\right)\,. \tag{C.11}$$

D Wealth concentration estimates for Belgium, Japan and South Africa

The tables below detail the new top wealth series produced for Belgium, Japan, and South Africa in Section 4.

Table D.1: Belgium: Top wealth shares (% of total personal wealth)

	Top 10%	Top 1%	Top 0.1%	Top 0.01%
1935	79.78	45.15	19.49	6.25
1936	80.03	46.10	22.39	8.37
1937	81.16	47.15	20.66	6.04
1938	79.69	44.80	19.43	6.34
1939	80.01	45.22	20.74	4.68
1940	81.18	46.57	24.59	11.30
1941	78.64	42.26	15.45	3.78
1942	79.56	44.29	20.05	5.44
1943	77.97	40.73	15.07	4.30
1944	82.39	43.54	17.11	4.39
1945	74.94	39.00	14.81	4.05
1946	73.27	37.95	15.47	3.91
1947	74.56	40.82	18.12	5.96
1948	73.87	39.94	18.82	7.85
1949	71.72	35.19	14.50	3.67
1950	72.93	36.01	14.64	4.53
1951	72.26	36.43	14.23	4.20
1952	70.86	34.86	13.90	3.47
1953	70.42	35.17	14.68	5.08
1954	71.30	35.78	14.30	3.87
1955	73.12	38.78	16.55	5.09
1956	73.12	37.28	15.07	5.38
1957	72.97	36.89	15.62	6.21
1958	72.26	37.18	15.70	4.73
1959	72.31	38.11	18.87	11.84
1960	73.06	37.91	17.24	5.85
1961	72.98	38.55	17.76	7.71
1962	70.99	37.43	15.17	4.30
1968	69.44	31.96	12.47	3.34
1969	70.08	32.92	12.99	3.91
1973	66.77	29.21	11.06	3.73
1974	65.70	28.68	10.84	3.07
1975	64.19	26.25	8.34	1.97
1977	61.71	24.33	8.46	2.32
1978	61.08	23.54	7.71	2.23
1981	59.46	23.76	8.62	2.52
1982	56.94	21.17	7.38	1.65
1984	56.60	20.68	6.37	1.61
1985	57.06	20.76	6.64	1.76
1987	56.02	19.98	6.25	1.52
1988	56.74	22.03	8.32	3.15
1990	56.24	20.59	7.12	2.35
1991	57.16	21.30	7.14	2.27
1994	55.23	19.12	5.46	1.34

Table D.2: Japan: Top wealth shares (% of total personal wealth)

	Top 1%	Top 0.1%	Top 0.01%
1970	25.24	8.26	2.11
1971	29.34	9.58	2.53
1972	27.10	9.08	2.61
1973	28.35	9.08	2.57
1974	27.96	8.77	2.22
1975	27.49	8.77	2.60
1976	26.80	8.29	2.07
1977	26.50	8.29	2.18
1978	25.92	8.08	2.06
1979	24.04	7.09	1.67
1980	24.03	7.52	1.84
1981	26.27	8.18	1.98
1982	27.33	8.58	2.20
1983	27.40	8.81	2.40
1984	27.06	8.22	1.98
1985	28.18	8.82	2.20
1986	26.47	8.37	2.21
1987	26.66	9.02	2.67
1988	29.94	10.75	3.40
1989	35.17	13.52	4.31
1990	35.86	12.60	3.54
1991	43.91	15.35	4.37
1992	46.70	15.44	3.80
1993	41.31	13.31	3.41
1994	36.82	11.82	2.91
1995	35.34	10.86	2.61
1996	33.16	10.20	2.35
1997	31.92	10.11	2.78
1998	29.21	8.70	2.00
1999	27.93	8.49	2.17
2000	26.33	7.93	1.89
2001	26.61	8.56	2.54
2002	24.44	7.43	1.97
2003	23.42	7.02	1.59
2004	22.37	6.86	2.08
2005	22.09	7.10	2.21
2006	22.38	7.39	2.46
2007	22.22	7.21	2.22
2008	22.49	7.22	1.98
2009	21.92	6.84	1.83
2010	21.16	6.34	1.59
2011	21.14	6.76	1.99
2012	20.79	6.55	1.95
2013	22.12	8.21	3.52
2014	20.26	6.60	2.03
2015	20.07	6.59	2.04
2016	19.87	6.55	2.05
2017	19.81	6.70	2.41

Table D.3: South Africa: Top wealth shares (% of total personal wealth)

	Top 0.1% (internal total)	Top 0.1% (external total)	Top 0.01% (internal total)	Top 0.01% (external total)
1924	28.42	19.58	6.46	4.45
1925	28.53	21.62	7.78	5.89
1926	24.94	20.07	7.23	5.82
1927	28.48	24.82	11.95	10.42
1928	29.17	22.96	10.82	8.52
1929	27.38	23.08	9.76	8.23
1930	40.45	37.68	23.71	22.09
1931	33.20	24.44	16.76	12.33
1932	31.49	22.17	12.26	8.63
1934	27.45	20.59	8.46	6.34
1935	26.35	22.03	7.75	6.48
1936	25.81	23.96	6.51	6.04
1937	30.80	27.96	13.81	12.53
1938	27.58	24.15	11.06	9.68
1939	28.16	21.50	10.33	7.89
1940	28.26	22.98	10.35	8.42
1941	29.17	21.85	11.28	8.44
1943	25.63	20.56	9.55	7.66
1944	22.23	18.86	7.31	6.20
1945	22.46	19.17	7.96	6.80
1946	24.46	17.53	8.15	5.84
1947	20.26	18.55	5.84	5.34
1948	18.92	19.40	5.73	5.87
1949	21.53	20.31	8.94	8.43
1950	22.06	18.62	7.23	6.10
1953	15.49	10.26	3.31	2.19
1954	15.71	11.81	3.69	2.77
1955	15.64	12.84	5.05	4.15
1956	18.62	14.68	6.00	4.73
1957	16.12	11.39	4.12	2.91
1958	14.35	13.08	6.43	5.86
1960	14.01	12.22	2.86	2.49
1961	16.62	12.65	1.95	1.49
1962	17.69	14.21	3.23	2.59
1963	12.40	10.00	1.32	1.07
1964	12.79	11.06	1.49	1.28
1965	14.72	10.26	2.14	1.49
1973	16.08	19.10	4.59	5.45
1974	16.43	19.24	5.51	6.45
1975	12.98	16.15	2.62	3.26
1976	11.72	14.63	2.44	3.05
1977	11.53	14.78	2.35	3.02
1978	12.8	17.37	3.16	4.29
1979	16.73	18.21	5.21	5.67
1980	13.6	12.05	3.99	3.54
1981	13.88	13.70	4.38	4.33
1982	11.3	11.66	3.05	3.15
1983	14.41	14.76	4.08	4.18
1984	12.87	5.02	3.88	1.52
1985	13.99	9.04	4.67	3.02

E Sources for the distribution of estates

Table E.1: Sources for the distribution of estates: Belgium

Annuaire Statistique de la Belgique et du Congo Belge	Tome	LX	Year	1938	p.	145
Annuaire Statistique de la Belgique et du Congo Belge	Tome	LXI		1939	p.	154
Annuaire Statistique de la Belgique et du Congo Belge	Tome	LXII		1940	p.	162
Annuaire Statistique de la Belgique et du Congo Belge	Tome	LXIII		1941	p.	148
Annuaire Statistique de la Belgique et du Congo Belge	Tome	LXIV		1942	p.	156
Annuaire Statistique de la Belgique et du Congo Belge	Tome	LXV		1943	p.	118
Annuaire Statistique de la Belgique et du Congo Belge	Tome	69		Mars 1949	p.	218
Annuaire Statistique de la Belgique et du Congo Belge	Tome	70		Mars 1950	p.	250
Annuaire Statistique de la Belgique et du Congo Belge	Tome	71		1951	p.	270
Annuaire Statistique de la Belgique et du Congo Belge	Tome	73		1952	p.	289
Annuaire Statistique de la Belgique et du Congo Belge	Tome	74		1953	p.	343
Annuaire Statistique de la Belgique et du Congo Belge	Tome	75		1954	p.	384
Annuaire Statistique de la Belgique et du Congo Belge	Tome	76		1955	p.	361
Annuaire Statistique de la Belgique et du Congo Belge	Tome	77		1956	p.	325
Annuaire Statistique de la Belgique et du Congo Belge	Tome	78		1957	p.	331
Annuaire Statistique de la Belgique et du Congo Belge	Tome	79		1958	p.	347
Annuaire Statistique de la Belgique et du Congo Belge	Tome	80		1959	p.	357
Annuaire Statistique de la Belgique	Tome	81		1960	p.	355
Annuaire Statistique de la Belgique	Tome	82		1961	p.	367
Annuaire Statistique de la Belgique	Tome	83		1962	p.	375
Annuaire Statistique de la Belgique	Tome	84		1963	p.	395
Annuaire Statistique de la Belgique	Tome	85		1964	p.	403
Annuaire Statistique de la Belgique	Tome	86		1965	p.	407
Annuaire Statistique de la Belgique	Tome	87		1966	p.	415
Annuaire Statistique de la Belgique	Tome	88		1967	p.	419
Annuaire Statistique de la Belgique	Tome	89		1968	p.	431
Annuaire Statistique de la Belgique	Tome	90		1970	p.	517
Annuaire Statistique de la Belgique	Tome	91		1971	pp.	484-485
Annuaire Statistique de la Belgique	Tome	92		1972	pp.	478-479
Annuaire Statistique de la Belgique	Tome	93		1973	pp.	522-523
Annuaire Statistique de la Belgique	Tome	94		1974	pp.	524-525
Annuaire Statistique de la Belgique	Tome	95		1975	pp.	506-507
Annuaire Statistique de la Belgique	Tome	96		1976	pp.	512-513
Annuaire Statistique de la Belgique	Tome	97		1977	pp.	528-529
Annuaire Statistique de la Belgique	Tome	98		1978	pp.	492-493
Annuaire Statistique de la Belgique	Tome	99		1979	pp.	488-489
Annuaire Statistique de la Belgique	Tome	100		1980	pp.	516-517
Annuaire Statistique de la Belgique	Tome	101		1981	pp.	524-525
Annuaire Statistique de la Belgique	Tome	102		1982	pp.	520-521
Annuaire Statistique de la Belgique	Tome	103		1983	pp.	512-513
Annuaire Statistique de la Belgique	Tome	104		1984	pp.	510-511
Annuaire Statistique de la Belgique	Tome	105		1985	pp.	492-493
Annuaire Statistique de la Belgique	Tome	106		1986	pp.	494-495
Annuaire Statistique de la Belgique	Tome	107		1987	pp.	506-507
Annuaire Statistique de la Belgique	Tome	108		1988	pp.	496-497
Annuaire Statistique de la Belgique	Tome	109		1989	pp.	492-493
Annuaire Statistique de la Belgique	Tome	110		1990	pp.	494-495
Annuaire Statistique de la Belgique	Tome	111		1991	pp.	490-491
Annuaire Statistique de la Belgique	Tome	112		1994	pp.	496-497
Annuaire Statistique de la Belgique	Tome	113		1995	pp.	510-511

Table E.2: Sources for the distribution of estates: Japan

The 96th National Tax Agency Annual Statistics Report	FY1970
The 97th National Tax Agency Annual Statistics Report	FY1971
The 98th National Tax Agency Annual Statistics Report	FY1972
The 99th National Tax Agency Annual Statistics Report	FY1973
The 100th National Tax Agency Annual Statistics Report	FY1974
The 101st National Tax Agency Annual Statistics Report	FY1975
The 102nd National Tax Agency Annual Statistics Report	FY1976
The 103rd National Tax Agency Annual Statistics Report	FY1977
The 104th National Tax Agency Annual Statistics Report	FY1978
The 105th National Tax Agency Annual Statistics Report	FY1979
The 106th National Tax Agency Annual Statistics Report	FY1980
The 107th National Tax Agency Annual Statistics Report	FY1981
The 108th National Tax Agency Annual Statistics Report	FY1982
The 109th National Tax Agency Annual Statistics Report	FY1983
The 110th National Tax Agency Annual Statistics Report	FY1984
The 111th National Tax Agency Annual Statistics Report	FY1985
The 112th National Tax Agency Annual Statistics Report	FY1986
The 113th National Tax Agency Annual Statistics Report	FY1987
The 114th National Tax Agency Annual Statistics Report	FY1988
The 115th National Tax Agency Annual Statistics Report	FY1989
The 116th National Tax Agency Annual Statistics Report	FY1990
The 117th National Tax Agency Annual Statistics Report	FY1991
The 118th National Tax Agency Annual Statistics Report	FY1992
The 119th National Tax Agency Annual Statistics Report	FY1993
The 120th National Tax Agency Annual Statistics Report	FY1994
The 121st National Tax Agency Annual Statistics Report	FY1995
The 122nd National Tax Agency Annual Statistics Report	FY1996
The 123rd National Tax Agency Annual Statistics Report	FY1997
The 124th National Tax Agency Annual Statistics Report	FY1998
The 125th National Tax Agency Annual Statistics Report	FY1999
The 126th National Tax Agency Annual Statistics Report	FY2000
The 127th National Tax Agency Annual Statistics Report	FY2001
The 128th National Tax Agency Annual Statistics Report	FY2002
The 129th National Tax Agency Annual Statistics Report	FY2003
The 130th National Tax Agency Annual Statistics Report	FY2004
The 131st National Tax Agency Annual Statistics Report	FY2005
The 132nd National Tax Agency Annual Statistics Report	FY2006
The 133rd National Tax Agency Annual Statistics Report	FY2007
The 134th National Tax Agency Annual Statistics Report	FY2008
The 135th National Tax Agency Annual Statistics Report	FY2009
The 136th National Tax Agency Annual Statistics Report	FY2010
The 137th National Tax Agency Annual Statistics Report	FY2011
The 138th National Tax Agency Annual Statistics Report	FY2012
The 139th National Tax Agency Annual Statistics Report	FY2013
The 140th National Tax Agency Annual Statistics Report	FY2014
The 141 National Tax Agency Annual Statistics Report	FY2015
The 142th (sic) National Tax Agency Annual Statistics Report	FY2016
The 143th National Tax Agency Annual Statistics Report	FY2017

Note: FY is financial year.

Table E.3: Sources for the distribution of estates: South Africa

Union of South Africa		
Report of the Commissioner for Inland Revenue for the year	1922-1923	p. 7; p. 8
Report of the Commissioner for Inland Revenue for the year	1923-1924	Statement XIV, Statement XV
Report of the Commissioner for Inland Revenue for the year	1924-1925	Statement XIV, Statement XV
Report of the Commissioner for Inland Revenue for the year	1925-1926	Statement XVIII, Statement XIX
Report of the Commissioner for Inland Revenue for the year	1926-1927	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1927-1928	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1928-1929	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1929-1930	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1930-1931	Statement XXI
Report of the Commissioner for Inland Revenue for the year	1931-1932	Statement XXI
Report of the Commissioner for Inland Revenue for the year	1932-1933	Statement XX, Statement XXI
Annual Report of the Commissioner for Inland Revenue for the year	1934-1935	Statement XXI, Statement XXII
Annual Report of the Commissioner for Inland Revenue for the year	1935-1936	Statement XXI, Statement XXII
Annual Report of the Commissioner for Inland Revenue for the year	1936-1937	Statement XX, Statement XXI
Annual Report of the Commissioner for Inland Revenue for the year	1937-1938	Statement XX, Statement XXI
Annual Report of the Commissioner for Inland Revenue for the year	1938-1939	Statement XX, Statement XXI
Annual Report of the Commissioner for Inland Revenue for the year	1939-1940	Statement XX, Statement XXI
Annual Report of the Commissioner for Inland Revenue for the year	1940-1941	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1941-1942	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1943-1944	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1944-1945	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1945-1946	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1946-1947	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1947-1948	Statement XXI
Report of the Commissioner for Inland Revenue for the year	1948-1949	Statement XXI
Report of the Commissioner for Inland Revenue for the year	1949-1950	Statement XX, Statement XXI
Report of the Commissioner for Inland Revenue for the year	1950-1951	Statement 19, Statement 20
Report of the Commissioner for Inland Revenue for the year	1951-1952	Statement 19, Statement 20
Report of the Commissioner for Inland Revenue for the year	1953-1956	Statement 10
Report of the Commissioner for Inland Revenue for the year	1956-1957	Statement 10
Report of the Commissioner for Inland Revenue for the year	1957-1958	Statement 10
Report of the Commissioner for Inland Revenue for the year	1958-1959	Statement 10
Report of the Commissioner for Inland Revenue for the year	1959-1961	p. 36
Republic of South Africa		
Report of the Secretary for Inland Revenue for the year	1966-1967	T26 to T45
Statistical Bulletin Inland Revenue year	1983	Table 11
Statistical Bulletin N. 2 Inland Revenue year	1984	Table 11
Statistical Bulletin N. 3 Inland Revenue year	1985	p. 12
Statistical Bulletin N. 4 Inland Revenue year	1986	p. 6
Statistical Bulletin N. 5 Inland Revenue year	1987	p. 6
Statistical Bulletin N. 6 Inland Revenue year	1988	p. 10; p. 11