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APRIL 2023

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This version: 20th April 2023

Abstract

Italy is one the countries with the highest wealth-to-income ratio in the developed world, but knowledge about the size distribution of wealth is currently limited. In this paper we estimate the distribution of personal wealth between 1995 and 2016, a period of economic turbulence and structural reforms. For this, we use a novel source on the full records of inheritance tax files, combined with surveys and national accounts. Unlike available statistics from household surveys alone, our estimates point to a sharp inversion of fortunes between the top and the bottom of the wealth distribution since the mid-1990s. Whereas the level of wealth concentration in Italy is in line with other European countries, its time trend appears more in line with the U.S., showing a large increase. Moreover, Italy stands out as one of the countries with the strongest decline in the wealth share of the bottom 50% of the population. A range of alternative series of wealth concentration, including estimates applying no adjustments and imputations, confirm our main findings. The paper also sheds new light on the determinants of wealth inequality trends. First, we show that although average wealth increases with age, dispersion within age groups remains very high; hence age plays a marginal role in explaining wealth concentration. Second, we show that house prices explain little of the change in wealth across the distribution since 1995. Changes in equity prices account for a large share of wealth growth above the 99th percentile. However, all in all, changes in the volume of assets and savings appear to be the predominant force behind the increase in wealth inequality, even at the top. The probability of top earners to climb to the top of the wealth distribution has doubled since the 2000s. Third, we document the growing role of life-time wealth transfers receipts, their increasing concentration at the top, and their increasingly favourable tax treatment for the wealthy.

Keywords: Wealth inequality, wealth distribution, top wealth shares, distributional national accounts, estate concentration, inheritance and gifts, inheritance tax
JEL Codes: D3, H24, N3, G50

Introduction

The stock of private wealth is equivalent to seven years of national income in Italy as of 2019, making it one of the countries with the highest wealth-to-income ratio in the developed world.[1] Yet, very little is known about how this stock is distributed across the population. This paper provides novel estimates of the distribution of personal wealth, with a particular focus on high-end wealth groups, thus contributing to a growing body of literature focusing on this topic. We take a multi-source, multi-series approach, including the use of a newly assembled microdata set from the administration of the inheritance tax that provides information on the wealth holding of the deceased from 1995 to 2016 and that has not been systematically exploited so far. Data from the inheritance tax records are used to assess the distribution of the wealth; this is further complemented with household survey (to take into account the wealth of the population not represented in the tax records) and the national balance sheet (to impute tax-exempt and underreported assets). Our approach allows us to distribute for the first time the personal wealth from the national accounts (NA) in Italy, as discussed in Alvaredo et al. (2020), and to give a very different picture from the existing one arising from household surveys.

We consider the use of the inheritance tax data as a fundamental step to widen the windows of observation on the wealth distribution of Italy. Even if other sources and methods provide direct or indirect information about wealth holdings, few of them are, currently, easily applicable to the Italian case. Italy does not have a wealth tax besides the property tax, whereas tax-based distributional information on investment income is not readily available, as personal income tax on financial income is mainly withheld at source in Italy. This makes the application of the capitalization method impossible at present.[2]

This work provides the first set of comprehensive estimates of wealth distribution and concentration that complement those from the Survey of Households on Income and Wealth (SHIW), administered by the Bank of Italy since the late 1980s. The use of different data sources for the study of wealth inequality is essential, as every source is open to challenge and has different advantages and shortcomings. Moreover, household surveys are generally deemed to be less suited to capture the wealth holdings at the very top for a variety of reasons, namely the lack of over-sampling of wealthy households, and differential non-response and under-reporting rates across wealth classes (Kennickell, 2019, Vermeulen, 2017). On the contrary, the use of inheritance tax data increases the probability of better covering top wealth groups, despite the existence of tax avoidance and evasion. The administrative data guarantee a high coverage of the asset holdings of more than half of decedents—more than 60% in recent years.[3]

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1. See wid.world.

2. There are at least six potential sources of evidence to study the distribution of personal wealth: (i) administrative data on the wealth of the living derived from annual wealth taxes; (ii) administrative data on investment income, capitalized to yield estimates of the underlying wealth; (iii) administrative data on individual estates at death, multiplied up to yield estimates of the wealth of the living; (iv) household surveys; (v) lists of large wealth holders, such as the *Forbes* list; and (vi) population censuses.

3. This is the result of the combination of the very high homeownership rate with a key administrative feature of the tax, which is strictly connected to the upkeep of the cadastral (real estate) register: all inheritances involving the transfer of real estate property are obliged to file a return, even when no tax is due (and even during the period when the inheritance tax itself was abolished between 2001 and 2006).

Our estimates suggest that the wealth levels in the upper tail are substantially above what household surveys capture, and that the level of wealth concentration is also higher and with a more pronounced increasing trend. According to the SHIW, the share accruing to the richest 1% of adults (half a million individuals) has remained roughly unchanged between 1995 and 2016, at around 14% (these numbers are in line with the existing literature, Brandolini et al., 2004, Cannari and D'Alessio, 2018). Our estimates, instead, imply that the share of the top 1% increased from 16% in 1995 to 22% in 2016 (notably, of a much larger aggregate). The share accruing to the richest 5,000 adults (the top 0.01%) almost tripled, increasing from 1.8% to 5%.

As a preview of the main results, Figure 1 shows a stark inversion of fortunes since 1995. The richest 0.1% saw a twofold increase in their real net wealth (from €7.6 million to €15.8 million at 2016 prices), making its share double, from 5.5% to 9.3% (equivalent to a change from 55 to 93 times their proportionate share). In contrast, the poorest 50% controlled 11.7% in 1995, and 3.5% recently. This corresponds to a 80% drop in the average net wealth (from €27,000 to €7,000 at 2016 prices). Strong concentration increases were also recorded for the richest 10%, whose share went up from 44% in 1995 to 56% in 2016. In 1995, the share of the middle 40% was very similar to that of the top 10%, but it declined over time by almost 5 percentage points instead.

FIGURE 1. The inversion of fortunes between 1995 and 2016

(a) Top 0.1% and bottom 50% shares

(b) Top 10%, Middle 40%, and Bottom 50% shares

Note: The graphs show the shares of total personal net wealth accrued by the bottom 50% of the adult population (25 million individuals in 2016) ranked by total net wealth, the richest 0.1% (50,000 individuals), the top 10%, the middle 40%, and the bottom 50%, benchmark definition.

Our series are also triangulated with external evidence: *Forbes* rich list (tracking the evolution of the share of the 5 richest individuals since 1988, or the richest 10 since 2001) and Credit Suisse Report (Davies et al., 2017), and the picture is broadly consistent with the evidence assembled here.

The use of tax data does not come without costs, so we operate adjustments and imputations. First, the valuation of real estate has to be adjusted to bring cadastral values in line with market prices. Second, the distribution of decedents needs to be reshaped into the distribution of living wealth holders through the application of the mortality multiplier method. Third, allowance for

the wealth of the unidentified population in the tax data is estimated with household surveys. Fourth, not all assets are taxable, and their reporting may not be mandatory (e.g. government bonds and financial assets held in private pension and life insurance funds); this—requiring imputation—may be due to underreporting, differences in valuation, tax avoidance and evasion, as well as non-reporting due to lack of fiscal incentives to do so (filling in the complex tax form on the nature and composition of the estate might be regarded as an unnecessary burden when the resulting inheritance is below the taxable threshold).[4]

The benchmark approach adopted here is to distribute in full the balance sheet of the household sector from the NA. This is based *not* on the assumption that the balance sheet gives the correct numbers (as discussed in Section 1), but that they provide a reasonable indicator (enshrined in official statistics) of the development of aggregates over time, as well as offer the possibility of better cross-country comparison. Such a methodological decision comes at the cost of imputing the wealth not observed in the tax records and the household surveys. However, we also produce series based on tax and survey data before imputations. Similarly, we produce series after inclusion of unreported offshore wealth and households' durables. In our view, this multi-series approach, that is, one that offers the possibility of comparing the pieces of information given by different and competing data sources, is preferable to the alternative option of looking at one and only one series resulting from the combination of those sources. This allows us to present the benchmark series in the context of a wider range of values, representing different methods of estimation. On the one hand, this is useful to convince readers that the series of imputations, albeit important, may not drive the key findings about the evolution of wealth concentration, at least in the case of Italy. On the other hand, the approach is also crucial to compare our estimates to existing historical series that are not up-scaled to the NA (Gabbuti and Morelli, 2020 for Italy, Piketty et al., 2006 for France, Alvaredo and Saez, 2009 for Spain, Alvaredo et al., 2018 for the UK, and Roine and Waldenström, 2015 for Finland, Norway, the Netherlands, Sweden, and Switzerland etc.) as well as to recent work for the U.S., France, Spain, and Germany (Albers et al., 2020, Batty et al., 2019, Garbinti et al., 2021, Martínez-Toledano, 2017, Saez and Zucman, 2016) which follow the Distributional National Accounts (DINA) framework (Alvaredo et al., 2016, 2020).

The level of wealth concentration observed in Italy appears to be in line with other European countries; however, its time evolution is closer to that found in the U.S, showing a sharp increase. By contrast, whereas the Italian middle 40% share (P50-90) remains relatively high, the share of the bottom 50% experienced the strongest decline since the mid-1990s when compared to other countries.

The paper devotes space to measurement, because we firmly believe that it is necessary to inform the reader on the weaknesses and strengths of the produced evidence. However, the paper also sheds light on the determinants of the wealth inequality trends revealed by our analysis. In doing so, we make additional contributions to the literature.

First, our estimates suggest that although average wealth grows with age, the dispersion of wealth within each age (and gender) group is not too dissimilar from that in the overall

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4. Assets are sometimes reported despite their tax-exemption status (e.g., government bonds), motivating a partial adjustment.

population. Hence, age and life-cycle factors do not explain the current level of wealth concentration. This is not a novel finding, but it has not been sufficiently stressed in the literature so far.

Second, we also provide new evidence, in the Italian context, that asset portfolios are highly heterogeneous across the distribution. Wealthy Italians hold the greatest portion of their portfolios in financial and business assets, adults between the median and 90th percentile, in the form of real estate (mostly housing), whereas poorer adults hold the biggest share of gross wealth in current and saving accounts, valuables, and also hold an important share of debt. This heterogeneity of portfolios has an influence on the increased concentration of wealth: housing wealth contributes almost 60% for the Middle 40% between 1995 and 2016. The share drops to 35% and 9% for the Top 1% and the Top 0.1%, respectively. On the contrary, financial and business assets drive the dynamics of wealth accumulation especially at the top: they account for 57% and 85% of the growth of net wealth for the Top 1% and the Top 0.1% groups, respectively. On the contrary, the declining value of currency and deposits and increasing levels of indebtedness account for a third of the net wealth dynamics for the Bottom 50% group.

Third, and building on the portfolio heterogeneity analysis, we investigate whether the wealth growth across different groups is the result of the change of saving patterns or the change in the price of assets. Our results show that, despite the strong relevance of housing assets in the upper-middle segments of the wealth distribution, very little of the change in wealth recorded between 1995 and 2016 across the distribution can be attributable to changes in house prices. This is at odds with recent evidence by Kuhn et al. (2020) for the US. Similarly, more recent work by Bauluz et al. (2022) for Europe, the US, and China, claims that "housing capital gains have been the single most important factor moderating global wealth inequality in recent decades" (pp. 3-4). In Italy this is not found to be the case, given that house prices have gone up substantially till 2008 and then declined thereafter so that the cumulative capital gains are very small in the period. On the contrary, changes in equity prices account for a large share of wealth growth above the 99th percentile, whereas capital gains of all financial and business assets are almost irrelevant in the middle or the bottom part of the distribution (with the exception of the 1995-2008 sub-period). All in all, changes in the price of assets, do not appear to be the predominant force behind the increase in wealth concentration. Hence, results show that total savings (defined considering changes in deposits and valuables and any residual changes in the volume of housing and financial assets) account for a very large portion of growth in net wealth, both in the overall population and within the top decile. Interestingly, this occurred despite a sustained declining trend of the saving capacity of Italian households over the past decades. We also investigate the *joint distribution of income and wealth* and show that the probability of top 1% and top 0.1% labor income earners to climb to to the top 1% of the wealth distribution doubled between 2001 and 2014.

Lastly, we provide novel evidence on the growing role of wealth transfers (i.e. inheritance and gifts inter vivos), as well as their increasing concentration at the top. We also estimate that wealthy inheritors were subject to an overall decreasing tax burden over the past twenty years. A lower proportion of inheritances generated by large bequests are subject to taxation today with respect to mid 1990s. At the same time, the average tax burden of large bequests has also shrunk substantially, undermining the progressivity of the inheritance and gift tax. Changes in the patterns of wealth transfers receipts have an impact on long-run dynamics of

wealth concentration but this important channel of wealth accumulation has been neglected in the empirical literature on the determinants of wealth concentration. Although, our paper does not directly quantify the proportion of changes in wealth concentration that can be attributed to such changes, we hope these novel findings will be the base for more scrutiny by future research.

The paper is structured as follows. The first section describes the concept of net wealth, and the nature of the aggregate wealth of the household sector. Section two dwells on the structure of the inheritance tax in Italy, the available data, and the mortality multiplier method. The section also describes the valuation of specific asset classes as well as the wealth of the missing population and the tax-exempt assets. The third section shows the main empirical findings about the evolution of wealth inequality and concentration in Italy, including the comparison of our estimates with those available in other countries. The fourth section triangulates our evidence with that available from alternative sources of data. Section five discusses the role of different factors in driving wealth concentration in Italy. The sixth and last section presents a series of robustness checks. Our concluding remarks follow.

## 1. The macro dimension: the growing relevance of personal wealth in Italy

According to the national balance sheets, Italian households are among the wealthiest and least indebted among the rich economies. The net wealth per capita, taken as the sum of all financial and real assets minus liabilities, was €21,000 (2016 prices) in 1966, and had experienced an eight-fold increase to €164,000 in 2006, just before the onset of the financial crisis. Since then, as shown in Figure 2, it dropped to €141,000 in 2016. Such a remarkable drop of 14% did not occur in any of the other advanced economies with the exception of Spain.

Over the last five decades, about half of the gross wealth of the personal sector has been composed of housing and land assets. Official balance sheets, published jointly by the Bank of Italy and ISTAT, are only available for the the household sector including the non-profit sector serving households. As detailed in the appendix, we derive our own estimates just for the household sector excluding non-profit organizations, which are at the base of our distributional exercise. The weight of direct holding of equities, investment funds and indirect holding of financial securities via life insurance and private pension funds increased from 14% to 23% in the same period. Saving and current accounts, currency, and bonds decreased from 24% to 17%, as did business assets and other non-financial assets, from 5.8% to 3.5%. These huge mountains of assets mirror into very shallow waters of per capita indebtedness. Personal debt is €15,000 per capita, and although its share in total gross wealth has almost doubled since 1995, it remains one of the lowest indebtedness levels currently recorded in the rich world, in contrast to the situation of the debt of the public sector.

Comparisons with other countries could take purchasing power parity (PPP) into account. This would transform Italian wealth holdings for 2016 to €150,000, which can be compared to Japan and France (€150,000), Germany and Spain (€140,000), the UK (€180,000) and the U.S. (€190,000).

Italy is also one of the countries with the highest ratios of private wealth to national income. More than seven years of national income are needed to account for the net worth of the household and non-profit sectors. This ratio was close to 2 around 1970 (and close to 6 in

FIGURE 2. The growing relevance of households per capita net wealth
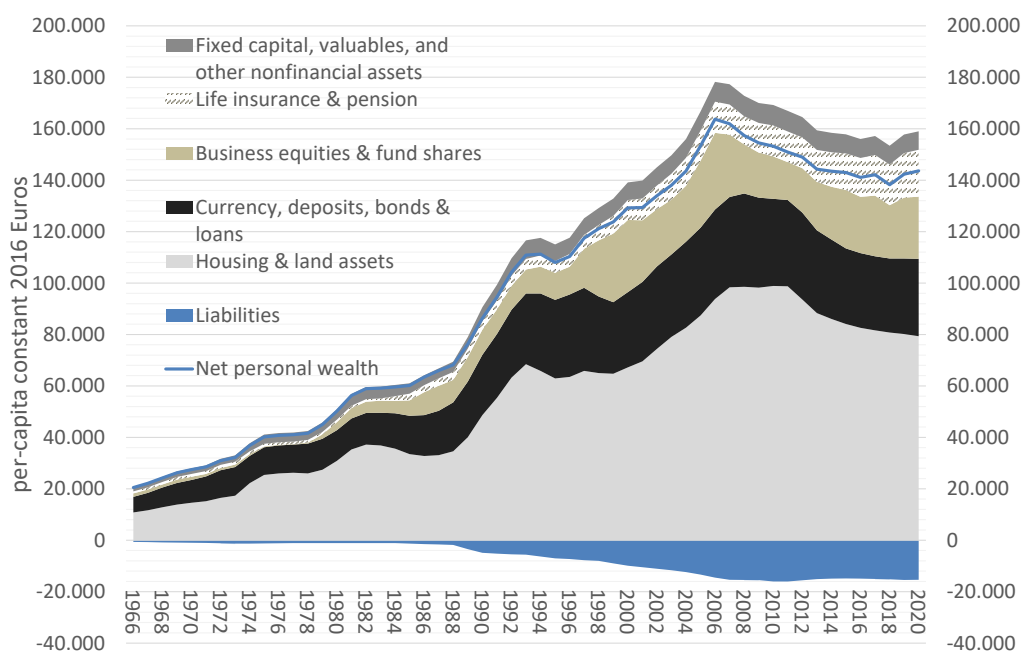
Note: The graph shows stacked estimates of five different asset classes (Housing and land; currency, deposits, and bonds; directly held shares in listed and unlisted corporations, other equity in quasi-corporations, and investment fund shares; life insurance reserves and the balance of private pension funds; Fixed capital and other non financial assets of small personal businesses of producer households (such as plant, machinery, equipment, inventories, and goodwill); and liabilities held by the household sector excluding the non-profit sector serving households. The series is derived assembling data from the balance sheets and the financial accounts from Bank of Italy, ISTAT, and WID.world. The blue line in the graph shows the evolution of household net wealth derived by summing all asset classes and subtracting all liabilities. Appendix A provides more information about how we reconstruct the series.

other rich countries like France, Japan, and the UK, or to 5 and 4 as the case for the U.S. and Germany).

The meaning of net wealth. As remarked in 2007 by the Governor of the Bank of Italy, Mario Draghi, "Changes in the functioning of advanced capitalist economies, as well as in the ageing of the population, contribute to shift the emphasis from income to wealth...On account of greater job insecurity or reduced social expenditure, wealth takes on a new significance for household prosperity. Personal wealth has a crucial role in cushioning against life's uncertainties, and the possibility of relying on a buffer stock makes people feel less vulnerable. But the implications are even more far-reaching, as wealth is a crucial determinant of what people can do at the beginning of their lives. For all these reasons, it is imperative that in the future we monitor the evolution of wealth in the same way that we have been monitoring the evolution of income" (2007). Wealth holding, by shaping one's current and future consumption and earning potential, represents a unique determinant of the well-being and the living standards of individuals and

households. The implications of wealth holding go well beyond the direct effects on consumption opportunities. Specific assets, such as company shares, may convey direct or indirect control over productive resources and, similarly, may also provide substantial power of influence in society as well as a clear mark of status. The level of individual wealth holding also affects risk-taking behavior, and grants or prevents access to specific investment, education, or job opportunities. Hence, the aggregate level of wealth, its composition, and its distribution affect the functioning of the economy and the structure of society, and may also guide the structure of tax policies (e.g., wealth would increase the ability to pay of individuals beyond their relative standing in the income distribution).

The main concept of net wealth used in this paper refers to the current value of all assets, tangible and intangible, that are under the control of the household sector, with the exclusion of the non-profit sector serving households, that provide economic benefits to the holders, and over which property rights can be exercised. The assets may be financial, such as current or savings accounts, stocks, bonds, financial assets held in private pension accounts, and life insurance reserves, or real assets, such as land, houses, non-residential buildings, and tangible and intangible fixed capital (plant, machinery, equipment, inventories, goodwill, software, and intellectual property rights). Thus, our definition of personal net wealth is aligned with that of the national balance sheet according to the System of National Accounts (SNA 2008) and the European System of Accounts (ESA 2010).[5] This definition is grounded in conventional, neoclassical economic theory, where wealth represents a store of value for present and future consumption. It is worth stressing, however, that there is not a unique definition of wealth, and that the methods of valuation matter substantially.

The use of the NA bears a number of problems. First, either for conceptual issues, or for limitations in measurement, wealth under the SNA excludes certain assets that are particularly relevant for specific groups of the distribution. NA only imprecisely captures the wealth that households own outside of the country of residence. This may well disproportionally benefit the very top. In this paper we carry out robustness exercises that incorporate estimates of unreported offshore bank deposits, and portfolios of financial securities managed by foreign financial institutions (but excluding foreign real estate, or valuables and works of art held abroad in vaults and "freeports").

Also, NA do not account for social security pension wealth or unfunded occupational defined benefit pension plans, which, instead, would likely add to the middle and the bottom of the distribution.[6] It is important to recognize that either the inclusion or the exclusion of public

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5.   The assets recorded in the balance sheets are economic assets, which are defined as "a store of value representing the benefits accruing to the economic owner by holding or using the entity over a period of time. It is a means of carrying forward value from one accounting period to another" (ESA 2010, p. 170).

6.   Recent work by Longmuir (2021) derives estimates of the Australian wealth distribution using the notion of 'augmented wealth', adding an estimate of the present value of social security pension wealth to the standard definition of net worth. The author shows that "pension wealth has an equalizing effect, as the Gini index in 2018 reduces from 0.66 for net worth to 0.571 for augmented wealth." Moreover, the author suggests that the omission of public pension claims 'potentially distorts the international comparison of wealth distributions'. Findings of a 'sharp fall of wealth inequality' when public pension wealth is included are also highlighted in the work by Cowell et al. (2017) for thirteen European countries. "Germany is the country that experiences the largest drop in the Gini index, which decreases from to 0.681 to 0.436, i.e. 0.245 points. Then, Austria, Netherlands and France report a decrease in the Gini index of about 0.19-0.21 points. Spain is the country that

pension assets gives rise to a number of conceptual issues. The estimation of public pension assets may be surrounded with considerable uncertainty as it depends on a number of assumptions and predictions: one need to estimate the expected retirement age as well as the individual's income pattern over the life-cycle and the evolution of pension policy and pension taxation parameters; the net present value is influenced by the choice of discount factor as well as the life expectancy of each individual and the mortality probability of the spouse. Moreover, future benefits from public pensions cannot be disposed of, transferred in full to other people, or used as collateral, and are not under the control of the rights' holders. Consequently, when researchers study the distribution of wealth from the perspective of the control over productive resources and the concentration of power, the exclusion of assets which are not under the direct control of individuals may appear as partially justified. However, this is more difficult to be accepted when the objective is to study the inequality of welfare over the life-cycle; pension assets can have important behavioral relevance as people may substitute future claims with alternative forms of savings accumulation in order to face future consumption needs (Feldstein, 1974). Yet, the inclusion of public pension assets alone may not be sufficient as the public provision of other services such as health and education can also affect individuals saving behaviour. Saez and Zucman (2016) further argue that "although social security matters for saving decisions, the same is true for all promises of future government transfers. Including social security wealth would thus call for including the present value of future Medicare benefits, future government education spending for one's children, etc., net of future taxes" (p. 526). In this paper we do not attempt to include future public pension or any other future claims from government services. Only assets held in private (defined contributions) pension plans are considered. But the debate is not settled.

Antiques, art, and valuables are included in the SNA definition, but consumer durables (vehicles, electronic goods, and other household possessions) are not. For the household sector, these are considered within the consumption section of the NA instead. According to the SHIW, the total value of the means of transportation and other durables (furniture, furnishings, appliances) owned by households was 4% of personal wealth in 2016. These assets are generally more evenly distributed than total wealth, and their inclusion may reduce the estimated wealth inequality, as we describe below.[7] As done for the financial securities held in off-shore accounts, we do incorporate alternative estimates of wealth concentration when including durables and household goods in the definition of wealth.

The second main limitation of the SNA is the market valuation of assets: the cash value that can be recovered (and therefore consumed) by selling the asset on a well-functioning market. Such method is problematic for assets that cannot be put on sale, either because a market does not exist or because the asset itself may not be marketable. This is a valid qualification for life insurance plans, which cannot be easily accessed for liquidation. However, private reserves that insurers are required to hold for future payment of life insurance benefits are included in the balance sheet within the class of "insurance technical reserves". This class of assets, fully

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reports the most modest decrease in the Gini index, which decreases by 0.073 points, from 0.554 to 0.481." With a reduction of 0.146 points Italy is found to be a middle-ground case.

7. The aggregate value in 2020 is €559.8 billion according to the "consumer durables" supplementary series estimated in the the National balance sheet for the household sector and the non-profit sector serving households. The aggregate value of households' durables in SHIW amounts to €366 billion in 2016.

accounted in our benchmark series, also include private balance of defined contribution pension plans. Moreover, the reserves held by firms for future payments of severance payments on behalf of workers are also included.[8]. A similar issue arises for shares in unlisted corporations or in unincorporated private businesses taking the form of quasi-corporations, as they may never be or have never been sold.[9] Financial accounts report estimated market values of unlisted shares derived looking at similar listed corporations in the same business sector. Similarly the market value of shares in quasi-corporations are estimated starting from self-reported market valuation of such enterprises within the SHIW survey data (the value excludes the buildings).[10]

Our benchmark wealth distribution series are derived to be consistent with the personal sector balance sheets. Hence, the valuation of business assets adopted in the national accounts also applies to our final benchmark series.

The third important limitation refers to the valuation of the housing stock. Countries do not apply a common methodology for the estimation of real estate in the NA (which gives rise to comparability issues), and the methods employed are less refined than those applied to financial assets. In the case of Italy, housing wealth is "estimated as the product of three factors: a) the number of dwellings owned by households; b) the average floor area in square meters of dwellings; c) the average price per square meter of the dwellings owned by households. The value of housing wealth is then increased by the value of public residential properties sold to households" (Banca d'Italia, 2014, p. 19). In this paper, as detailed in the following sections, we derive a market value measure of housing stock based on individual cadastral values reported on tax records. Our independent aggregate value of the housing stock tracks very closely the total from the household's sector balance sheet and, ultimately, our distributional estimates are fully aligned with the latter.[11]

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8. This form of "compulsory savings" is called *Trattamento di Fine Rapporto, TFR*.

9. As discussed in Rodano and Signorini (2008), "Unincorporated businesses fall into two categories for the purposes of statistical classification. According to international recording standards as set out in ESA95, some of them are called 'quasi-corporations' and are included in the non-financial corporations sector. Quasi-corporations are defined as organizations not having independent legal status, that keep a full set of accounts, and whose economic and financial behaviour is different from that of their owners. This is a rather general description and it has to be operationalised at the national level. In Italy, the operational definition of nonfinancial quasi-corporations includes all firms that take the more formal types of unlimited liability partnerships (società in nome collettivo, società in accomandita semplice) regardless of size; it also includes simpler partnerships (società semplici, società di fatto) and sole proprietorships (ditte individuali), provided they have more than five employees. Enterprises falling within this category are assumed to possess the character of a quasi-corporation and are therefore to be recorded in the non-financial corporations sector. The rest (i.e., simple partnerships and sole proprietorships with up to five employees) are to be recorded in the producer households sub-sector" (p.150).

10. See Appendix A.3 for details on the value of business shares and equities in the financial and macroeconomic accounts.

11. The value of housing can be further separated from the value of the underlying land, which can account for the largest share of the valuation of the stock. Very few countries report the land value separately from that of the housing stock (the UK is one of them).

2. From the wealth of the decedents to the wealth of the living

2.1. The inheritance tax in Italy

The inheritance tax (*Imposta sulle successioni e le donazioni*) concerns all worldwide taxable assets inherited, net of liabilities and deductible expenses, from a deceased person domiciled in Italy.[12] It applies to the amount received by each heir and not to the amount of total wealth left at death, as is the case for the estate taxes levied in the U.S. or the UK. Different rates apply depending on the degree of kinship. For spouses and direct descendants or ascendants, the rate is 4% above any net share above €1 million.[13] For siblings, the rate is 6% above €100,000. For relatives within the fourth degree, direct relatives in law, side relatives in law within the third degree, the rate is 6% with no exemption threshold; 8% applies on all other parties with no exemption threshold. The same rates and structure correspond to inter vivos gifts.[14] Until 2016 the exemption threshold was reduced in an amount equal to the capitalized lifetime donations received by each heir from the same deceased. This provision (called *coacervo*) limited the scope for avoidance of the tax by means of gifts by integrating the taxation of gifts and inheritance.[15]

The administration of the tax is linked to the upkeep of the cadastral register, as other taxes are due on transactions of real estate rights (e.g., registration duty as well as mortgage and cadastral taxes). This administrative feature, combined with high homeownership rates, means that the inheritance data cover more than 50% of the decedents for every year under investigation, even when the inheritance tax was abolished between 2001 and 2006. The coverage rate was 63% in 2014, the highest on record.[16] A variety of exemptions permit the reduction of the effective tax bill beyond the statutory description. Indeed, many asset transfers are not subject to taxation: reserves accumulated in private pension, life insurance funds, shares of family business passed to a surviving spouse or direct descendants, postal saving bonds, and government bonds. The tax-exempt status implies, in many cases, but not always, that such holdings are not reported in the tax returns and need to be partially or fully imputed. The treatment of tax-exempt assets is discussed in the next section.

The period under investigation witnessed substantial changes to the tax code. Three major reforms were enacted in 2000, 2001, and 2006. Before 2000, the tax was a mix between a progressive estate tax (with marginal rates ranging from 3% to 27%), and an inheritance tax

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12.   Only the net value of assets located in Italy is included in the tax base in the case of a person not deemed domiciled in Italy for tax purposes.

13.   In the presence of a disabled heir the tax-exempt threshold is €1.5 million.

14.   In 2000 and 2001, the gift tax rates were 1 percentage point lower than the inheritance tax rates.

15.   It is not yet clear if this provision is still in force, as the supreme court issued non-unanimous judgments on this between 2016 and 2019. A system purely based on lifetime capital receipts, irrespective of the identity of the donor, would be more effective in reducing tax avoidance. Indeed, currently a single heir can receive different inheritances and still pay zero taxes as long as each inherited share is below the exemption threshold. It is also important to note that in case the *coacervo* is definitively abandoned by the jurisprudence, inheritance tax avoidance schemes through inter vivos gifts will be easier.

16.   The rate dropped to 61% in 2015 also due to unexpectedly high mortality rates in that year. Total deaths in 2015 amounted to 648,000, 40,000 above the average number of deaths in 2012-2016. The relative (small) decline of the rate after 2014 may also be due to a change in legislation (passed at the end of 2014) that increased the non-filing threshold from 50,000 Italian Lira (i.e., €25,823) to €100,000 (the threshold defining the net value above which the filing is required for those estates without any real estate properties or rights).

(with a further graduation of marginal rates up to 33%) that applied only to recipients different from the spouse and direct relatives.[17] In 2001 the inheritance and gift taxes were abolished, and then reintroduced in 2006.

2.2. The inheritance tax data

Data used in this paper come from the universe of inheritance tax returns, opened between 1995 and 2016 (evaluated at the year of death). The return is filed by the estate executor within twelve months of the death.[18] A dedicated official at the local branch of the tax authority processes the returns and assesses the tax liability. At the same time, legal proof of ownership and third-party assessments of asset valuation are often required, enhancing the accuracy of the information and reducing the scope for tax evasion.[19]

We determine the net wealth of the decedent by adding all reported financial and real assets and subtracting all liabilities. We also add the market value of assets sold within six months from death, which was reported between 1990 and 2000; this is typically negligible and does not affect the results.

The microdata were transformed into detailed tabular form by the statistical office of the Ministry of Economics and Finance and shared with us. The tabulations have 34 net wealth ranges, from negative values to the highest range worth €20 million or more. The demographic information is provided by seven 10-year age groups (i.e., from under 20 to over 80), two gender groups (males, females), and three geographical areas (south and islands, north, and center).[20] Four asset classes are identified: housing and land; business assets, equity, and debt securities; other assets (including current and saving deposits, valuables, etc.); and liabilities and deductible expenses.[21] The data, therefore, lump together business assets (a form of real assets) with financial assets. The tabulations identify the taxes paid (on the global value of the estate as well as on the inherited shares), the value of assets sold within six months from death (reported between 1990 and 2000), and the capitalized value of all gifts and donations done in life. Some

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17. In October 1999 the first tax bracket was eliminated and the tax exemption threshold increased from €125,000 to €175,000.

18. Tax returns are submitted to the tax office in the province where the deceased had residence. The time limit was 6 months until 2003. The latest data update in this paper was obtained in May 2020. A set of 2,600 tax returns presented in 2018 with the new electronic form, but related to deaths occurred in 2016, were included in the data. In principle, there could be a very small number of tax returns submitted or revised even 10 or 20 years after death as more precise information about the estate comes to light, but these amendments are not taken into account in the statistics. Every year-specific database becomes consolidated for our purposes if two years have passed since the year of death.

19. For instance, financial institutions need to certify the balances of all accounts; the cadastral office certifies the cadastral value of buildings, land, or dwellings; a certified copy of the most recent balance sheets needs to be attached to prove the book value of any personal business; and the official certification of ownership of listed corporate stocks should also be provided. Similarly, all the expenses and liabilities that are reported for deduction purposes need to be appropriately documented.

20. We also make use of more refined age decomposition based on twenty three 5-years age groups for a subset of years, namely for 1995 and for the post-2012 period. Note also that a negligible number of observations do not report gender or the age of the decedent. These account for "gender not stated" or "age not stated" respectively.

21. Starting from 2017 only, the paper module for inheritance tax returns has been gradually replaced by an electronic form that includes a considerable amount of additional detail about the composition of the estates.

of this additional information will be used in section 5.

2.3. The application of the mortality multiplier method, the estimation of missing wealth, and the treatment of different assets

The distribution of the taxable wealth of the decedents, provided by the inheritance tax data, is different from that of the wealth of the living. A number of adjustments are required: differential mortality multipliers have to be applied to transform the estate data into estimates of wealth-holding; an estimate of the wealth of those not covered by the tax (the *missing wealth* of the *missing/non identified* population), as well as that of the exempted assets, is necessary; and real estate valuation has to be converted from cadastral to market prices. In this section we also discuss the estimation of personal wealth held in trust and the valuation of business assets as well as the treatment of liabilities. A summary discussion about the treatment of different assets in the tax records and in our benchmark series can be found in Appendix T.

Re-weighting the population of the deceased. In 1995, 30 percent of estates belonged to individuals aged 80 years old and above; the number has grown to 60 percent in recent years. Similarly, males are over-represented across all age groups, except the oldest group. To re-weigh the decedent population we apply mortality multipliers, obtained by inverting the mortality rates, which are therefore treated as if they were sampling rates of the living population. The application of mortality multipliers has a long tradition in economics and statistics and leads to the derivation of the *identified* wealth and population (for a description of the method, see Atkinson and Harrison, 1978). We use detailed annual mortality tables published by the ISTAT, available for each age, gender, and geographical location.[22]

We make use of the information reported to the tax authorities as well as detailed mortality rates by a set of socio-demographic characteristics. The inverse of the mortality rate of each decent group i (the multiplier is defined as $m_i \equiv \frac{1}{p_i}$, where p_i is the mortality rate of group i) represents the number of living individuals with similar socio-demographic characteristics. We multiply the number of decedents and their reported wealth value by the relevant mortality multiplier m_i for each group i. This procedure reshapes the decedent population, creating a representation of the living population to estimate its distribution of wealth.

We define the estate value of each decedent as $w_{E,i}$ and arranged them in descending order, so that $w_{E,i} \geq w_{E,j}$, if $i < j$. The population of decedents is N_E and the total value of their estates is defined as W_E and takes the following form:

$$W_E = \sum_{i=1}^{N_E} w_{E,i} \,. \tag{1}$$

The application of the mortality multiplier provides the following result:

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22. Appendix D provides the description of the mortality data. We also give a more detailed discussion about how mortality multipliers affect the age distribution of wealth holdings.

$$W = \sum_{i=1}^{N_E} m_i w_{E,i} \,. \tag{2}$$

where W is the total wealth among the living population of the group i.

The inheritance tax returns are mandatory only if rights on real estate are transferred, or if the net value of the estate is above €25,000. Hence, only a fraction of total deaths are observed in the tax records: in 2013, 365,000 estates out of 600,000 adult deaths. Although incomplete, a coverage rate higher than 60% is very high compared to evidence in other rich countries: in the UK, this number is below 50%, whereas in the U.S. it is lower than 0.5%. Given the large number of decedents covered, the re-weighting of tax records allows the method to account for a substantial fraction of the living population (50%) and personal net worth (80% of the NA in recent years, and 65–70% in the mid-1990s), and this, only including the correction of the market price of housing assets. The total net wealth in the SHIW, representative of the entire population, is instead very similar to that identified from tax records between 1995 and 2006; however, it only accounts for 65–70% of the NA total afterwards.

The wealth of the missing population. The tax data are representative of the living adults whose wealth arrangements are such that they come to the notice of the tax authority in the event of their death. The need to estimate the amount of *missing wealth* is a necessary step if we want to assess the size and the distribution for the entire population. The SHIW is the basis for this. In order to be consistent with the distribution at the individual level, we first allocate household wealth to adult members of the household.[23] We then estimate that around 50% of adults are accounted as missing, with strong heterogeneity across age groups[24].

Once the missing population and their wealth holding are estimated, we can impute these values to the tax-based distributional information. Appendix H describes the very simple imputation process and shows that the estimated missing wealth amounts to €700 billions and it is mostly composed of deposits and valuables.

The valuation of real estate. The value of land, buildings, and dwellings is reported at cadastral values for tax purposes which generally underestimates market prices.[25] In order to overcome this problem, we have applied, with the support of the statistical office of the Ministry of Economy and Finance, a proportional adjustment to bring the cadastral values in line with market ones. The yearly adjustment factor is defined as the ratio of the (average) market price and cadastral valuation at the national level. The ratio of average market price (obtained from the Osservatorio del Mercato Immobiliare - OMI, published by the Revenue Agency/Nomisma) to cadastral value of housing is observed to be constant over the years 2009-2012 at around 3.3. The ratio declined to 3.2 in 2013, to 3.0 in 2014-2015 and to 2.9 in 2016. The time series of

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23. The transformation from household to personal wealth is described in Appendix K, and follows D'Alessio, 2018.

24. Refer to figures F.1(b) and H.1(b). Figure F.2(a) shows that the coverage rates are lower for younger age groups and very low for those aged 20 or less who are more likely to have zero wealth holdings

25. The underestimation of market values could be particularly salient for older buildings whose value typically has not been updated for many decades. The sell-up value is reported only for those buildings under construction or for those for which no cadastral rent has been attributed yet.

adjustment factors is shown in the appendix E.

Most notably, the simple re-scaling of property values using an annual market to cadastral value ratio generates a total housing and land stock very close to that estimated in household sector balance sheets (the average estate, valued at market prices, increased from €209,000 in 1995 to €332,000 in 2007 at 2016 prices; it remained relatively constant until 2012, and then started to decrease to €293,000 in 2016). Due to the structure of inheritance tax filing as well as the prevalence of homeownership in Italy, the number of inheritance tax filers who declare real estate assets is above 90%. Similarly, the declared estate is also mostly composed of real estate assets: Whereas 91% of estates were composed of housing and land in 1995, this fraction declined to 78% in 2016. This is also the result of the tax exemption of a number of financial assets. However, the high share of housing and land does not mean that our data are not able to capture large financial wealth holdings at the very top of the wealth distribution. Indeed, as reported in Acciari and Morelli (2020), "the relative composition of declared portfolios changes drastically depending on the size of the estate... In 2016, only 10% of total gross estate is composed of housing and land for the group of richest 0.01% of total decedents, a group whose total declared net estate is at least €17 million. For this group, nearly 90% of total gross estate value is held in financial securities and privately held business assets. Meanwhile, for estates below the 99th percentile, housing and land account for at least 75% of total gross estate value."

The use of a national multiplier could mask potential heterogeneity across geographical areas and, most importantly, across the wealth distribution (e.g., the degree of underestimation of real estate market values could be more pronounced for rich individuals). To address this concern, we run a number of checks matching the full cadastral records including more than 34 million properties to the corresponding OMI market value of the area and to the income tax statistics for more than 32 million tax payers (the OMI market value is the average market price of the micro-zone where the real estate is situated). Checks are also carried out using of an integration of the survey EU-SILC with admin data from the cadastre and from OMI market value (carried out internally at the Ministry of Economy and Finance to run a microsimulation model). The exercises are described in Appendix E.2. The main results suggest that although the full heterogeneity across locations and rankings in the income distribution is ignored, the use of a national multiplier should only marginally affect estimates of wealth concentration. Our results are likely to represent conservative estimates, as controlling for the heterogeneity discussed above would have likely increased the level of wealth concentration even further, albeit marginally.

Tax-exempt assets. Italian legislation grants full exemption to financial assets invested as private pension and life insurance, postal saving bonds (i.e., *Buoni Fruttiferi Postali*), and a number of national and extra-national government securities.[26] The list of exempted assets also includes vehicles in the national registry, credits towards the state, properties that are listed as cultural and historical heritage, and all family businesses and control shares of private

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26. There are now 134 countries whose tax authorities have "adequate" exchange of information with Italy. As a result, these countries are included in the so-called "white list," necessary to get access to more favorable tax treatment.

businesses that are transferred to direct descendants or to a spouse.[27] The value of tax-exempt assets considered here, imputed to the population, is taken from the household sector balance sheet as the value of insurance technical reserves net of their liabilities (i.e., the total value of assets accumulated in pension, life insurance, and severance payment funds), plus 50% of Italian government securities. These imputed tax-exempt assets amounted to €320 billion in 1995 and €940 billion in 2016, equivalent to 11% of household net wealth (see appendix H.2). The reporting of government bonds is often advised by tax accountants and frequently occurs in those cases where securities are bundled with other assets within investment funds (e.g., banks and other financial intermediaries are required to provide detailed descriptions of investment funds and accounts following death of a legal owner). Such investment bundles can be fully reported on the inheritance tax form, and the tax authority would then compute the relevant tax deductions.[28]

Business shares and equities. Total value of business assets held by households is composed of the sum of the shares in corporations and quasi-corporations. Our tabulations bundle business assets with other financial assets such as mutual fund shares and bonds. Listed shares of corporations are reported at market value on inheritance tax records, whereas unlisted shares and equities in quasi-corporations are reported at book value. However, the final valuation of business assets adopted in our benchmark distribution series is consistent with personal sector balance sheets. Hence, the shares in corporations and quasi-corporations are included at market value. To do so, the value of the asset class "Shares and other equities" from the household sector balance sheets that is not accounted for in our inheritance tax-based data is distributed to the whole adult population in proportion of the total "financial assets" in each age, gender, and location cell. Note that we also distribute in the same way the value of plant, machinery, equipment, inventories, and goodwill of small personal businesses of producer households (differently from shares in corporations and quasi-corporations these are real assets listed as "Fixed capital" in the balance sheet of the household sector and are valued at substitution price net of depreciation). See the Appendix A.3 for an account of business assets in the macroeconomic accounts.

Trusts. Trusts are not taxable under the inheritance tax, as the property of the settled assets is transferred from the settlors to the trustees. Very little is known about the amount of wealth held in trusts in Italy, but their use is not as widespread as in the U.S. or the UK. The number of trusts operating in Italy and required to file a tax record increased from 65 in 2009 to 151 in 2019 (14 of which were foreign trusts) according to data accessed at the Ministry of Economy and Finance. Using the universe of income tax files, we can observe the capital incomes from trusts (national and foreign) that are imputed to individual resident beneficiaries (transparent trusts) and those who are retained in the opaque trusts (*Redditi da capitale imputati ai trusts*; on average 89% of capital incomes of trusts are reported to be distributed to beneficiaries). We

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27. The tax exemption status is valid under the condition that the business is run and the control share is maintained for at least 5 years from the wealth transfer at death. Nonetheless, and similarly to what happens to any real estate rights, the value of business assets has to be reported in the inheritance tax returns and will be deducted from the final liability. The remaining exempted assets are generally not reported on tax records. It is also worth mentioning that inherited or donated assets of any kind may be fully exempted if the recipient belongs to one of these categories: religious entities, NGOs, political parties, state, regional or local authorities, and research institutions.

28. We consider 100% of government securities during the years where the estate, gift, and inheritance tax was not in place (e.g., the period included between October 2001 and October 2006).

capitalize those capital income flows, getting a total value of €166-332 million for the year 2015 and €263-526 million in 2019.[29] Such estimated wealth values only account for 0.002%-0.005% of total wealth in 2016 (see Appendix S). These values almost surely represent a lower bound as capital incomes are often subject to separate withholding taxes and may be under-reported in Italian income tax records. Yet even doubling the estimates of total wealth held in trusts would not change the fact that such assets would only have a negligible effect on the distribution of personal wealth even if they were imputed entirely to the wealthiest groups.

Liabilities. The concept of net worth used in this paper subtracts all liabilities from real and financial assets. The existence of very high tax exempt thresholds reduces the incentive for detailed reporting of liabilities for most of the (non-taxable) estates. To overcome this limitation, in our benchmark series, the unobserved value of liabilities reported in the national balance sheets is imputed proportionally to the population according to the distribution of liabilities reconstructed from the tax data, complemented with observations about the missing population, using the survey data as described above.

A less relevant limitation of tax records comes from the fact that liabilities may be reported together with deductible expenses, which include the costs of a funeral or medical treatments during the last six months of the deceased person's life. It is not possible to appropriately add the deductible expenses back to the value of the individual estate, but the entity of these expenses is negligible (e.g., only a small fixed amount of funeral costs that can be deducted for tax reasons but no specific threshold is specified for health related costs).

2.4. Combining different sources of data

The process of adding the wealth of the identified population (including the price adjustment to real estate), the wealth of the missing population, and the imputation of exempted assets, shown in Figure 3, generates a total wealth that is between 80% and 100% of the balance sheet of the household sector in the NA, with very similar trends.

In seeking to align the benchmark series to the National Accounts, the remaining gap of total assets and liabilities must be imputed. This benchmark approach is justified on the grounds that the NA provide a reasonable indicator of the development of wealth over time, preserving a high degree of cross-country comparability, not on the assumption that the NA give the correct numbers. On the one hand, the imputation of the wealth gap is a controversial exercise, riddled with difficulties and uncertainty. On the other hand, the adjustment to NA is advantageous in as much as it deals indirectly with any residual misreporting, mis-valuation, or tax avoidance and evasion ignored in the previous steps. In any case, it should be stressed that some of the difference between NA and other wealth data sources are rooted in definitional issues and not on quantitative misalignment.

For all these reasons, we will also discuss how estimates behave once we deviate from the benchmark in a variety of ways (e.g. excluding imputations). This type of exercise is not

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29. Two main rates of returns are used in the capitalization exercise, 4% and 8%, similar to what done in Saez and Zucman (2016). Previous works by Kopczuk and Saez (2004) and Alvaredo et al. (2018) used an interest rate of 7.5% and of 5.6% for the U.S. and the UK respectively.

FIGURE 3. Total personal net wealth and total gross housing and land wealth: from inheritance tax records to National Accounts
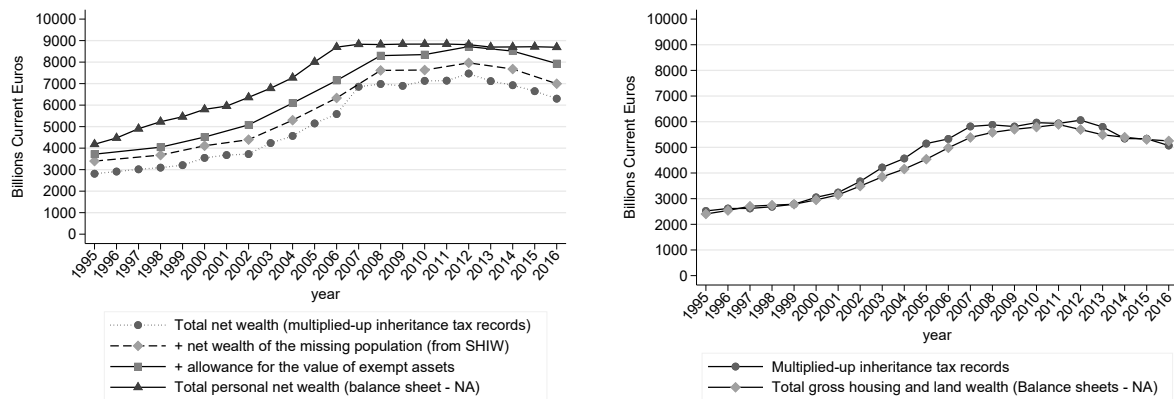
(a) Total personal net wealth

(b) Gross housing and land wealth only

Note: Panel (a) compares the different wealth aggregates, from that identified using the estate multiplier method (scaling-up the reported wealth at death), to the total net wealth of the household sector from the national balance sheets. Panel (b) compares the total gross value of the housing and land stock as identified from the inheritance tax records to that reconstructed from the balance sheet of the household sector from the NA.

commonly reported in existing studies of wealth inequality, but we argue that it is essential to increase transparency about how final measures of concentrations are derived, and should not be relegated to a marginal appendix.

3. The growing inequality of wealth holdings

3.1. Benchmark series

One of the immediate advantages of our benchmark approach, similar to what can be done with household surveys as opposed to the strict application of the estate or the capitalization methods, is the possibility of analyzing the size distribution for the whole population. We can show how the shape of the wealth distribution has changed over time. As depicted in figure 4 the Lorenz curve shifted outward from 1995 to 2016 (panel (a)), and also plots the difference between these two curves over time (panel (b)). The difference is always negative for every wealth group, as the Lorenz curve in 2016 always lies below that of 1995. Therefore, any possible standard indicator would point to the same direction: wealth inequality has increased in Italy over the time period considered.[30]

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30. This result follows from Atkinson et al. (1970) under the simple condition that the inequality indicator considered is consistent with the Pigou-Dalton principle of transfers. Such principle requires, loosely speaking, that any transfer that takes from the rich and gives to the poor, under the condition that the rich remain richer than the poor, would lead inequality to decrease.

FIGURE 4. Increasing wealth inequality over time
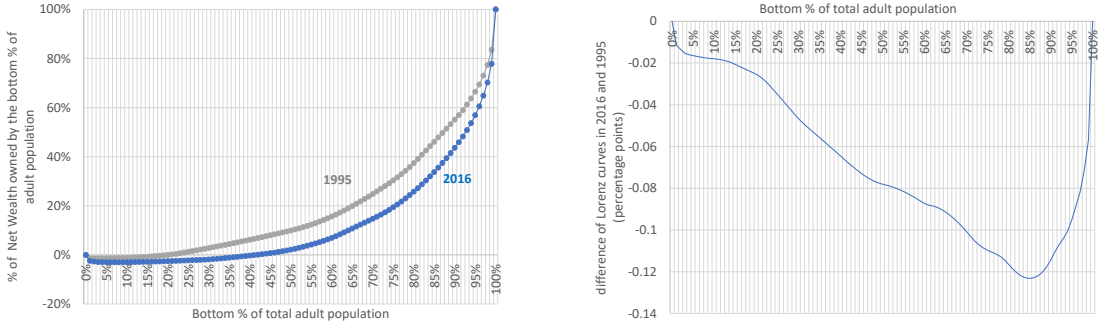
(a) Lorenz curves: 1995 and 2016

(b) Difference between Lorenz curves: 2016-1995

Note: Panel (a) compares the Lorenz curves in 1995 and 2016. Panel (b) shows the difference between these two Lorenz curves.

We illustrate this point with the evolution of the Gini coefficient, which recorded a 14 percentage point increase, from 62% in 1995 to 76% in 2016. A practical interpretation considers the change in the net wealth per adult, which increased from €137,000 to €176,000 over the same period: this means that if we take any two adults from the population at random, the expected difference of their wealth holding increased from €171,000 to €268,000. This is a substantial change if compared with results from SHIW data.

We zoom in on the upper wealth brackets. The top 1% (adults with at least €1.5 million and average net wealth holdings of €3.8 million) controlled about 22% of net wealth in 2016, a share that has increased by 6 percentage points since 1995 (Figure 5). Panels (a) and (b) of Figure 5 also demonstrate the importance of looking within the top 1%, as top groups are highly heterogeneous. The share of the top 0.01% more than doubled between 1995 and 2016, increasing from 1.8% to 5%. Such a tiny group held 500 times their proportionate share in 2016, with a minimum net worth of €20 million and average net worth of €83 million, equivalent to 470 times the average net worth. The share of those in the top 1% but not in the top 0.01% has been rising gradually from 1995 to 2012, going from 14.4% to 19.%, before declining again and stabilizing around 17%.

The ranges of values depicted in the figures (they are not confidence intervals in the statistical sense) signal that the adjustments required to reach the benchmark series are not the only ones that can be adopted. Yet, the estimated wealth concentration and its evolution is rather robust to the inclusion or exclusion of our adjustments to the data. The bottom of the range is derived by imputing only tax exempt assets: falling short of fully imputing all missing assets and liabilities required to align distributional estimates to the household balance sheet as done in our benchmark case. The upper limit, instead, represents the top share impute even more assets than our benchmark case by including also the allowance for unreported financial assets held in offshore tax havens.

FIGURE 5. The evolution of top wealth shares. Italy 1995–2016
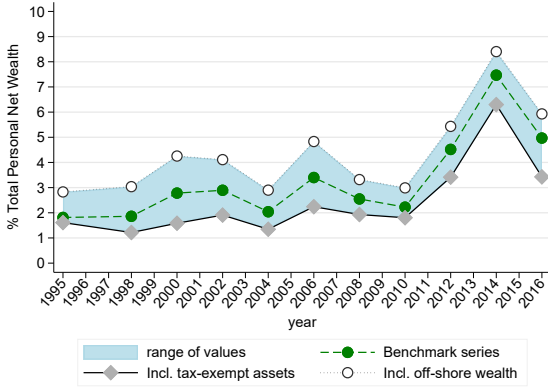
(a) Top 0.01%
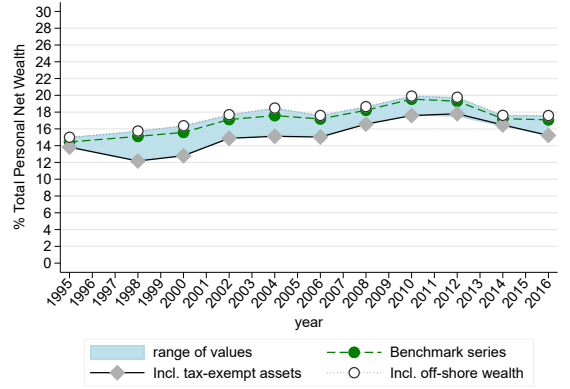
(b) Top 1-0.99%
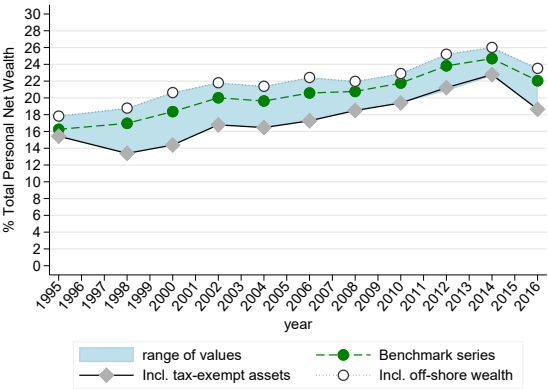
(c) Top 1%
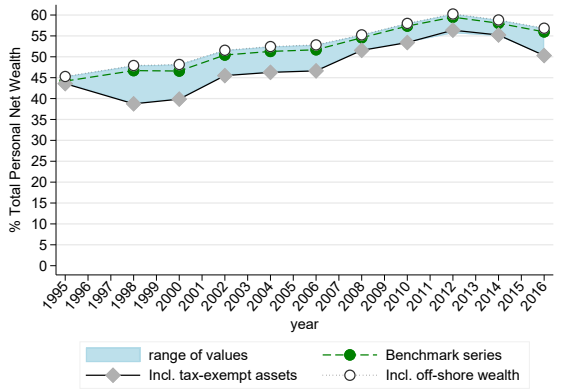
(d) Top 10%

Note: The graphs show the evolution of the shares of total personal net wealth for four subgroups of the adult population between 1995 and 2016. Each panel shows three series. The middle line is the benchmark (distribution of balance sheets). The upper line, after adjustment to National Accounts, allows also for unreported offshore financial assets. The lower line, instead, only allows for tax exempt assets and not full imputation of all assets and liabilities to align distributional estimates to National Accounts.

Unreported offshore wealth. A fraction of financial wealth remains unreported or unrecorded in official statistics and tax agencies. Zucman (2013) argued that this represents 10% of world GDP. With related procedures, Pellegrini et al. (2016) estimated the total value of undeclared debt and equity securities in Italy to be €161.4 billion in 2007, excluding the value of undeclared bank deposits. In order to consider a less incomplete measure of financial assets held offshore, we add to this number the amount of undeclared bank deposits held by the non-banking sector in offshore centers as also reported in Pellegrini et al. (2016) (based on the cross-border banking statistics released by the Bank of International Settlements). For this, we assume that half belongs to individuals, and allocate to Italy the country's share of global GDP.[31] The resulting

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31. The same share was assumed in Johannesen and Zucman (2014) and appears consistent with more recent works by García Luna and Hardy (2019) who found that at end-March 2019, households (including non-profit institutions serving households) accounted for 51% of Swiss banks' cross-border liabilities. In the same work, if considering all the countries in the sample, households account for only 14% of banks' cross-border liabilities.

estimate of unreported financial wealth held offshore by Italian investors is €187.2 billion in 2007, or some 2–3% of personal wealth.[32] This is extrapolated backward and forward according to the the evolution of the European offshore financial wealth given in Alstadsæter et al. (2018), to cover the period 1995–2016.

If we assume that the share of undeclared wealth as well as its relative distribution across the wealth distribution in Italy is the same of what was estimated for Denmark and Norway by Alstadsæter et al. (2019), then the share held by the top 1% increases by 1 to 2 percentage points throughout with respect to the series before this adjustment. This is a sizable effect that becomes even more visible at the very top. The richest one in one thousand individuals saw their share increase by 65% in 1995 (from 1.8% to 3%) and by 14% in 2016 (from 5% to 6%). The inclusion of unreported offshore financial wealth is surrounded by much uncertainty, however, it does not appear to substantially affect the trend of the wealth concentration over the period of investigation.

3.2. Comparison with other countries

Estimates of wealth concentration that are comparable to our benchmark series currently exist for a handful of countries, namely France, Germany, Spain, and the U.S. (the comparison with existing country series that do not follow the strategy of up-scaling to the NA is given in Figure 18(b)). Figure 6 displays three concentration indicators: top 10%, bottom 50%, and middle 40%. Italy, in the mid-1990s, had one of the (relatively) best-positioned middle 40% groups, and one of the lowest concentration levels. Similarly, the bottom 50% held 12% of wealth in 1995 compared to 8% in France, 7% in Spain, 5% in Germany, and 1% in the U.S. Twenty years later, Italy appears to have experienced the largest drop in total wealth held by the bottom 50%, and, although the levels of wealth concentration are now closer to other European countries, its relative increase over time bears more similarity to the dynamics of the U.S. However, the middle 40% in Italy controls 40% of total net wealth compared to around 30% in the U.S.

The notable decline in the share of the bottom 50% may seem surprising from the perspective of the given international comparison. However, it is consistent with the large increase in aggregate wealth together with the fact that such group has not benefited proportionally from the elements pushing upwards the average wealth: they own at best zero-return financial assets, have very little net real estate, or are heavily indebted mortgage-wise. The stability of the bottom 50% share in Spain and France is likely the mechanical result of the different treatment applied in those studies: wealth bottom-coded at zero (no negative wealth), and smoothing in the lower part of the distribution.

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32. Incidentally this is very similar to the 2007 value reported for Italy in Alstadsæter et al. (2018), €191.3 billion, or $262.2 billion USD.

FIGURE 6. Wealth concentration: a cross-country comparison

(a) Top 10% - time series   (b) Middle 40% - time series   (c) Bottom 50% - time series

(d) Top 10% - summary   (e) Middle 40% - summary   (f) Bottom 50% - summary
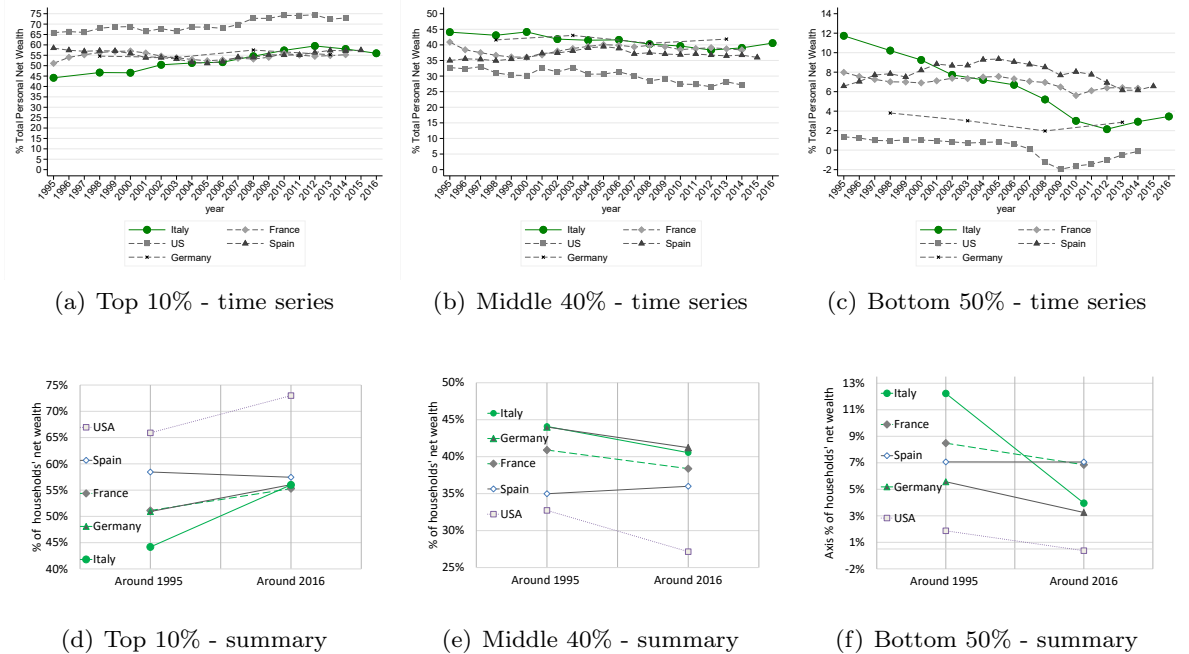
Note: The figure compares the evolution of wealth inequality from around 1995 to around 2016 for countries for which we have series comparable to our benchmark. Italy is based on the authors' results, Spain comes from Martínez-Toledano, 2017, France from Garbinti et al., 2021, Germany from Albers et al., 2020, and the U.S. from Saez and Zucman, 2016. "Around 1995," refers to 1995 for all countries except Germany (for which it refers to 1993). "Around 2016" refers to 2014 for France and the U.S., to 2015 for Spain, to 2016 for Italy, and to 2018 for Germany.

4. Triangulation with other sources

We now consider external evidence to assess the reliability of our estimates of the concentration of wealth in Italy. We provide series based on a variety of sources, from household surveys to rich lists and banking sector reports.

Household surveys. Household surveys provide essential information about the distribution of wealth, especially when assets registries and individual capital income data are absent or not easily accessible, as for the case of Italy. The SHIW has existed since 1989. The comparison with tax data requires changing the unit of analysis, moving from households to individuals. Household wealth needs to be allocated to each adult member using the relevant information from the survey questionnaire, as done in D'Alessio (2018) and mentioned in Section 3.3. Furthermore, to bring the estimate in line with our wealth concept, an estimate of private insurance funds and pension assets are added to individuals declaring payments of any insurance premium or private pension contribution. As shown in Figure 7, moving from the household to the individual reduces the share of the bottom 50% by 5 percentage points (panel (b)), a large change, and increases the share of the top 1% by 2 percentage points (panel (a)). The concentration at the top is only marginally different if we split household wealth equally among the head of the household and his or her partner (equal-split series).

FIGURE 7. Gini coefficient, Top 1%, and Bottom 50% shares in total wealth: comparing results with household survey data
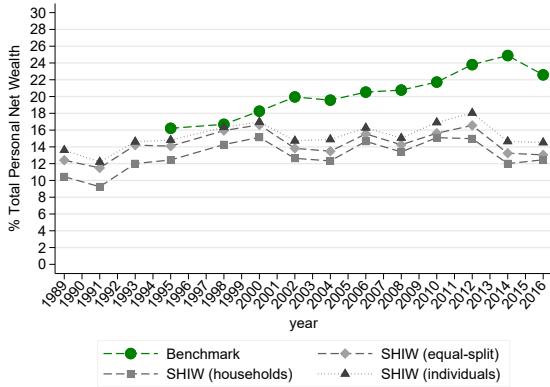
(a) Top 1 %
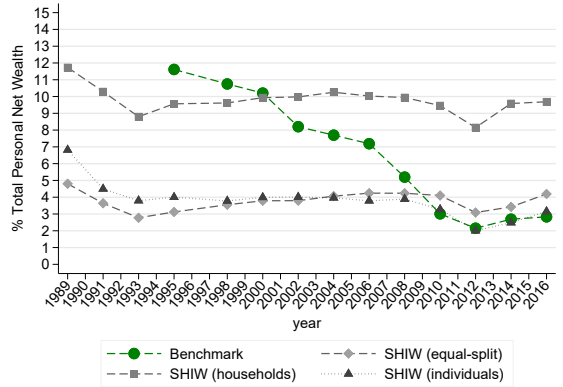
(b) Bottom 50 %
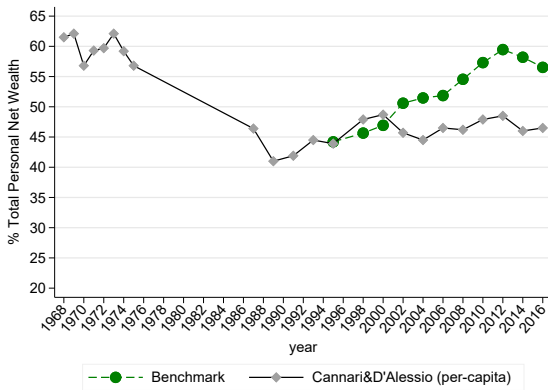
(c) Top 10 % - in the long-run
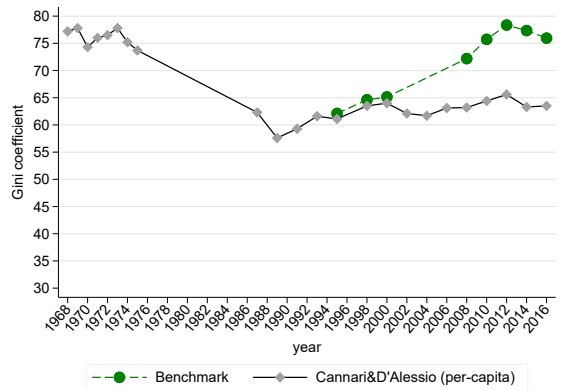
(d) Gini coefficient - in the long-run

Note: Panels (a) and (b) show the evolution of the top 1% and bottom 50% shares from household surveys (SHIW) compared to our benchmark series. The comparison requires adjusting the wealth concept and the unit of analysis (individuals). Panel (c) compares the evolution of our benchmark series of the top 10% with that from Cannari and D'Alessio (2018) based on the combination of the SHIW and historical surveys from 1968 to 1975.

The level and dynamics of wealth concentration are very similar across tax- and survey-based estimates until 2000, when they begin to diverge. According to the SHIW, the top 1% share remained roughly constant between 1995 and 2016, whereas it increased by 6 percentage points according to our benchmark (Figure 7(a)). On the contrary, as shown in Figure 7(b), the share held by the bottom 50% is substantially higher in our benchmark series until 2004. The share of the bottom 50% becomes almost identical in both sources only since the mid-2000s.

Different explanations can rationalize these complex findings. The under-representation of the wealth concentration at the top is not surprising, as household surveys are not necessarily well-suited to capturing the right tail of a very skewed wealth distribution, for a variety of reasons. First, in the presence of "fat tails", such as the distribution of wealth, a random sample may not be fully representative of all wealth groups, especially if the sampling frame of the survey does not allow for the oversampling of wealthy households, as it is the case for the

SHIW. Second, even if very wealthy households were appropriately sampled, they might have a higher rate of nonresponse, as they may be harder to find or trace, or they may be less willing to cooperate to reveal their complex asset portfolios. The compliance rate may well be lower at the top of the wealth distribution, distorting the estimation of inequality indicators (Kennickell, 2019, Korinek et al., 2007, Muñoz and Morelli, 2020). Indeed, the SHIW identifies fewer people and less wealth for the wealthiest ranges of the distribution compared to our multiplied-up estates from inheritance tax records (more details in Appendix F).[33]

Nonetheless, total personal wealth in the survey data amounts to 60% to 70% of the balance sheets despite its implicit coverage of total population (see Figure G.2 panels (a) and (c) in the appendix). This indicates that underreporting of different types of assets and liabilities, as well as coverage issues, may also apply to the middle and bottom ranges of the distribution. The fact that the bottom 50% of the distribution appears so different in the survey data compared to our benchmark results may also indicate the inability of the survey to appropriately account for the most important form of assets for the lower groups, namely currency, deposits, and valuables. In our derived benchmark series, these assets constituted more than 50% of the wealth of individuals with less than €15,000, that is, a substantial part of the bottom 50%. This stresses the need for better data to assess low-end segments of the wealth distribution too, not just the high-end, as generally noted. The total value of currency, deposits, and bonds reported in the survey data was lower by a factor of 3.5. By 2004, the share of currency, deposits and bonds stabilized around 20% of total net wealth in the balance sheet. The survey underestimated the total NA value by 2.7 times by then. In 1995, however, the value of currency, deposits and bonds accounted for 32% of total gross personal wealth in the balance sheet and the relative importance of this asset class declined over time and accounted for only 18% of total gross personal wealth in 2016.

More generally, the aggregate coverage rate of assets in the survey data with respect to the national account statistics is highly heterogeneous across asset types, ranging from 30% for liabilities and 35% for financial assets to 85% for housing assets. The trend of these asset coverage rates also changed over time: whereas little change occurred for housing assets, the coverage rate for financial assets and liabilities has been steadily declining over time. Figure G.2 (panels (b) and (d)) as well as Table H.1 in the appendix document these patterns providing also a more detailed decomposition of asset types.

Rich lists and banking sector reports. _Forbes_ magazine gives information on Italian billionaires; only 5 individuals were recorded in 1988, and 35 in 2019. It is not easy to assess the representativeness and reliability of these lists. The data are often based on journalistic estimates that can be subject to several types of errors, and the methodology cannot be evaluated. According to Vermeulen (2017), parametrically adjusting the SHIW with the extreme observations from the rich list increases the top 1% share by 6–7 percentage points from a level of 14% in 2010. Applying similar methods and data from the _Forbes_ World's Billionaires, Davies et al. (2017) imputed the "missing" upper-end wealth tail to household survey data for many countries beginning in 2000. The exercise is also carried out, on an annual basis, for the Global Wealth Report by Credit Suisse; their estimates appear to be in line with our benchmark series, since the mid-2000s. Figure 8(a) shows this for the top 1%. These hybrid estimate seems to

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33.   It is worth remembering, as reminded in Deaton (2005), that the absence of the rich from surveys does not necessarily imply that measured inequality is biased downwards.

suggest that the correction of survey data for missing wealth, especially in the upper end wealth bracket, may prove a fruitful avenue for future research.

We can track the share of total net wealth held by the *Forbes* richest 5 or 10 individuals, since 1988 and 2000 respectively. As shown in Figure 8(b), a group whose size is a thousand times bigger (the top 0.01% represents 5,000 individuals) holds a share ten times higher. The dynamics of the *Forbes* list broadly concurs with our benchmark series. The 5 wealthiest Italians almost tripled their share of total wealth from the mid-1990s to 2016, from 0.2% to 0.7% (and the share remained at a similar level till 2019); the share of the top 0.01% went up too, from% 2 to 7%.

FIGURE 8. Triangulation of the evidence with external data series
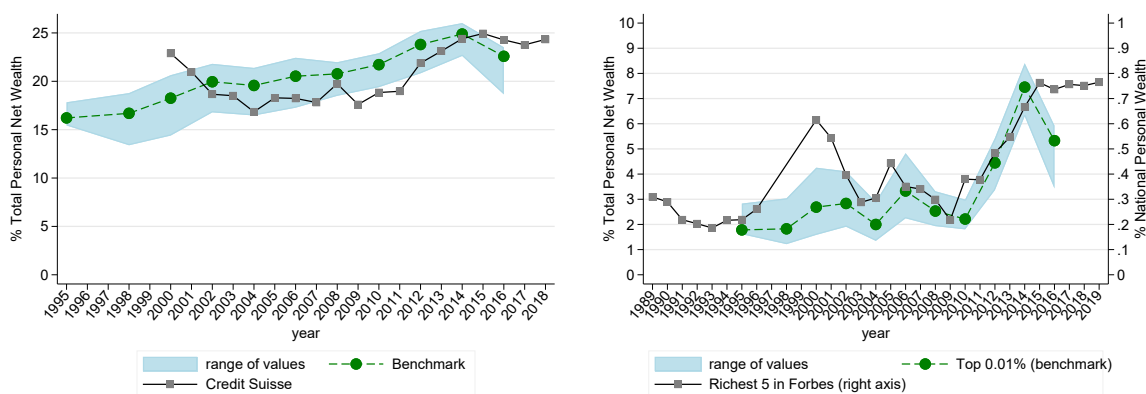
(a) Top 1% in Credit Suisse data   (b) The wealth share of 5 richest *Forbes* billionaires

Note: Panel (a) compares the top 1% share of wealth from our benchmark series, from the Credit Suisse Report (combining SHIW data and *Forbes* rich list). Panel (b) compares the top 0.01% share of wealth from our benchmark series with that of the 5 richest individuals listed in the USD global billionaires rich list by *Forbes*.

5. Determinants of wealth concentration

Identifying the precise channels that affect the evolution of wealth inequality is a fundamental question that has important implications for policy but remains broadly unanswered. Recent work in the U.S. has emphasized that wealth inequality can be fueled by differential saving rates coupled with increasing income inequality (Saez and Zucman, 2016). As discussed in Fagereng et al. (2019), richer households mostly "save by holding," "meaning that they tend to hold on to assets experiencing persistent capital gains." Indeed, a growing body of evidence stresses the importance of the heterogeneity of portfolio composition, asset prices, and rates of return across the wealth distribution (Advani et al., 2020, Alvaredo et al., 2018, Benhabib et al., 2017, Fagereng et al., 2020, Kuhn et al., 2020, Martínez-Toledano, 2020). Beyond these factors, individuals also differ in the extent of wealth transfers received via gifts and inheritances, as stressed in Feiveson and Sabelhaus (2018). It has also been suggested that the receipt of large inheritances may have a dis-equalizing effect, especially in the long-run (Nekoei and Seim, 2018, Nolan et al., 2020). Reality is complex and certainly involves all the aforementioned elements, and others too. For instance, the recent work by Hubmer et al. (2020) highlights how the decline

of the progressivity of income taxes could explain the most important part of the dynamics of US wealth concentration since 1980s. Other macroeconomic factors may well be very important too. Indeed, the period under analysis here, is one of substantial economic turbulence, and structural reforms for the Italian economy affecting the labor and credit markets, public pension system, as well as a widespread program of privatization of large state-owned corporations. There are also concerns about the impact of the large programmes of long-term bonds purchases, pursued in the US, in the UK, and by the European Central Bank following the Great Recession. As remarked in Brandolini et al. (2018) "the currency crisis of 1992 is a watershed in Italy's economic development. It marks the start of a phase of weak economic performance and uncertain growth prospects." This section explores some of the potential determinants of the trend of wealth concentration in Italy.

5.1. The portfolio composition across the wealth distribution and wealth dynamics

Workers save out of earned incomes during their working lives in order to dis-save through retirement and to face any other expected or unexpected need throughout their life cycle. Moreover, for any given age, different people across the income and wealth distributions may have different saving rates. Beyond this (obvious) accumulation channel, the existing stock of real and financial assets tend to reproduce itself; financial and real estate wealth may be invested, generating income returns that can be saved in turn. Positive real interest rates may accrue on bank accounts, and assets may also appreciate or depreciate over time, implying changes in the valuation of the stock of wealth independent of individual decisions to save.

Crucially, the strength of each of these channels may vary over time and may well apply differently to different segments of the distribution. For instance, households' savings rate out of disposable income has been steadily declining in Italy since the mid-1990s, dropping from 16% in 1995 to 3% in 2016. Over the same period, the harmonized interest rates on deposits (by the household and the non-financial corporate sectors) dropped from 5.6% to 0.4%. As the weight of deposits in the wealth portfolio is particularly high at the bottom of the distribution (jointly with valuables, they are worth at least 50% of gross wealth for the bottom 50% group as shown in Figure 9), it is reasonable to expect a strong co-movement between the decline of saving rates (and of returns on savings) and the wealth share of this group. At the same time, we should expect the middle 40% and the top decile with the exclusion of the top 5% to be particularly sensitive to the dynamics of the real estate market, as housing and land constitute the biggest asset class for them, namely around 60% of total gross wealth in recent years (see Figure N.1(b) and N.1(c) where the time series of the Italian house price index is superimposed the the dynamics of the share of total personal net wealth for these two groups). According to the OECD, the house price index increased by 35% between 1995 and 2008, closely following the growth in the average net wealth held by the middle 40%. Following the 2008/2009 financial crisis, house prices stagnated and then started to decline; by 2016, the reduction in the average house price was 27%, and the real average net wealth of middle 40% declined by 12% between 2008 and 2016. Conversely, the reversal of house prices since the 2008 crisis, coupled with a fast rebound of stock prices, may have contributed to the substantial rise in wealth concentration that we observe since 2010. Indeed, the OECD share price index for Italy declined by 59% between 2007 and 2012 and rebounded by 50% by 2015, before dropping again by 15% in 2016. Financial securities and corporate and non-corporate personal business assets are dominant in

FIGURE 9. The composition of wealth across the wealth distribution

(a) 1995

(b) 2000

(c) 2008

(d) 2016
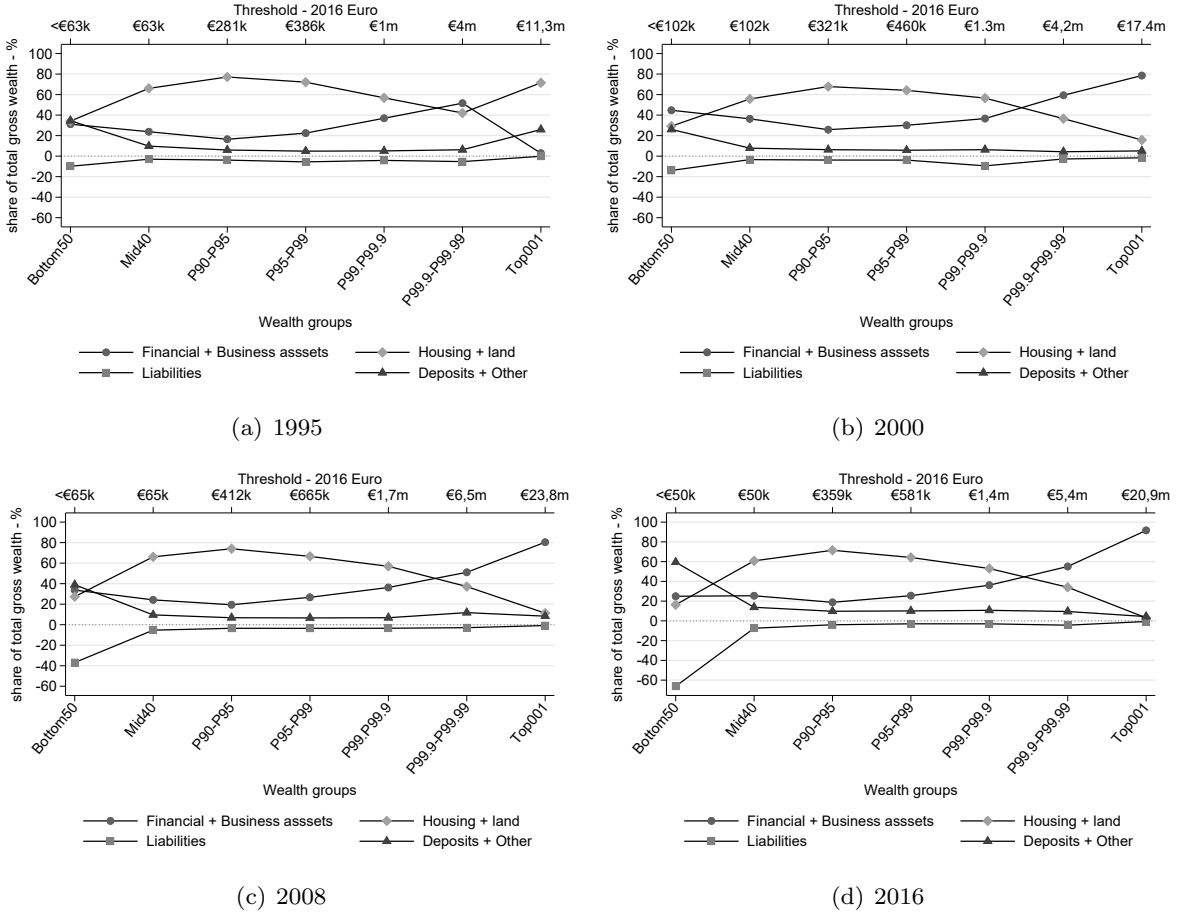
Note: Adults are ranked by net wealth. Bottom, middle, and high-end groups are identified and total net wealth is decomposed into four classes: housing and land; business assets, equity, and debt securities; deposits and other assets (including cash, valuables, etc.); and liabilities. The top x-axis in each panel of the graph represents the monetary threshold (in 2016 Euro) to belong to each group. See table N.1 in the appendix for more details.

the portfolios of the wealthy, especially in recent years. In 2016, individuals with more than €20 million (the top 0.01%) held more than 80% of their wealth in the form of financial and business assets(see Figure 9).

To further probe the role of heterogeneous portfolios and their returns, we use our data to show how different assets classes contributed to the rise in the concentration of wealth at the top. We divide wealth into net housing assets and net non-housing assets (e.g. mostly financial assets), and allocate both to different groups of the distribution (preserving the ranking of adults according to net wealth). For each group i we define the share in total net wealth as S_i, which in turn can be written as the weighted average of the housing (H) wealth share and the non-housing (NH) wealth share of the same group i:

$$S_i = \frac{H_i + NH_i}{W} = \frac{H_i}{H}\alpha_H + \frac{NH_i}{NH}(1 - \alpha_H) = S_i^H \alpha_H + S_i^{NH}(1 - \alpha_H),\qquad(3)$$

FIGURE 10. The contribution of housing and non-housing wealth the the growing concentration of wealth

(a) Bottom 50%

(b) Middle 40%

(c) Top 10%

(d) Top 1%

(e) Top 0.1%

(f) Top 0.01%
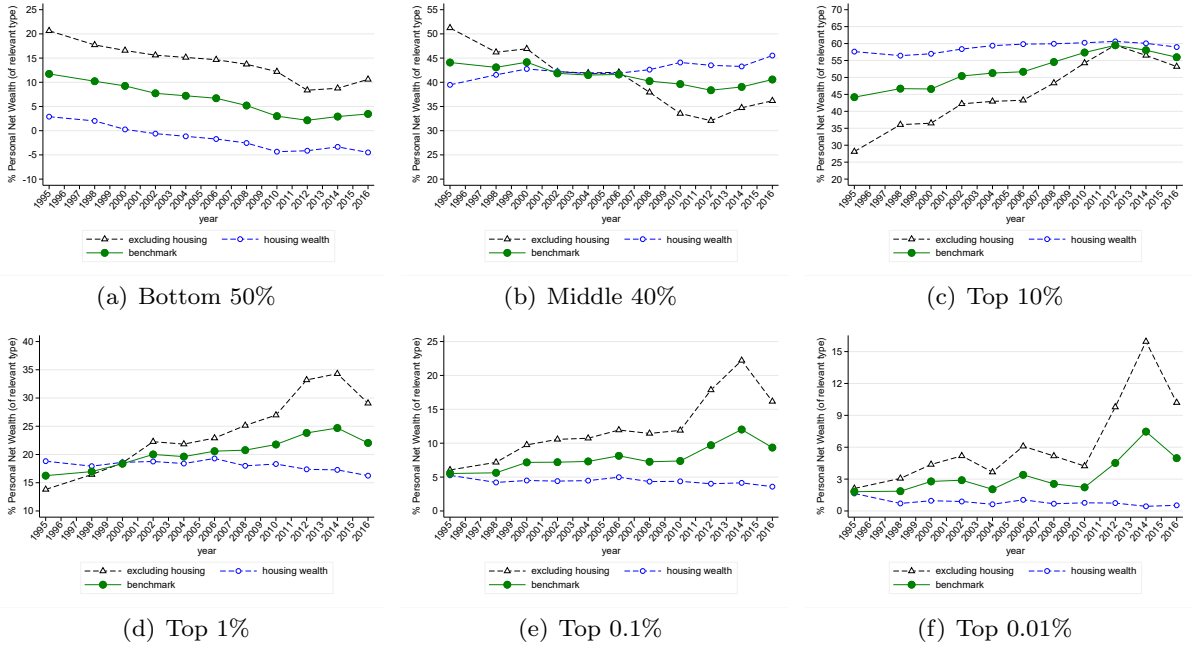
Note: We divide wealth into net housing assets and net non-housing assets, and allocate both to different groups of the distribution (preserving the ranking of adults according to total net wealth). For each group i we define the share in total net wealth as S_i, which in turn can be written as the weighted average of the housing (H) wealth share and the non-housing (NH) wealth share of the same group i can be defined as $S_i = \frac{W_i}{W} = S_i^H \alpha_H + S_i^{NH}(1 - \alpha_H)$ where α_H and $1 - \alpha_H$ are the relative weights of net housing and net non-housing wealth in the total net wealth of the household sector.

where α_H and $1 - \alpha_H$ are the relative weights of net housing and net non-housing wealth in the total net wealth of the household sector. The results of this simple exercise reveal, in Figure 10, that wealthy individuals have been capturing a growing share of non-housing wealth. By contrast, the share of total housing stock captured at the very top of the net wealth distribution has remained relatively flat since 1995 (Figure 10, panels (c) to (f)). Upper end groups aside, the share of non-housing wealth decreased visibly for the bottom 50% group, turning negative since early 2000s, and increased by 5 percentage points for the middle 40% group. The share of non-housing net wealth drives most of the negative trend for the bottom 90% and the positive trend for top groups, above the 90th percentile. For instance, the share of non-housing net wealth tripled between 1995 and 2016 for the top 0.1% group, growing from 5% to 15%. This is in agreement with the findings described by Alvaredo et al. (2018) for the UK, in the sense that housing wealth may have well "moderated the tendency for concentration to increase in other forms of wealth" (p.37). However, this does not apply outside the top ranges of the wealth distribution. The pronounced downward trend in the share of the bottom 50% was driven by both housing and non-housing wealth (Figure 10(a)); the magnitude of the decline in the relative share of middle 40% was reduced by a slight increase in the share of net housing assets (Figure 10(b)).

5.2. Decomposing wealth growth by wealth groups and asset types: the role of savings, indebtedness, and capital gains

To better understand the proportional contribution of each asset class to the wealth growth of each wealth group P, we consider net wealth NW as the sum of each assets class A_j, housing and land (H), business and financial assets (F), and deposits and valuables (Dep), net of total indebtedness (D).

$$NW_t^P = \sum_j^J (A_{j,t}^P - D_{j,t}^P) \tag{4}$$

Following the work by Albers et al. (2020), we identify the contribution of each asset class to total wealth growth, over 1995-2016, by totally differentiating equation 4 and dividing by NW_t^P.

$$\frac{dNW_{t+1}^P}{NW_t^P} = \sum_j^J \frac{dA_{j,t+1}^P - dD_{t+1}^P}{NW_t^P} = \frac{dH_{j,t+1}^P + dF_{j,t+1}^P + dDep_{j,t+1}^P - dD_{j,t+1}^P}{NW_t^P} \tag{5}$$

Differently from Albers et al. (2020), we explicitly consider the composition of net wealth growth (i.e. gross wealth net of total indebtedness) and in doing so we are able to isolate the contribution of indebtedness too. Table N.3 and Figures 11(a) and 11(b) highlight the heterogeneity of the results by wealth groups.

Between 1995 and 2016, housing wealth contributes 67% to the growth of gross wealth for the overall population. The relative contribution remains close to 60% for the Middle 40%. The contribution of housing and land declines to 50% for the top decile and to 35% and 9% for the Top 1% and the Top 0.1%, respectively. On the contrary, the role of financial and business assets becomes much more prominent within the top percentile: it accounts for 57% and 85% of the growth of net wealth for the Top 1% and the Top 0.1 % groups, respectively (see Appendix N.1). Things are very different for the Bottom 50% group, which lost 90% of net wealth over 1995-2016, and for which declining value of currency and deposits and increasing levels of indebtedness account for a third of its net wealth dynamics over time.

The analysis so far did not highlight to what extent the differential wealth growth across wealth groups is the result of the change in the volume of savings or the changes in the price of assets. One could use a very simple law of motion of net wealth for each group P at time t, NW_t^P:

$$NW_{t+1}^P = (1 + q_t^P)W_t^P + \tilde{S}_t^P \tag{6}$$

where $NW_t^P = W_t^P - D_t^P$, W_t^P is total gross wealth, D_t^P is the level of debt, $\tilde{S}_t^P$ is total savings in period t net of all changes in indebtedness level for the group P, and q_t^P is the weighted average of price changes of asset j weighted by the average portfolio share of each asset j for wealth group P.

We could then make use of the four main components of net wealth available in our database, H, F, Dep, and D. We assume that all changes in the latter two asset classes are only resulting from changes in volumes (savings), not in prices, so that only price changes for

housing and land (q_t^{HP}) and for financial and business assets q_t^{FP} are considered to derive estimates of capital gains. The accumulation equation can then be rewritten as:

$$(W_{t+1}^P - W_t^P) - (D_{t+1}^P - D_t^P) = q_t^{HP} H_t^P + q_t^{FP} F_t^P + \Delta Dep_t^P - \Delta D_t^P + RS_t^P \qquad (7)$$

Price changes for different asset classes could be used in combination with the observed wealth portfolio of different wealth groups P to derive saving rates across the wealth distribution. In line with the existing literature (Albers et al., 2020, Kuhn et al., 2020, Saez and Zucman, 2016), the resulting savings flows and capital gains would be considered "synthetic" as they are derived under the assumption of no mobility of individuals across wealth groups.

In particular, equation (7) opens a way to identify the role played by capital gains from housing and financial assets, the changes in the indebtedness levels, ΔD_t^P, the changes in savings under the form of deposits and valuables, ΔDep_t^P. Any residual change that reconciles the change in the wealth of group P is defined as residual savings, RS_t^P (we can interpret this as the variation in wealth resulting from changes in the volumes of housing and financial assets).

This exercise requires information about changes in prices. Similarly to what is done in the work by Albers et al. (2020), we use the observed portfolio composition of each wealth group P and the cumulative changes in the share price index and the house price index from the OECD.[34] We carry out the exercise over four different sub-periods, namely 1995-2000, 2000-2008, 2008-2012, and 2012-2016.[35] This allows us to decompose the cumulative wealth growth across wealth groups during the whole period, between 1995 and 2016, and between 1995 and 2008, right before the onset of the financial recession.

Results are presented in Table N.4 and Figures 11(c) and 11(d) for the Bottom 50%, the Middle 40%, and the Top 10%. To illustrate further heterogeneity within the very top, also the Top 1% and the Top 0.01% are shown. Two main sets of findings are worth highlighting.

First, relatively little of the change in wealth recorded between 1995 and 2016 can be attributable to changes in house prices. This is due to the fact that house prices have gone up substantially till 2008 and then declined thereafter so that the cumulative capital gains are very small in the period. The role of capital gains of housing assets becomes more prominent if

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34.   The financial and business asset category is very coarse and the composition of assets within this category can vary a great deal across the distribution. For instance, it may well be that the bottom and middle part of the distribution mostly hold pension and life insurance assets or safer government bonds whereas riskier shares in public and private companies and mutual funds may be the prevalent financial investment at the very top of the distribution. To account for such heterogeneity in the composition of financial assets across the distribution, we consider -30% the share price index change for the bottom 90% of the distribution and + 30% the share price index change for the groups above the 99th percentile. Such adjustment means that the share price index increase between 1995 and 2016 would be changed from 64%, as reported in the OECD data, to 45% for the bottom 90% and to 83% for the wealth groups within the top percentile. Data on asset prices from the OECD are reported in Table N.2.

35.   The periods are not symmetric given the data structure at hand. First, our data series begins in 1995. Moreover, taking 2000 to 2008 as one of the period of reference avoids relying on wealth composition information during years in which the quality of data is diminished (the inheritance tax was abolished between 2001 and 2006). Note also that the results are robust to the use of cumulative price changes between 1995 and 2008 and between 1995 and 2016 without considering sub-periods in the analysis. The main difference being that the exclusion of sub-periods would slightly overestimate the role of capital gains for financial assets.

we restrict the analysis to the upper middle class (Middle 40%) and to the sub-period preceding the great financial recession. On the contrary, changes in equity prices account for a growing share of wealth accumulation as we move above the 90th percentile. Total wealth of the top 1% increased by more than 250% from 1995 to 2008 and 36% of such growth is attributable to changes in the price of financial and business assets. The percentage grows to 44% for the Top 0.1% group. Capital gains of all financial and business assets accounts for 24% of net wealth growth between 1995 and 2016 in the upper-middle part of the distribution. On the contrary, over the same period, housing prices changes account for 23% of the growth of Middle 40% group and only 6% for the Top 0.1% group.

The second main set of results follows. Our analysis suggests that changes in net wealth are predominantly driven by volumes and not by changes in the prices of financial and real assets. This is particularly true for the bottom 50%, which experienced a 90% decline in net wealth between 1995 and 2016. For this group, increasing indebtedness and, most importantly, declining deposits and the volume of housing and financial assets account for the bulk of overall change in wealth. At the very top, the net wealth of the Top 0.1% grew by almost 300% over the same period, and more than 75% of that growth is driven by an increase in the volume of savings, namely changes in the volume of real and financial assets and increases in deposits and valuable assets. Restricting the analysis to the period preceding the onset of the great financial recession highlights a larger role of capital gains, especially at the top of the distribution. However, the role of net savings remains substantial and explains slightly less than 50% of the overall growth in net wealth even for the Top 0.1%.

It is worth noting that the use of external share and housing price indexes to derive "synthetic saving rates" for different wealth groups does not preserve the consistency with the national accounts framework. As discussed in Bauluz et al. (2022), to derive implied asset price changes that are consistent with the balance sheet of the household sector, one needs the saving flows of each asset class in the financial and real assets accounts of the households sector. These serve to estimate, as residuals, the shares of the aggregate wealth accumulation explained by changes in asset prices. Using detailed quarterly data from the Financial Accounts published by the Bank of Italy, we could decompose the change in the valuation of each financial asset class into price adjustments and financial flows. We show in Appendix A.2, Figure A.3 that the overall contribution of price changes for total financial assets is relatively dominant in almost all years from 1995 to 2021.[36]

However, in our case we cannot make use of the implied price changes for each financial asset class from the previous exercise as our data does not allow for a precise identification of different types of financial assets holdings (our class of financial assets bundles together shares, bonds, mutual funds, and other financial instruments). Moreover, a similar exercise cannot be carried out for real assets as no official accounting of the real asset flows exists.

Moreover, as discussed in Mian et al. (2020) and Bauluz et al. (2022), a growing share of the evolution of equity prices may reflect changes in retained corporate earnings. To the extent that

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36. The estimates are consistent with existing ones from the work of Caprara et al. (2020), who documented a "...dominance of price adjustments over financial flows" for Italy, Spain, Canada, the United Kingdom, and the United States.

retained earnings are effectively considered, at least in part, as a saving flow concentrated at the top of the distribution, the method adopted above could overestimate equity capital gains and underestimate the role of saving at the top of the distribution. Such underestimation may even be greater over time to the extent that retained earnings have grown in recent decades as shown Bauluz et al. (2022) for a number of high-income countries.

FIGURE 11. Net wealth growth decomposition across wealth distribution
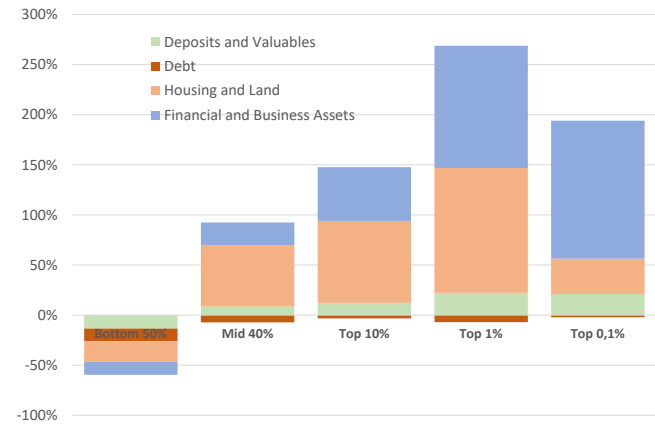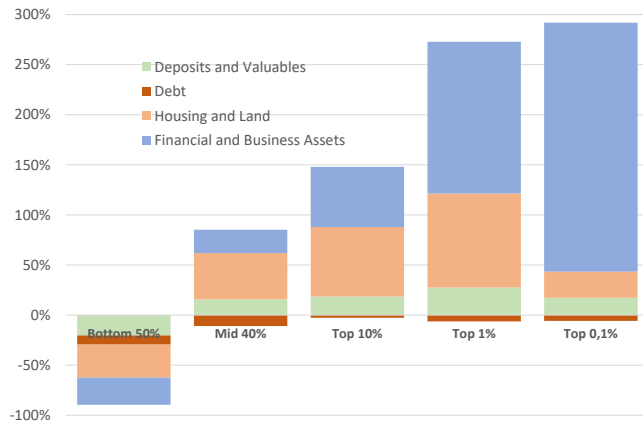
(a) Portfolio decomposition of wealth growth - 1995 to 2016

(b) Portfolio decomposition of wealth growth - 1995 to 2008
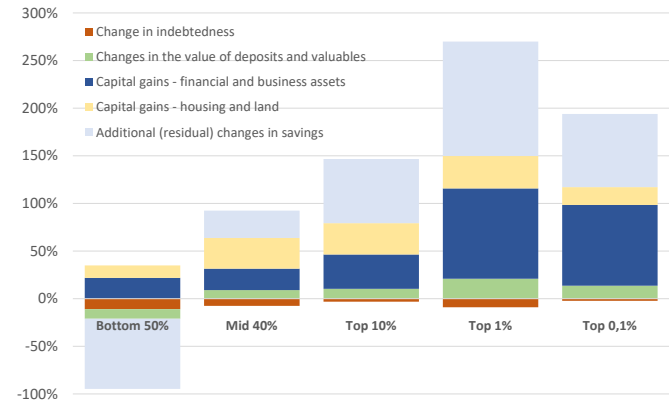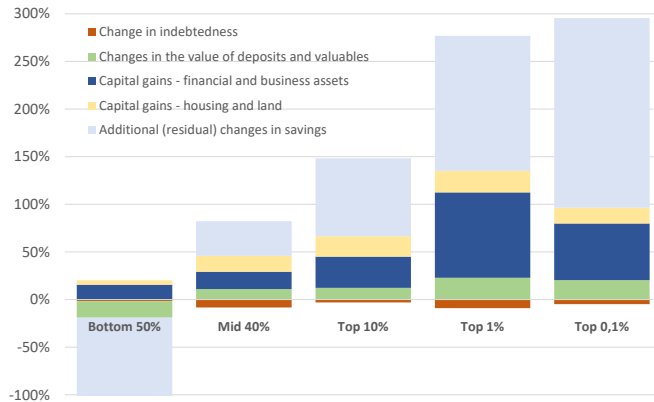
(c) Capital Gains vs Savings - 1995 to 2016

(d) Capital Gains vs Savings - 1995 to 2008

Interestingly, the role of changes in the volumes of assets and savings remains very large even with no allowance for corporate retained earnings, including at the top of the distribution. Moreover, the role of changes in the volume of assets remains strong despite a sustained declining trend of the saving capacity of Italian households over the past decades. Whereas the household saving rate in percentage of disposable household income was one of the highest in the world in 1995 (around 16%), it declined to moderate levels at around 3.2% in 2016. Using the survey data from SHIW we estimated the gradient of household saving rates (defined as the difference between disposable income and consumption as a proportion of disposable income) with respect to ranking of household along the net wealth distribution. We then preserve this gradient but adjust the estimated levels of saving rates to account for the proportional difference between the aggregate saving rates estimated in survey data and OECD macroeconomic statistics. The results averaged out for the 2000-2006 and 2008-2016 periods are shown in Figure 12 and show no evidence for a growing degree of dispersion of saving rates by wealth levels. Saving rates were more than halved for every net wealth decile from 2000-2006 to 2008-2016. Saving rate of the richest decile was 12% on average between 2000 and 2006, 10 percentage points higher than that of the bottom decile. Over the 2008-2016 the saving rate of the top decile was halved to 6 %, whereas the average saving rate of the bottom decile turned slightly negative.

FIGURE 12. Heterogeneity of saving rates across household wealth groups
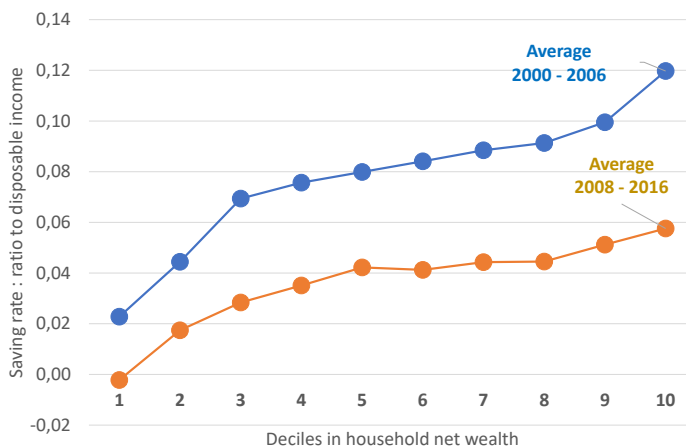
Notes: The figure shows saving rates by wealth levels estimated using survey data from SHIW. Saving rate is defined as the difference between disposable income and consumption as a proportion of disposable income. Saving rates are then re-scaled to account for the proportional difference between the aggregate saving rates estimated in survey data and OECD macroeconomic statistics.

We further investigate whether a growing share of labor or capital incomes is concentrating in the hands of wealthy individuals, and we look at the *joint distribution of income and wealth* to assess to what extent top wealth holders are also top labor and top capital incomes earners.

In order to derive the share of total labor income accruing to the top of the wealth distribution, we have linked, at the level of the individual, income from tax data in the year

before death to the net wealth at death.[37] We have done this exercise on the wealth observed in year 2014, which represents the peak of concentration, and on the wealth observed in year 2001, the last year before the temporary elimination of the inheritance tax. Personal Income tax records have been analysed in years 2013 and 2000 respectively. We have then built aggregated data matrices, with joint distribution of wealth and labor income, for different age groups and gender.

We define labor income as the sum of employment income ("Reddito da lavoro dipendente") and self-employment income. We define self-employed income as the sum of professional income, income from sole proprietorship and partnerships.[38] For those categories it should be taken into account that a part of income is generated from labor, while the remaining part is generated from capital. As regards professional income, we have imputed 100% of income to labor, since this income comes from the exercise of any profession or vocation which calls for an intellectual or manual skill. For sole proprietorship and partnerships we have followed Saez and Zucman (2020) who allocate to labor 80% of sole proprietorship income. Differently from Saez and Zucman (2020), we apply the same 80% proportion also to partnership income since in Italy partnerships are typically very small and not different from sole proprietorship[39] Capital income is instead defined as the sum of financial capital income (including realized capital gains), lands and buildings income, and the residual 20% of business income that we assume are not attributable to labor. However, it is worth noting that some forms of financial income are taxed at source, so they are not captured in personal income tax returns.[40]

In Figure 13 we show the share of capital income and labor income accruing to the top 1% of the wealth distribution. The concentration of capital income is much greater than the concentration of labor income and greater even than the concentration of personal wealth. However, the dynamics of concentration over time appears relatively stable between 2001 and 2014. While labor income share for the top 1% of the wealth distribution declined slightly from 2.82 to 2.29 percent, the share of capital income increased slightly from 15.5 to 16.1 percent and does not mimic the sustained rise in wealth concentration at the top. The overall dynamics of top fiscal income shares is mostly driven by what happens to the labor income which accounts for around 55 percent of total reported fiscal income, whereas capital income only accounts for 5 percent of the total. A similar exercise carried out for France by Garbinti et al. (2021) shows that the labor income share of wealthy individuals declined substantially over the course of the long run from 1970 onward, moving in opposite direction to the share of capital income accruing to the top of the wealth distribution. More in line with our evidence, Garbinti et al. (2021) show

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37. We have then applied mortality multipliers to derive the joint distribution of income and wealth for the living. Similarly, we have derived the estimated market valuation of real estates correcting the reported cadastral values. See section 2.3 for a detailed description of both passages.

38. Self-employment income include the following categories: "reddito da lavoro autonomo, perdita da lavoro autonomo, reddito d'impresa in contabilità ordinaria, perdita d'impresa in contabilità ordinaria, reddito d'impresa in contabilità semplificata, perdita d'impresa in contabilitá semplificata, reddito da partecipazione, perdita da partecipazione, redditi diversi". There are no S-corporations in Italy.

39. According to tax returns statistics of tax year 2019, 99,9% of Italian partnerships are small enterprises (i.e. with a turnover lower than 10 million euros). This share of 80% for the labor component of income of sole proprietorship and partnerships has also been used specifically for the Italian case in EC (2004), p. 175.

40. Capital income include the following categories:" reddito dominicale e agrario, reddito da fabbricati e cedolare secca, reddito di capitale (include plusvalenze di natura finanziaria)".

a much milder dynamics of income shares from 2000 onward.

We further estimate the probability for top labor earners to belong to the top percentile of the personal wealth distribution. We conducted the exercise for the Top 1% and Top 0.1% labor income earners (reporting at least 90,000 Euro and 200,000 Euro), and found that between 2001 and 2014 such probability doubled for both labor income groups. It increased from 7.8% to 15.5% for the richest 1% labor income earners (and from 20.5% to 54.3% for the top 0.1%). Such level in recent years is similar to what is observed in France (Garbinti et al., 2021). However, the estimated trend appears opposite in sign: in France the probability of top 1% of labor earners to belong to the top 1% of wealth holders is slightly declining from around 20% in 2000 to 17% in 2012, and the negative trend is much more pronounced if compared to available estimates in 1970, 29%.

On the one hand, the results may indicate that upper wealth ranges may open the doors to top earning positions. On the other hand, consistently with the evidence about raising top income shares over the past decades (Alvaredo and Pisano, 2010 and Guzzardi et al., 2022), results may indicate that Italian top labor earners have increasingly higher chances to climb the wealth ladder to the very top (via either higher savings or higher returns to wealth).

However, as remarked in Brandolini et al. (2018), it is important to recall that widening inequalities must be seen in the context of a peculiar macroeconomic setting in which "Italy is the only major advanced country which, in the last two decades, suffered a fall in real household incomes per capita" (p. 5). The documented growing probability for top earners to be found at the top of the wealth distribution may, therefore, can have an alternative interpretation: individuals in the bottom and middle ranks of the income distribution may find it increasingly difficult to climb the wealth ladder. Raising wealth to income aggregate ratio as documented in the introduction may reflect this growing relative 'unaffordability' of wealth for average income earners.

5.3. The evolution of wealth over the life cycle

The concentration estimates discussed so far refer to snapshots of the distribution in given years and include wealth and savings accumulated for life cycle purposes. As written in Cowell and Van Kerm (2015), "even if everyone had common wealth accumulation paths over the life cycle, wealth at any point in time would turn out to be unequally distributed when pooling observations of individuals of different age." Indeed, average wealth does vary considerably across the age distribution; older generations are much richer than younger ones as one would expect. In 1995, average wealth peaked at 40–50 years old but was less than a third of this amount for the 20–40 year-old group. Average wealth increased for all ages until 2007 before receding following the Great Recession, in particular for younger groups (Figure 14(a)). However, assessing the average wealth holding between age groups does not sufficiently capture the role of age in determining the extent of wealth concentration.

To address this concern, we attempt to isolate the effect of age from that of other wealth-generating factors that are correlated with age, such as education level and birth cohort. To do so we compute an age-adjusted Gini index that directly isolates the net effect of age on inequality via a multivariate regression model as suggested in Almas et al. (2012). We apply this exercise
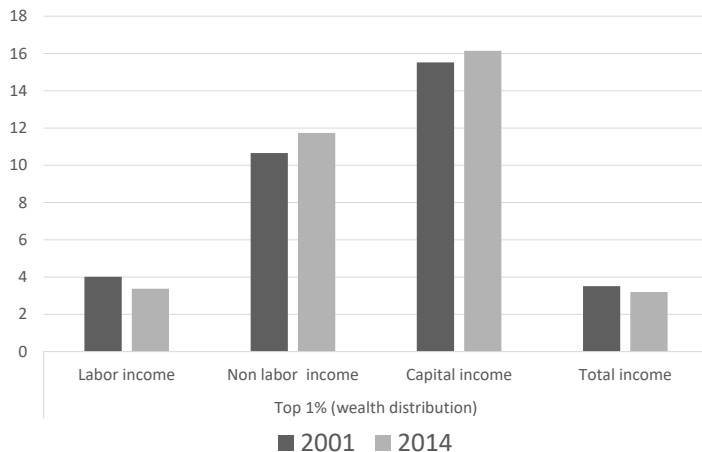
Note: The joint distribution of income and wealth is estimated using records linking individual income tax data in the year before death and the adjusted value of reported net wealth at death. We define labor income as the sum of employment and self-employment incomes (i.e., professional incomes + 80% of partnership and sole proprietorship incomes). Capital income is defined as the sum of financial capital income (including realized capital gains), lands and buildings income, and the residual 20% of business incomes that we assume are not attributable to labor. Non-labor income is defined as the sum of capital income and old-age taxable pension incomes (excluding non-contributory social protection pensions).

to our tax-based data (where we can only condition on gender) as well as to the survey data (where we can use a richer set of controls such as gender, type of work, sector of work, and education). As shown in the Appendix U (Figure U.1 and Table U.1), the age-adjusted Gini is found to be at most 0.015 Gini points below the unadjusted one, with no apparent trend effect, suggesting a marginal role of age components in explaining current wealth distribution.[41]

Following Atkinson (1971) we also conduct two additional exercises. First, we assess the age distribution of wealth holding in the population as a whole and in the subgroup of wealthy individuals. If age were the most important factor driving wealth accumulation, we would find mostly older individuals populating the high end of the distribution. However, as shown in Figure 14(b), this is not the case: old, middle-aged, and sometimes young people alike can be found within the richest groups as well as in the overall population, albeit in different proportions. Second, we analyze the distribution of wealth holding within each age group and compare it to that of the overall population. Figures 14(c) and 14(d) display the high-end segment of the Lorenz curve corresponding to the richest 5% of adults (i.e., above the 95th percentile) for each independent age/gender group in comparison to that of the overall population. The vertical dotted lines identify the top 1% in each case. One can derive the share

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41. The adjustment procedure proposed by Almas et al. (2012) rely on calculations of the Gini coefficients without negatives and substituting all zeros with 1. Although the method can isolate the effect of age components, this makes the method less appealing to estimate the actual levels of wealth inequality given the substantial role played by zeroes and negative values in the distribution of wealth.

FIGURE 14. The life-cycle dimension of wealth distribution and inequality
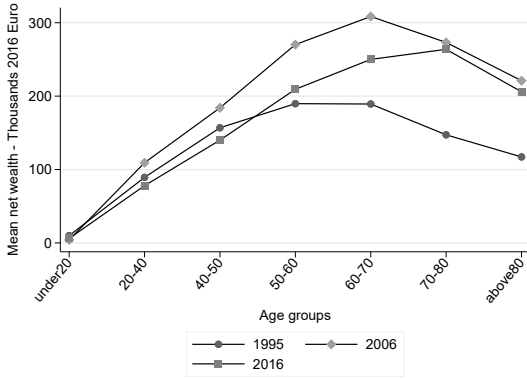
(a) Evolution of mean wealth across age groups
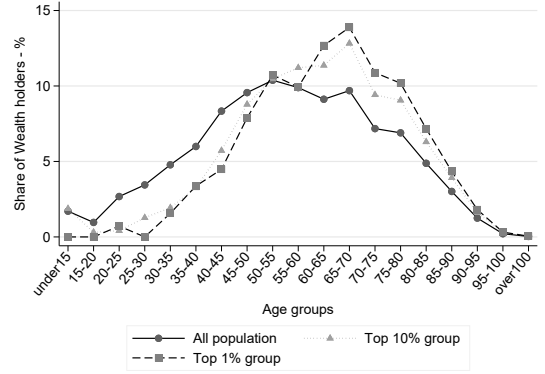
(b) The age distribution of wealth
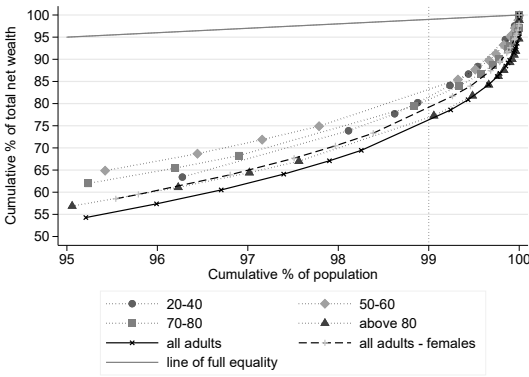
(c) Females 2016: The upper Lorenz curve by age groups:
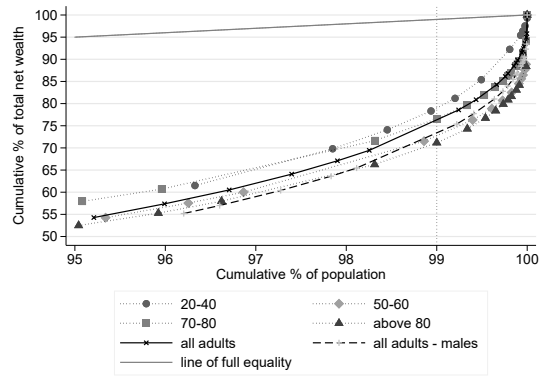
(d) Males 2016: The upper Lorenz curve by age groups

of total wealth held by each top 1% group as 100% minus the cumulative percent of total wealth identified on the y-axis, where the vertical line meets each Lorenz curve. The result strongly suggests that wealth remains widely concentrated within all age/gender groups, with the shares of total wealth held by the top 1% being roughly similar, irrespective of age and gender. Most importantly, no group presents a degree of wealth concentration that is considerably lower than that of the overall population. The only exception appears to the younger group of males, for whom wealth appears relatively less concentrated than in the overall population.

The fact that wealth inequality is similar across age (and gender) groups is not a novel finding, but it has not been sufficiently stressed in the literature. Similar findings about considerable inequality even among people of the same age were already found in Cowell and Van Kerm (2015) and also in Atkinson (1971): "[I]f we standardize for age and sex, the degree of inequality is not substantially reduced" (p. 248). Atkinson concludes that "life-cycle factors cannot explain the upper tail of the current distribution of wealth in Britain, and there are good reasons for believing that there is a high degree of concentration in the distribution of wealth inherited by people over their lives." (pp. 251–252) The relevance of this statement about the residual role of inheritance in driving wealth concentration at the top can be explored with the existing data.

We now turn to this important point.

5.4. The growing role of inheritances and its dwindling taxation

Wealth transfers, including inheritances and inter vivos gifts, are important economic resources for households. Intergenerational wealth transfers also play an important role to determine long-run dynamics of wealth concentration and this is a subject of a growing body of research (see Nekoei and Seim, 2018, Nolan et al., 2020 for detailed discussions and empirical assessment of such question). In this paper we do not attempt to directly quantify the proportion of changes in wealth concentration that can be attributed to changes in the patterns of wealth transfers receipts and its taxation. Instead, we provide novel quantitative evidence about the growing incidence and concentration of bequests and lifetime receipts of wealth transfers in Italy. We also show that the tax treatment of such wealth transfers have become increasingly favorable to the wealthy over time.

In low-growth economies, bequests play a much more important role than own savings in the process of accumulation. Not surprisingly, in rich countries, their scale relative to national income has increased substantially in recent decades (Piketty (2011); Atkinson (2018); Alvaredo et al. (2017)); Italy is no exception. As shown in figure 15(a), we estimate that from the mid-1990s to the mid-2010s the annual flow of total market value of inheritances and gifts almost doubled, from 8.4% to 15.2% of national income, and they grew from 1.7% to 2.5% of personal wealth.[42] We also document a tendency of large bequests to concentrate in fewer hands. Figure 15(b) shows the evolution of the share of total estates held by the richest 1% of decedents. The latter increased by at least 4 percentage points from 1995 to 2016, from 18% to 22%. The results imply, only indirectly, a potential concentration of inherited shares derived from total estate. To shed light on this important issue, in a complementary exercise we assume that every estate is split equally between two heirs, and we also add the lifetime donations to the total estate value as reported on tax records. This effectively allows us to estimate lifetime wealth transfers concentration measures. Plotting the evidence in Figure 15(b), we show that the share of lifetime transfers received by the richest 1% of heirs increased substantially from 19% to 25%, from 1995

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42. These estimates are very closely aligned to those shown in Acciari and Morelli (2020) relying mostly on declared information on tax statistics, with aggregate and proportional corrections for under-reporting of wealth. Yet, the estimates presented in this paper rely on the benchmark wealth distribution of the entire population reconciled with the national household's balance sheet. Total wealth holdings are classified by gender, location, and age groups and each cell is multiplied with the relevant mortality rate (as estimated by ISTAT). Such exercise represents a reverse engineering of the mortality multiplier method, estimating the entire deceased population and its wealth holdings every year. The advantage of this approach is the derivation of a full distribution of the estates at death, including implied adjustments to their wealth reported on the tax records as well as an allowance for the wealth of non-filers. A similar approach was applied in the work of Cannari and D'Alessio (2008) simulating inheritance receipts by applying mortality tables to the reported wealth in the Survey of Income and Wealth. In this case the total value of inheritance flows as a share of total net worth is substantially lower and it increased much more moderately over time, from 0.99% in 1995 to 1.52% in 2016. The estimated series of total annual flows of gifts cannot be estimated with this method and is taken from Acciari and Morelli (2020).

to 2016.[43]

The relevance of inheritance patterns for wealth accumulation can be highly relevant also at the very top of the wealth distribution. Data on Italian billionaires by *Forbes* indicate that the fortunes of 6 out of the top 10 richest individuals are recorded as "inherited" or "inherited and growing". Direct microdata evidence about the relevance of wealth transfers for the upper wealth brackets is provided in the work by Nolan et al. (2022), which shows that the likelihood of having received, at any point in life, an inheritance or gift increases with the level of wealth as reported in the household survey data for Italy, France, Germany, Spain, the UK and the US. In particular, the authors find that in Italy 55% of households in the top wealth decile report having received any form of inheritance or gifts in their life compared to only 3.4% of the first quartile of the distribution. The authors also show that the average amount received generally rise as one moves up the wealth distribution and "are by far the largest for recipients in the top 1%". Although a non negligible proportion of households in the top 1% of the distribution did not receive any intergenerational transfers, those who did benefited of particularly large amounts on average, which would have added to their accumulation of wealth. Transfers going to the top 1% are generally worth 7 times the overall average transfer value in the population (which is estimated to be around 350,000 euro), whereas for the bottom quartile this ratio is closer to half. The authors also describe how these patterns remain valid within age-groups and state that "This will of course reflect inter alia the impact that receipt of the inheritance or gift has had on current wealth and location in the wealth distribution."

Despite the growing relevance of personal wealth and inheritance as proportion of national income, as well as their concentration, the receipts from the inheritance tax experienced a notable decrease from 0.14% to 0.06% of total tax revenues, from the end 1990s to 2016 (Figure 15(a)).[44] The dwindling role of inheritance and gift taxes is important to the extent that it enhances the share of the current wealth distribution and accumulation that is due to interpersonal wealth transfers. As argued in Cowell et al. (2018), wealth transfer taxes are very important for "the long-run distribution of wealth, reducing equilibrium inequality (the 'predistribution' effect) by a much larger amount than what is apparent in terms of the immediate impact of the tax (the 'redistribution' effect)." Along similar lines, the work by Nekoei and Seim (2018) argues that "inheritance taxation can reduce long-run wealth inequality", albeit, "solely through the taxation of very large inheritances."

The causes of the reduction in the tax revenue are found in the profound changes made to the structure of the estate, inheritance, and gift tax, including the marked decline of its progressivity over the last decades. A year before the inheritance tax was repealed, the estate tax with a progressive tax schedule was transformed into the current structure of a proportional

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43. Note that the adjustments for missing wealth would rely on a poor set of information in the years when the inheritance tax was cancelled (2001-2006) as the reporting of assets other than real estates was compromised. For this reason, the levels of adjusted concentration estimates in the years 2002, 2004, and 2006 are proportionally linked to the unadjusted concentration figures in 2001 and 2008. More detailed information about the distribution of estate at death and the lifetime wealth transfers are shown in Appendix R.

44. The total revenue generated from the inheritance tax associated with individuals who died in 2016 was worth €400 million. The official figure of the Ministry of Economy and Finance for the inheritance tax revenue, measured at the year of account and not at year of death, is €558 million for 2016. An additional €183 million came from the gift tax.

inheritance tax (levied on the beneficiary). As described in Jappelli et al. (2014), the marginal rates of the estate tax ranged from 3% to 27% in the 1990s. In 2000, the inheritance tax was introduced with a unique, proportional tax rate at 4% for transfers received by a spouse or direct relative, which has remained unchanged even since the tax was reintroduced in 2006. The exemption threshold for similar transfers increased substantially from nearly €125,000 between 1995 and 1999, to nearly €175,000 until 2000, and then to €1 million from 2006 onward.

Approximately 70% of the estates above €300,000 were subject to taxation between 1995 and 1999. In the tax regime valid since October 2006, as highlighted in Figure 16(a), only 30% of estates valued between €2.5 million and €6 million and less than 80% of the richest estates (€10 million and above) were subject to taxation, on average. At the same time, the share of estates between zero and €20,000 subject to taxation increased from 1.6% in the pre-2000 tax regime to 14% on average in the current tax regime. Many small estates are now subject to taxation due to the fact that the exemption threshold was cancelled for wealth transfers occurring beyond the fourth degree of kinship. Even small inheritances are, therefore, subject to taxation if received from donors outside the more direct family sphere. As a result, the share of total estates that are now subject to taxation is just above 10%, compared to 8% in the 1990s. Furthermore, conditionally on being taxed, the richest estates now have a substantially lower tax bill. The richest estates (€10 million and above) paid the equivalent of 6.3% of the estate value in taxes on average before 2000, with considerable variance around this average value.[45]

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45.   As shown in the appendix, the average tax rate for estates above €10 million could be higher than 20% of the estate value or as low as zero. Given the existence of a large category of tax-exempt assets, the effective tax rates depend substantially on the composition of the estate.
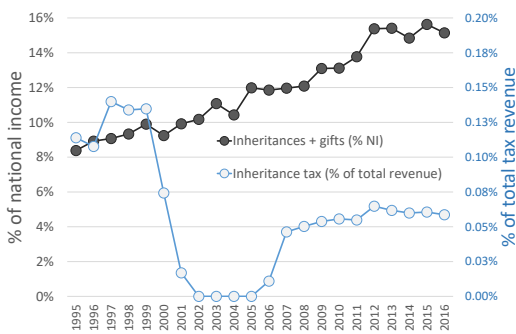
(a) Wealth transfers & inheritance tax revenue
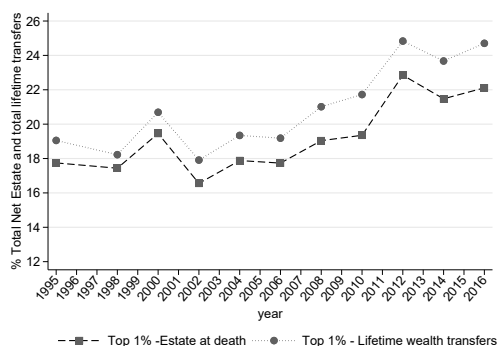
(b) Top1 % - Estate and lifetime wealth transfers concentration

Note: Panel a) shows the value of annual flows of inheritances and gifts inter vivos as share of national income and the value of inheritance tax paid (excluding gift tax) as a share of total annual tax revenue. The effective tax liabilities paid from the inheritance tax forms are reported at year of death. Total annual tax revenue is derived on a year of account basis from official statistics of the Ministry of Economics and Finance. Panel b) shows the share of total estate value held by the richest 1% of decedents and the share of lifetime wealth transfers received by the richest 1% heirs (the value of lifetime wealth transfers is derived as the sum of total inheritances and total inter vivos gifts ; the number of heirs are derived assuming that every decedent have distributed her wealth and donated equally between two heirs). The value of the estates at death and wealth transfers received are adjusted for under-reporting, including among others allowances for the value of tax-exempt assets. The value of estate makes allowance for deceased individuals whose wealth is not reflected in the inheritance tax records (the missing population).

FIGURE 16. The decline of the tax burden on the wealthy
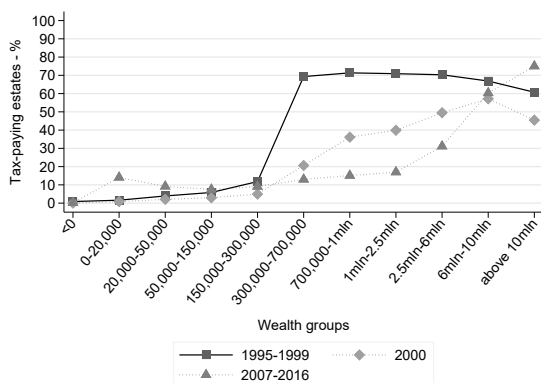
(a) Percent of estates taxed by net estate value
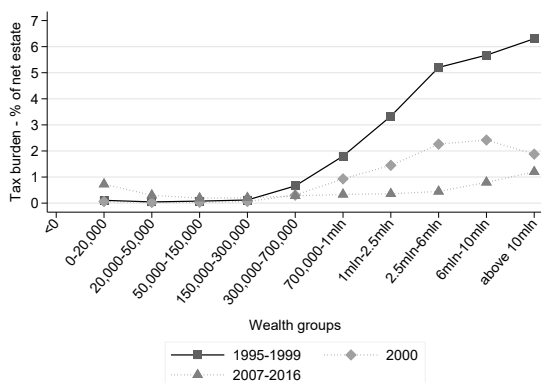
(b) average tax paid as percent of net estate value

Note: Panel (a) shows the % of estates subject to inheritance tax. Panel (b) shows the average tax burden by net estate ranges. Following the evolution of major reforms in the tax structure in 2000 and 2006, we compare the average values of the above-mentioned indicators in three main periods: 1995–1999, 2000, and 2007–2016. The 2001–2006 period is excluded as the inheritance tax was abolished in Italy during this period. The average tax burden is estimated based on the tax liability associated to each estate, computed as the sum of the tax applied on the global value of the estate, when applicable (i.e., before 2000), and on the share of the estate inherited by the heirs.

As shown in Figure 16(b), the average tax bill on the same estate has, since 2006, dropped to 1.2% of the estate value. This is not too dissimilar from the average tax bill of 0.7% associated with very small estates (between zero and €20,000). Therefore, under the current regime, a much smaller share of large estates are subject to taxation, the average tax rate for the largest estates has dropped by 80%, and the progressive structure of the inheritance tax—relative to the estate value—no longer exists. This does not necessarily mean that the major changes to the inheritance tax observed in Italy since year 2000 has directly determined the increase in wealth concentration in the same period; nevertheless, it can play a more substantial role for its long-run trend.

6. Robustness analysis

6.1. Alternative mortality rates

Older people, as expected, do have higher mortality rates than younger ones. Similarly, males tend to have a shorter life span than females. However, demographic factors are not the only ones influencing mortality. Socio-economic conditions such as marital status, geographical location, education, and income or wealth matter too. Indeed, rich people tend to live longer. Chetty et al. (2016) highlighted that being at the top of the income distribution provides with a substantial longevity advantage; people aged 40-60 in the top 1% of the U.S. income distribution have a mortality rate that is 30% of the rate for the overall population of the same age group. This could be relevant for the estate multiplier method, as a failure to appropriately account for mortality heterogeneity may result in biased estimates of the distribution of wealth, a point already highlighted in earlier work (Atkinson and Harrison, 1978). Nevertheless, this intuition is not always correct, because the underlying distribution of estates also plays a role, as explained in Alvaredo et al. (2018).

For a robustness analysis, we make use of the most updated recent estimates from the ISTAT, which account for the socio-economic gradient of mortality by linking the mortality records to the education levels for 2012, and for age groups between 25 and 90 years old. A distinction is drawn between four education groups: no education or elementary school; middle school; high school; and college degree or higher.[46] Controlling for education has an important effect on mortality. The life expectancy of a 25 year-old with no education or with elementary school is 4 years lower, on average, than that of an individual holding a college degree or higher. The difference in life expectancy is 5 years higher for males alone. Table Q.1 shows that, in 2012, the mortality rate for 40 year-old males was 0.16% on average. The mortality rate drops by more than half for a male in the same age group but with a college degree or higher. By contrast, the mortality rate is more than twice the average (206%) in the case of an elementary school

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46.   The ISTAT original classification is the following: "Nessun titolo o Licenza elementare"; "Licenza media inferiore"; "Licenza media superiore"; and "Laurea o titolo superiore". Two additional categories are dropped as redundant: "Nessun titolo o licenza elementare o licenza media inferiore; and "Licenza elementare o licenza media inferiore."

education at most.[47]

In seeking to establish whether and how steeper mortality multipliers change wealth concentration estimates, we assume that individuals with assets above €1 million have a relative longevity advantage—in relation to the overall population with the same demographic characteristics—equal to those in the highest education class. Individuals with wealth below €50,000 have been assumed to have the mortality rate of the group with primary education at most. Finally, individuals in intermediate wealth ranges, namely between €50,000 and €300,000 and up to €1 million, are assumed to have mortality patterns similar to those with middle school and high school, respectively. This type of adjustment is clearly imperfect and the information about mortality rates adjusted by education is only available for 2012; the same relative adjustments have been applied to the remaining years in our sample. The direction of the change is as expected (an increase in top shares), but the difference with the benchmark series at the top is small (for a more detailed discussion about the nature of these adjustments and their implications for top wealth shares see Alvaredo et al., 2018, Berman and Morelli, 2021).

A further confirmation that the results are robust to the use of more refined mortality multipliers is the use of tabulations containing finer disaggregation by age bracket and geographical location. Multipliers in 1995 were lower in the north of the country compared to the south and the islands. By 2016 it was the opposite. Theoretically, not accounting for such heterogeneity may bias downward the increasing trend in wealth concentration, given that the northern areas are the wealthiest. The concentration series, excluding any imputations, are robust in the presence of such refinements (see figure Q.1 in the appendix).

6.2. The inclusion of durables

The benchmark estimates discussed in Section 3.1 are based on distributing the entirety of the national balance sheets to the adult population. As mentioned, NA figures are not necessarily the ideal point of reference. We have discussed that some assets are missing from the official records, despite their relevance for households, such as vehicles and other durable goods (accounting for 8% of total wealth identified in the 2016 SHIW data). The exclusion of such assets would likely be felt more strongly in the bottom parts of the distribution. Hence, the exclusion of durables can have different implications for inequality estimates than the exclusion of financial assets stashed in off-shore accounts. As shown in Figure 17, including durables would, in fact, reduce the top shares marginally, but would increase the share of the bottom 50% by non-trivial 1–2 percentage points.

6.3. The role of imputations

Imputations are always surrounded with considerable uncertainty. In this paper we rely on a number of assumptions based on the observed wealth holdings aggregated by the four large macro-categories of assets available in the digitized tax records. These imputations could not be carried out asset by asset based on micro-level evidence and can appear controversial. For

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47. This mortality rate gradient by education groups is similar to that used by Kopczuk and Saez (2004) for the U.S.
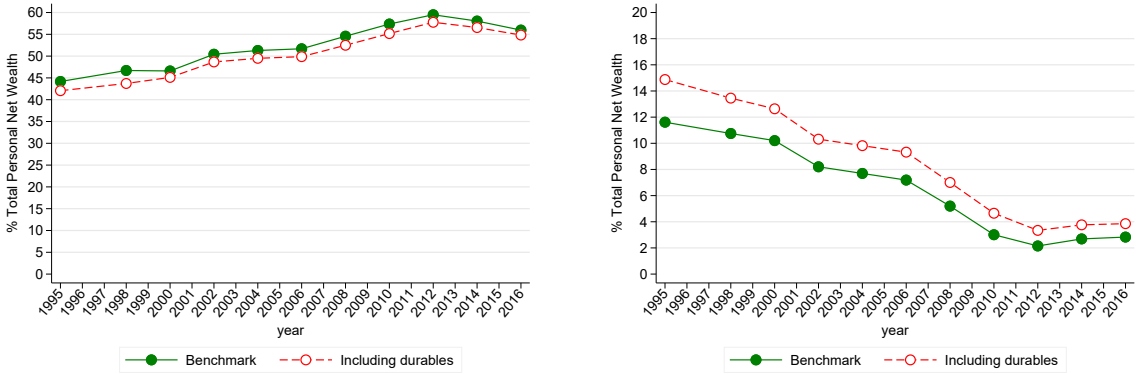
(a) Top 10%

(b) Bottom 50%

Note: The value of durables is imputed to the gender, age, location, and wealth levels as reported in the survey data. .

the benchmark series, we make the following imputations: (i) we first multiply up the estate distribution using mortality multipliers; (ii) we then append an estimate of the wealth of the missing population based on household survey data; and finally (iii) we distribute the remaining wealth gap with respect to the NA according to the relative distribution of asset classes in the identified wealth from tax records complemented with that of the missing population from survey data.

One must wonder to what extent the benchmark estimates are driven by specific imputation choices in steps (ii) and (iii). To address this concern we discuss two alternative imputation scenarios. First, we derive a series that imputes the wealth gap by relying exclusively on the identified asset distribution based on tax records; second, we derive a series where step (ii) is based exclusively on values reported in the household survey data, rather than relying on adjusted values to account for underreporting.[48] Both approaches attach more weight to wealth reported in the tax records, which is on average more concentrated than what would appear if one takes into consideration smaller wealth holdings that cannot come to the notice of the tax authority. Hence, the alternative set of imputations, when compared to our benchmark series, generally suggest higher wealth concentration at the top and a lower share for the bottom 50% of the population (deatils are given in Appendix O).

Wealth concentration with no imputations. Most importantly, we also estimate wealth concentration at the top without resorting to imputations of any kind, (i.e., entirely bypassing step (iii) above). The derivation of unadjusted wealth concentration statistics enhances our understanding of the series and their comparability across countries, given this was the dominant procedure in the literature until recently. Estimates for the UK in Atkinson and Harrison (1978) and Alvaredo et al. (2018), for instance, followed this path. Importantly, this was done using both

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48. As mentioned earlier in the paper, to account for underreporting of assets in the household survey data, we proportionally adjust non-housing asset values using the ratio of total value between the National Accounts and the SHIW, asset class by asset class.

internal and *external* wealth totals. Typically, researchers use external data (e.g., the National Accounts) on total wealth that bear no relation to tax data. However, when the population coverage of inheritance tax records is particularly high (like in the case of Italy or the UK), one can also rely on the multiplied-up estates as well as the estimated wealth of the missing population to derive an internal measure for total wealth. Figures 18(a) and 18(b) give the results. The series for the top 1% share based on both external and internal totals and no imputations point to a more moderate increase of inequality over the past decades (top 1% increased by 1 percentage point from 1995 to 2016 and by 5 to 6 percentage points from 1995 to 2014). [49] The evolution of the top 1% share based on internal totals and no imputations is also compared to that of other countries as available from existing literature. Both levels of wealth concentration in Italy as well as its trends appear very much in line with available comparable estimates for the UK, Norway, Finland, Sweden, Spain, and the Netherlands.

This may be suggestive of the fact that the imputation procedures of the unobserved wealth can play an important role in generating cross-country heterogeneity in the levels and trends of wealth concentration and should be carefully assessed and understood.[50]

Importantly, and reasonably, the role of imputations appears stronger especially in those years where the underlying inheritance tax data provide a less complete information to derive distribution estimates. For instance, between 2001 and 2006 the inheritance tax was abolished and the unadjusted data is mostly informative about housing wealth holdings. Similarly, in 2014 the tax legislation increased the non-filing threshold from €25,823 (50,000 Italian Lira) to €100,000.This has likely worsened the quality of unadjusted information to derive compelling wealth distributional estimates. Indeed, as documented in Appendix H, the number of unidentified adults increases by 1.5 million from 2012 to 2014 and whereas the total net wealth identified from the inheritance tax records amounted to 85% of total personal net wealth from macroeconomic statistics, this ratio dropped to 70% by 2016 (see Appendix G).

Hence, we believe our benchmark series with full imputation of missing wealth represents a more convincing representation of the actual dynamics and levels of the wealth concentration.

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49.   Appendix P shows more evidence about different wealth groups. For instance, evidence for the Top10% wealth share shows a much more pronounced increase in wealth concentration over the same period, from 44.3% in 1995 to 48.5% in 2016. Notice, also, that the external total series with no imputations can be derived on a yearly basis, as it does not require any information from household survey data to be estimated.

50.   Notice also that the evidence provided by our unadjusted series shows that the level of wealth concentration is more aligned with that obtained using comparable estimates derived from the SHIW. Yet, the level of wealth concentration remains higher with a more pronounced positive trend (see Figure P.2 in the appendix).

FIGURE 18. Top 1% share without imputations
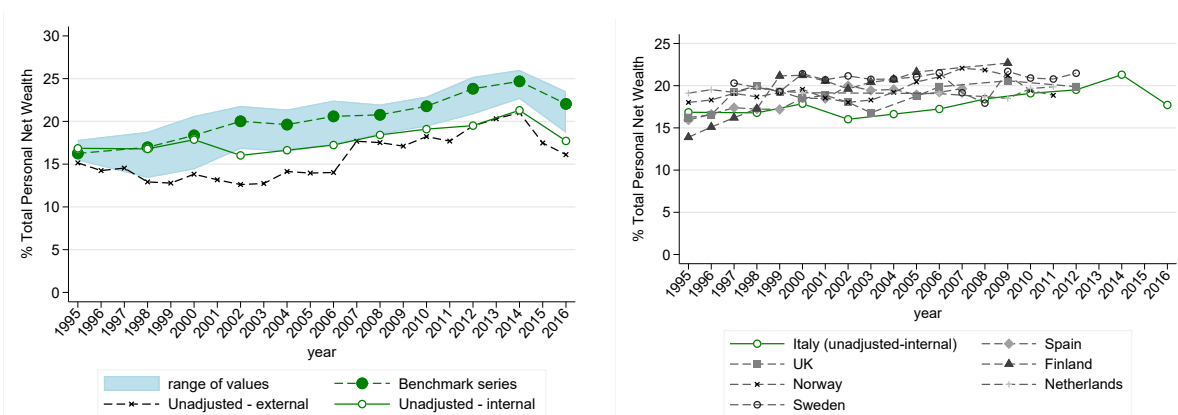
(a) No imputations

(b) No imputations - other countries

Note: Panel a compares the benchmark series of top 1% wealth share, consistent with the NA, to two series derived without resorting to any imputations of missing wealth. The two series reflect different strategies to estimate an appropriate wealth total (i.e. the denominator). On the one hand, we subtract tax-exempt assets from the NA total (external total). On the other hand, we estimate the wealth of the missing population and add it to the identified wealth obtained through the re-scaling the inheritance tax records with mortality multipliers (internal total). Panel b compares the 'internal total' series to the evolution of wealth concentration in other countries. The UK series is taken from Alvaredo et al. (2018) and it is directly comparable to the Italian one (e.g. both series refer to individual adults and are derived from the inheritance tax data using an internal total and no imputations). Figures for Finland, Netherlands, Norway, Sweden estimated by Roine and Waldenström (2015) are from wealth tax tabulations and refer to household units (with the exception of Finland where data refer to individual adults). Data for Spain refer to individual adults and are taken from Alvaredo and Saez (2009) from wealth tax data.

Final remarks

"Statistics on wealth distribution," writes Atkinson (1978), "play 'a key political role' and they are as sensitive an issue as the balance of payments or unemployment figures. This means that it is all the more important that they should be firmly based. We should examine critically the evidence and the assumptions underlying it." With these principles in mind, this paper makes contributions along three dimensions: methodological, empirical, and on implications for future research.

This paper estimates new series of wealth inequality in Italy over 1995–2016, a period of substantial economic turbulence and structural reforms for the national economy. Methodologically, the work uses, for the first time, the full set of inheritance tax returns. In line with similar works for other countries, we show that the administration of the inheritance tax generates high-quality data with substantial coverage of the population. The use of these data provides more convincing coverage of the upper end of the wealth distribution compared to the household survey data. Particular attention has been given to the critical analysis of the assumptions required to go from the tax records to the distribution of the wealth of the household sector in the National Accounts. As this involves a number of controversial decisions, we have adopted a multi-series approach, that is, one that allows for the possibility of comparing the pieces of information given by different and competing data sources. A series without imputations is also estimated. We firmly believe that, given the current, imperfect state of data on the distribution

of assets and liabilities, such an approach is preferable to the alternative option of looking at one and only one series resulting from a single source, or from a particular combination of sources. The data currently available to study the personal distribution of wealth in Italy are not ideal. As a consequence, many decisions based on judgment had to be made. We have sought to be as explicit about the adjustments as space and readability permit. Other scholars may opt to apply different assumptions.

Concerning findings, our main results suggest a substantial increase in wealth concentration and wealth inequality, and a dramatic decline of wealth shares held by the bottom groups of the adult population. Over the past two decades, Italian wealth distribution became substantially more unequal. The 2008/2009 financial crisis, as well as the ensuing double-dip economic recession and European debt crisis, which peaked between 2010 and 2012, appear to have markedly accelerated the process, with the bottom 50% of the adult population now holding only 3% of total wealth, while the richest 0.01% hold more than 10%. In the 2000s, these two groups held a similar share of total wealth, 7%, before starting to diverge. These trends occurred in tandem with a decreasing household saving rate, shrinking availability of liquid financial resources for the bottom half of the adult population, a doubling of the weight of aggregate flow of wealth transfers, rising concentration of bequests in the hands of few, and a substantial reduction of the tax burden on wealthy inheritors. In probing the evidence about potential determinants of wealth concentration, the evidence collected suggests that wealth growth has been predominantly driven by the volume of savings, and not by changes in prices of assets. We show that the probability of top earners to climb to the top percentile of the wealth distribution has doubled from 2001 to 2014. We show that, although age and wealth accumulation go hand in hand, wealth concentration within each age group remains substantial so that age and lyfe-factors play a marginal role in explaining wealth concentration levels and dynamics. Finally, we provide evidence of the growing concentration of inheritances, as well as the shrinking of taxes on bequests.

Growing wealth disparities in this scenario appear concerning on several grounds. First, rising wealth inequality may be coupled with growing financial vulnerability and insecurity for a vast number of adult individuals who have limited private financial resources to cushion adverse circumstances. Second, growing inequalities of wealth holdings can have corrosive effects on equality of opportunity, as well as on intergenerational mobility when they crystallize over time and turn into persistent disparities across generations. Available, comparable cross-country measures suggest that Italy (as well as the U.S.) is one of the countries where offspring's earnings are the most dependent on those of their parents, implying low intergenerational mobility across generations (for a discussion see Acciari et al., 2019, Bloise, 2018, Cannari and D'Alessio, 2018, Corak, 2013).

Although the paper expands the available windows of observation on the Italian wealth pyramid, many data limitations remain, and it is imperative to invest heavily in official statistics to measure, directly and indirectly, net wealth holdings. Three main steps can be taken to improve data on wealth distribution in Italy. First, the stock of asset holdings may be indirectly estimated through the observation of their resulting yields via capitalization methods. Such flows of income, the asset returns, can be partly observed in income tax data. A large fraction of investment incomes are not always taxable, and therefore not necessarily observable on tax returns. In Italy, most capital incomes are taxed at the source and are not reported in the tax files, making the application of the capitalization method unfeasible at present, but this

administrative feature of the income tax should not be understood as an absolute impediment to the production of information for statistical purposes. Second, a detailed census on real and financial assets would be an excellent source for estimating the distribution of wealth holdings. The gathering of such information is already a common practice for real estate assets through the *cadastre*, although it is usually difficult to access for research purposes. Moreover, the actual cadastral values of real estate need updating to be brought in line with market valuations. A comprehensive registry of financial assets, accessible for research analysis, would prove very helpful. Since 2011, Italian law made such a register a concrete reality as financial institutions are obliged to share data concerning financial wealth holdings of their individual customers with the revenue agency.[51] Third, a renovated survey on households wealth holdings could be partially linked to some of the administrative registers listed above and could be endowed with a new sampling design, one that over-samples wealthy households. These changes could go long way toward expanding our knowledge of the wealth holdings of both the low end and the high end of the wealth distribution. Preserving a focus on the households as unit of analysis without turning completely and unilaterally to the analysis of the individual distribution would also be very important to better understand the welfare implications of a changing wealth distribution (many assets are shared within households irrespective of their individual ownership), the interrelationships between the two units, and the historical evolution of the concept of family. Likewise, the use of household survey data remains a fundamental anchor to adopt a complementary definition of wealth which does not neglect the complex interactions between the need to accumulate private wealth and the provision of public goods and services, and social security benefits.

Improving our knowledge of the size distribution of income and wealth is a realistic goal with important implications for policy interventions. Likewise, it is also essential that future research sheds further light on the main determinants of large fortunes and wealth concentration, including the role of different tax policies as well as monetary policy intervention. Better data on the poorer segments of the wealth distribution are also needed to gain a more complete view of the relevance of financial vulnerability and insecurity conditions for households. The recent COVID-19 pandemic has highlighted the importance of available personal liquid assets to accommodate large and widespread income shocks for a sustained period of time.

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51. According to Decree Law 06/12/2011, n. 201, article 11, such data can only be used for tax evasion risk analysis and for other institutional activities of the public authorities.

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Appendices

Appendix A: Wealth totals and main distributional estimates

A.1. Top wealth shares

In this section we report three sets of estimates of wealth shares and wealth thresholds (at 2016 prices) for a number of wealth groups of the adult population (age 20+) between 1995 and 2016. Table A.1 shows the main benchmark distributional estimates derived to be consistent with the balance sheets of the personal sector. Table A.3 shows estimates that, after adjustment to National Accounts, allow also for unreported offshore financial assets. Table A.2 shows estimates that only allow for tax exempt assets and not the full imputation of all assets and liabilities to align distributional estimates to National Accounts.

TABLE A.1. Top wealth shares and wealth group thresholds in thousands 2016 Euro - benchmark estimates

Year	Bottom 90 %	Bottom 50%	Mid 40%	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.05%	Top 0.01%	Top 10 - 1 %	Top 1 - 0.1%	Top 0.1 - 0.01%	P50	P90	P95	P99	P95	P99.9	P99.5	P99.99
1995	55,82	11,73	44,09	44,18	33,01	16,25	11,93	5,53	3,89	1,81	27,93	10,73	3,71	62,90	280,61	385,73	1044,39	1499,42	4031,57	5676,35	11258,04
1996																					
1997																					
1998	53,30	10,22	43,08	46,70	34,44	16,97	12,17	5,63	4,12	1,86	29,73	11,34	3,77	93,78	312,24	400,23	1242,67	2009,57	4340,57	6062,83	11993,02
1999																					
2000	53,40	9,25	44,15	46,60	35,61	18,37	13,49	7,17	5,42	2,78	28,23	11,19	4,39	101,81	321,10	459,71	1293,44	2036,75	4177,10	7712,95	17420,73
2001																					
2002	49,57	7,72	41,85	50,43	39,22	20,01	14,56	7,20	5,78	2,89	30,41	12,81	4,30	67,32	301,96	664,45	1524,61	1984,16	6173,36	8156,49	19443,90
2003																					
2004	48,71	7,21	41,50	51,29	38,95	19,63	14,29	7,31	5,14	2,04	31,66	12,31	5,27	63,35	417,64	621,68	1796,69	2342,40	5719,23	9539,51	21749,83
2005																					
2006	48,32	6,70	41,61	51,68	39,59	20,59	15,29	8,14	6,31	3,40	31,10	12,45	4,74	65,99	376,86	684,98	1956,99	2956,57	7397,94	10488,10	22341,59
2007																					
2008	45,44	5,20	40,24	54,56	41,29	20,77	15,17	7,26	5,45	2,55	33,79	13,51	4,71	65,17	411,71	665,33	1644,87	2662,15	6461,64	8251,70	23796,08
2009																					
2010	42,64	3,01	39,63	57,36	43,67	21,77	15,73	7,38	5,20	2,22	35,59	14,39	5,15	57,84	427,86	686,92	1799,07	2881,69	7324,79	9594,19	18711,56
2011																					
2012	40,51	2,15	38,36	59,49	45,75	23,82	17,96	9,70	7,71	4,52	35,67	14,12	5,18	56,25	404,38	653,29	1727,23	2687,27	6233,84	9093,72	30416,52
2013																					
2014	41,96	2,92	39,04	58,04	44,91	24,69	19,53	12,02	9,98	7,47	33,35	12,67	4,55	56,85	375,00	580,50	1425,84	2236,94	5690,10	8802,94	31205,09
2015																					
2016	44,03	3,46	40,57	55,97	42,89	22,05	16,86	9,35	7,56	4,97	33,92	12,69	4,38	49,92	358,55	581,10	1442,67	2298,45	5422,02	8009,63	20907,72

Note: The table shows estimates of wealth shares and wealth thresholds (at 2016 prices) for a number of wealth groups of the adult population (age 20+) between 1995 and 2016. The table shows the main benchmark distributional estimates derived to be consistent with the balance sheets of the personal sector.

TABLE A.2. Top wealth shares and wealth group thresholds in thousands 2016 Euro - estimates imputing only tax-exempt assets.

Year	Bottom 90 %	Bottom 50%	Mid 40%	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.05%	Top 0.01%	Top 10 - 1 %	Top 1 - 0.1%	Top 0.1 - 0.01%	P50	P90	P95	P99	P95	P99.9	P99.5	P99.99
1995	56,42	25,31	31,12	43,58	32,23	15,43	11,14	4,95	3,45	1,61	28,15	10,48	3,34		246,24	379,12	950,84	1383,34	3283,34	4446,05	8112,24
1996																					
1997																					
1998	61,25	33,50	27,75	38,75	28,58	13,39	9,44	4,06	2,88	1,22	25,36	9,32	2,85	1,44	244,84	380,66	957,74	1376,06	2901,38	3967,11	9027,14
1999																					
2000	60,13	31,64	28,50	39,87	29,73	14,39	10,34	4,78	3,43	1,58	25,48	9,60	3,20	4,47	262,74	409,83	1068,85	1527,05	3539,91	4670,89	9688,20
2001																					
2002	54,50	22,78	31,72	45,50	34,70	16,79	11,98	5,35	4,09	1,91	28,71	11,44	3,44	-50,08	196,67	286,36	891,00	1173,21	2521,47	3390,20	6698,26
2003																					
2004	53,72	22,35	31,37	46,28	34,46	16,46	11,76	5,44	3,64	1,35	29,82	11,03	4,09		299,98	471,42	1154,76	1667,24	3783,56	5662,19	11283,89
2005																					
2006	53,37	21,92	31,44	46,63	35,03	17,27	12,58	6,05	4,46	2,24	29,37	11,22	3,81		348,52	544,88	1324,88	1942,44	4167,93	6050,12	12368,99
2007																					
2008	48,46	12,92	35,54	51,54	38,41	18,49	13,29	5,95	4,29	1,93	33,05	12,55	4,02	16,35	397,28	623,41	1576,16	2282,53	5101,58	7268,60	14657,75
2009																					
2010	46,59	10,61	35,98	53,41	39,99	19,39	13,80	6,21	4,32	1,80	34,02	13,18	4,41	16,70	391,79	617,56	1552,80	2318,73	5232,48	7257,51	16419,75
2011																					
2012	43,63	6,95	36,68	56,37	42,56	21,22	15,50	7,91	6,14	3,42	35,16	13,31	4,49	20,22	387,61	614,25	1571,91	2240,24	4897,16	6894,61	15396,44
2013																					
2014	44,78	10,66	34,13	55,22	42,30	22,77	17,84	10,64	8,73	6,30	32,44	12,14	4,34	7,90	346,10	545,08	1319,11	1950,01	4569,07	6737,82	15514,31
2015																					
2016	49,70	16,47	33,23	50,30	37,86	18,65	13,85	7,14	5,55	3,43	31,65	11,51	3,71	5,27	326,78	514,05	1267,76	1787,89	4034,24	5344,82	11250,15

Note: The table shows estimates of wealth shares and wealth thresholds (at 2016 prices) for a number of wealth groups of the adult population (age 20+) between 1995 and 2016. The table shows estimates that only allow for tax exempt assets and not the full imputation of all assets and liabilities to align distributional estimates to National Accounts.

TABLE A.3. Top wealth shares and wealth group thresholds in thousands 2016 Euro - Estimates including unreported financial assets in offshore accounts

| Year	Bottom 90 %	Bottom 50%	Mid 40%	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.05%	Top 0.01%	Top 10 - 1 %	Top 1 - 0.1%	Top 0.1 - 0.01%	P50	P90	P95	P99	P95	P99.9	P99.5	P99.99
1995	54,72	11,53	43,19	45,28	34,33	17,83	13,53	6,98	5,38	2,83	27,45	10,85	4,15	62,90	280,61	385,73	1044,39	1499,42	4031,57	5676,35	11258,04
1996																					
1997																					
1998	52,09	10,01	42,07	47,91	35,93	18,78	14,02	7,32	5,85	3,04	29,13	11,46	4,28	93,78	312,24	400,23	1242,67	2009,57	4340,57	6062,83	11993,02
1999																					
2000	51,84	9,02	42,82	48,16	37,48	20,63	15,80	9,27	7,58	4,25	27,52	11,36	5,02	101,81	321,10	459,71	1293,44	2036,75	4177,10	7712,95	17420,73
2001																					
2002	48,44	7,58	40,86	51,56	40,64	21,80	16,34	8,80	7,53	4,11	29,76	13,01	4,68	67,32	301,96	664,45	1524,61	1984,16	6173,36	8156,49	19443,90
2003																					
2004	47,55	7,07	40,48	52,45	40,36	21,38	16,04	8,94	6,70	2,90	31,06	12,45	6,04	63,35	417,64	621,68	1796,69	2342,39	5719,23	9539,51	21749,83
2005																					
2006	47,15	6,56	40,59	52,85	41,03	22,43	17,17	9,94	8,22	4,83	30,42	12,49	5,11	65,99	376,86	684,98	1956,99	2956,57	7397,94	10488,18	22341,59
2007																					
2008	44,75	5,14	39,61	55,25	42,17	21,97	16,34	8,35	6,58	3,32	33,28	13,62	5,03	65,17	411,71	665,33	1644,87	2662,15	6461,64	8251,70	23796,08
2009																					
2010	42,01	2,98	39,02	57,99	44,50	22,90	16,88	8,45	6,30	2,99	35,09	14,45	5,46	57,84	427,86	686,92	1799,07	2881,69	7324,79	9594,19	18711,56
2011																					
2012	39,75	2,14	37,61	60,25	46,77	25,21	19,36	11,01	9,05	5,43	35,04	14,20	5,57	56,25	404,38	653,29	1727,23	2687,27	6233,84	9093,72	30416,52
2013																					
2014	41,18	2,90	38,29	58,82	45,92	26,02	20,89	13,27	11,28	8,40	32,80	12,74	4,87	56,85	375,00	580,50	1425,84	2236,94	5690,11	8802,94	31205,09
2015																					
2016	43,16	3,42	39,74	56,84	44,01	23,52	18,36	10,74	8,99	5,93	33,32	12,78	4,81	49,92	358,55	581,10	1442,67	2298,45	5422,02	8009,63	20907,72

Note: The table shows estimates of wealth shares and wealth thresholds (at 2016 prices) for a number of wealth groups of the adult population (age 20+) between 1995 and 2016. The table shows estimates that, after adjustment to National Accounts, allow also for unreported offshore financial assets.

A.2. Wealth totals: households sector balance sheet

In this section we describe how we derived the total net wealth of the household sector (excluding the non-profit sector serving households - NPSH). First, we used the assessment of the overall wealth of Italian households published by the Bank of Italy in the Supplement to the Statistical Bulletin. Estimates of the balance sheets of the household sector and the household sector including the non-profit sector are available for the years 1995 to 2013.

Data on financial assets and liabilities obtained from the Financial Accounts run by the Bank of Italy have been supplemented with an estimate of the value of their real assets released by the Italian statistical office (ISTAT). In particular, we have retrieved these statistical series from table 1A and table 1B of the report "household Wealth in Italy - 2014", published in 2015 by the Bank of Italy. This publication of the households balance sheet was discontinued in the same year. A similar exercise was then resumed in 2019, in collaboration with ISTAT covering a shorter time horizon (from 2005) and aggregating the household sector and the NPSH. The 2022 release of the household balance sheet as well as the detailed set of Financial Accounts were then used to extrapolate the balance sheet of the household sector from 2013 to 2020. The series for 1995-2020 are then linked proportionally in 1995 to the earlier series beginning in 1966, published by the World Inequality Database (WID.world).

FIGURE A.1. The growing relevance of households per capita net wealth
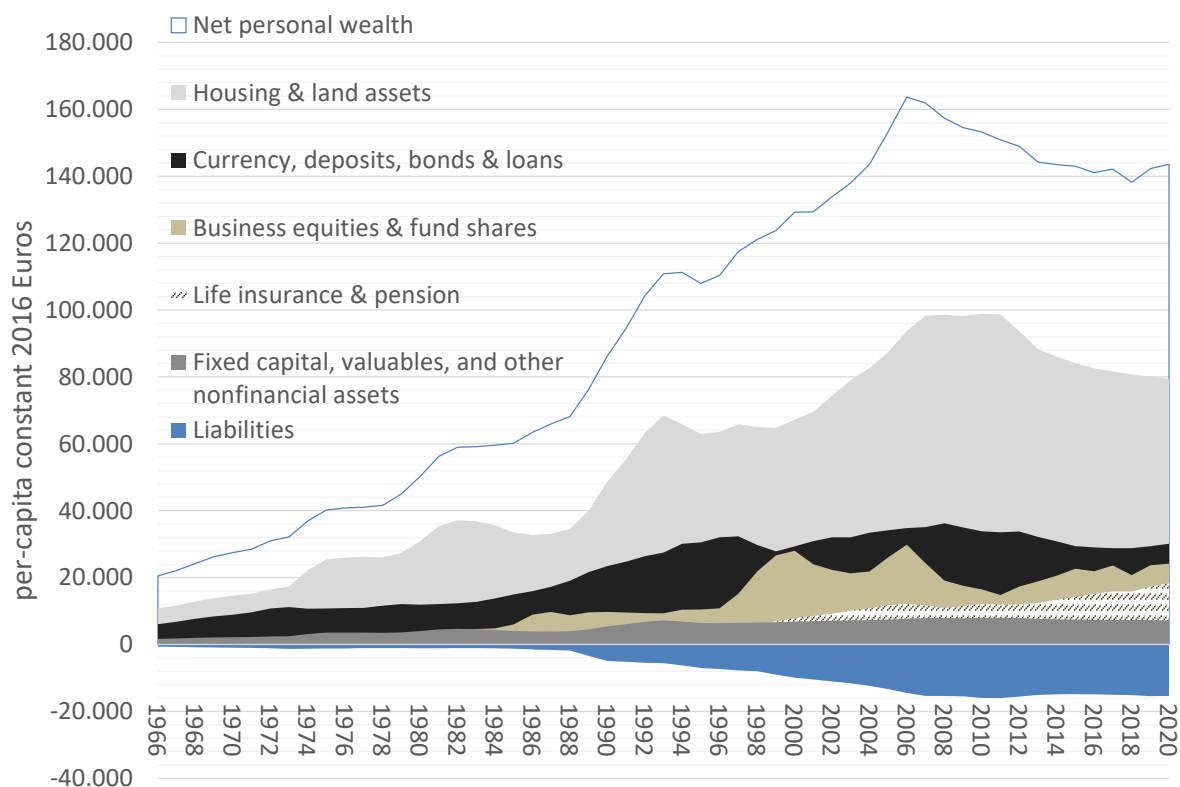
Note: The graph shows unstacked estimates of five different asset classes (i.e. Housing and land; currency, deposits, and bonds; directly held shares in listed and unlisted corporations, other equity in quasi-corporations, and investment fund shares; life insurance reserves and the balance of private pension funds; Fixed capital and other non financial assets of small personal businesses of producer households (such as plant, machinery, equipment, inventories, and goodwill); and liabilities held by the household sector excluding the non-profit sector serving households. The series is derived assembling data from Bank of Italy, ISTAT, and WID.world. The top line in the graph shows the evolution of household net wealth derived by stacking (summing) all asset classes and subtracting all liabilities.

TABLE A.4. Aggregate values of total wealth and asset classes of the household sector- 1966-2020 - Billions 2016 Euro

Year	Net personal wealth	Gross personal wealth	Housing & land assets	Fixed capital, valuables, and other nonfinancial assets	Currency, deposits, bonds & loans	Business equities & fund shares	Life insurance & pension	Liabilities
1966	1.076	1.112	568	89	319	69	42	36
1967	1.170	1.209	615	95	360	67	46	40
1968	1.290	1.335	683	104	408	63	52	45
1969	1.406	1.455	743	112	450	68	56	49
1970	1.478	1.530	785	117	478	66	58	52
1971	1.542	1.598	822	121	520	52	61	56
1972	1.683	1.746	896	130	585	47	65	63
1973	1.761	1.833	948	135	611	51	63	72
1974	2.033	2.103	1.222	172	588	39	59	70
1975	2.230	2.298	1.408	196	595	21	57	68
1976	2.273	2.340	1.447	198	606	14	57	67
1977	2.297	2.359	1.469	199	612	10	56	63
1978	2.336	2.398	1.460	195	650	23	57	62
1979	2.535	2.598	1.545	203	680	93	56	63
1980	2.834	2.898	1.742	225	672	177	54	64
1981	3.178	3.241	1.996	255	681	226	54	63
1982	3.333	3.394	2.101	264	697	249	54	61
1983	3.346	3.408	2.086	258	720	262	54	61
1984	3.372	3.436	2.015	246	780	272	102	64
1985	3.406	3.478	1.895	228	845	338	147	72
1986	3.590	3.674	1.854	219	900	503	155	84
1987	3.733	3.827	1.873	218	975	550	165	94
1988	3.861	3.965	1.957	224	1.079	495	175	104
1989	4.324	4.518	2.269	256	1.225	545	184	195
1990	4.894	5.172	2.761	306	1.329	552	189	278
1991	5.364	5.659	3.144	343	1.406	543	201	294
1992	5.919	6.231	3.591	385	1.498	531	219	312
1993	6.299	6.618	3.890	411	1.562	529	234	319
1994	6.325	6.683	3.744	389	1.711	592	248	358
1995	6.138	6.538	3.577	365	1.737	594	266	400
1996	6.274	6.690	3.612	363	1.820	615	281	416
1997	6.683	7.123	3.745	368	1.841	860	309	440
1998	6.893	7.349	3.701	374	1.694	1.240	340	456
1999	7.045	7.557	3.685	378	1.585	1.514	395	512
2000	7.358	7.922	3.826	388	1.669	1.596	443	564
2001	7.371	7.968	3.962	396	1.761	1.365	484	597
2002	7.646	8.277	4.245	404	1.831	1.274	523	631
2003	7.925	8.593	4.540	412	1.840	1.222	579	668
2004	8.305	9.023	4.779	421	1.933	1.261	628	717
2005	8.925	9.704	5.087	433	1.985	1.515	684	779
2006	9.565	10.413	5.480	448	2.033	1.742	710	848
2007	9.518	10.422	5.780	461	2.065	1.426	690	904
2008	9.323	10.237	5.839	469	2.146	1.133	649	913
2009	9.206	10.130	5.852	465	2.083	1.045	685	924
2010	9.167	10.125	5.916	477	2.026	985	721	959
2011	9.062	10.025	5.929	481	2.014	887	714	963
2012	8.987	9.928	5.649	476	2.036	1.043	722	941
2013	8.770	9.688	5.368	465	1.955	1.147	752	917
2014	8.724	9.629	5.232	457	1.874	1.251	815	906
2015	8.674	9.575	5.101	452	1.782	1.374	866	900
2016	8.548	9.451	5.004	446	1.760	1.327	914	903
2017	8.602	9.511	4.938	445	1.741	1.428	959	909
2018	8.353	9.270	4.881	441	1.740	1.252	955	917
2019	8.590	9.522	4.838	437	1.774	1.428	1.044	932
2020	8.658	9.586	4.784	432	1.813	1.457	1.100	928

TABLE A.5. Per capita values of total wealth and asset classes of the household sector- 1966-2020 - Billions 2016 Euro

Year	Net personal wealth	Gross personal wealth	Housing & land assets	Fixed capital, valuables, and other nonfinancial assets	Currency, deposits, bonds & loans	Business equities & fund shares	Life insurance & pension	Liabilities	Price index (2016 = 100)	Total population - thousand
1966	20.492	21.169	10.816	1.693	6.071	1.319	792	677	4	52.519
1967	22.113	22.859	11.627	1.797	6.814	1.269	876	747	4	52.901
1968	24.235	25.080	12.827	1.957	7.670	1.179	969	845	4	53.236
1969	26.265	27.184	13.887	2.091	8.402	1.270	1.040	919	4	53.538
1970	27.455	28.424	14.592	2.169	8.887	1.219	1.077	969	5	53.822
1971	28.515	29.558	15.193	2.229	9.615	956	1.124	1.043	5	54.073
1972	30.955	32.114	16.485	2.386	10.760	858	1.191	1.160	5	54.381
1973	32.164	33.482	17.324	2.474	11.163	925	1.152	1.319	6	54.751
1974	36.883	38.162	22.180	3.121	10.672	700	1.062	1.279	7	55.111
1975	40.220	41.451	25.398	3.531	10.723	383	1.036	1.232	9	55.441
1976	40.799	42.002	25.973	3.559	10.884	250	1.015	1.202	10	55.718
1977	41.045	42.164	26.251	3.549	10.929	175	996	1.118	12	55.955
1978	41.595	42.701	25.996	3.465	11.574	404	1.011	1.106	14	56.155
1979	45.019	46.128	27.433	3.603	12.068	1.656	1.003	1.110	16	56.318
1980	50.224	51.352	30.864	3.994	11.899	3.135	964	1.127	19	56.434
1981	56.246	57.369	35.325	4.506	12.059	3.993	950	1.123	23	56.502
1982	58.938	60.021	37.160	4.673	12.330	4.403	948	1.083	27	56.544
1983	59.162	60.246	36.872	4.568	12.726	4.633	960	1.084	31	56.564
1984	59.596	60.733	35.611	4.347	13.780	4.809	1.802	1.137	34	56.577
1985	60.182	61.454	33.488	4.026	14.938	5.974	2.604	1.272	37	56.593
1986	63.435	64.912	32.759	3.877	15.907	8.886	2.739	1.477	40	56.596
1987	65.955	67.612	33.091	3.856	17.231	9.721	2.917	1.657	42	56.602
1988	68.181	70.021	34.564	3.962	19.052	8.734	3.094	1.840	45	56.629
1989	76.297	79.730	40.033	4.514	21.622	9.616	3.244	3.433	48	56.672
1990	86.284	91.194	48.680	5.399	23.439	9.732	3.340	4.910	52	56.719
1991	94.513	99.699	55.387	6.047	24.775	9.566	3.540	5.185	56	56.759
1992	104.205	109.698	63.231	6.786	26.380	9.352	3.855	5.494	58	56.797
1993	110.829	116.449	68.456	7.228	27.478	9.315	4.111	5.619	60	56.832
1994	111.277	117.567	65.859	6.838	30.096	10.407	4.364	6.290	63	56.843
1995	107.982	115.023	62.930	6.418	30.559	10.443	4.673	7.041	66	56.844
1996	110.348	117.662	63.522	6.376	32.013	10.808	4.943	7.314	69	56.860
1997	117.465	125.203	65.825	6.468	32.357	15.117	5.436	7.738	70	56.890
1998	121.124	129.141	65.031	6.569	29.766	21.793	5.982	8.017	72	56.907
1999	123.778	132.777	64.738	6.648	27.843	26.609	6.939	8.999	73	56.916
2000	129.218	139.121	67.192	6.820	29.303	28.020	7.786	9.904	75	56.942
2001	129.354	139.839	69.533	6.949	30.904	23.950	8.503	10.484	77	56.980
2002	133.901	144.959	74.351	7.073	32.061	22.311	9.164	11.059	80	57.100
2003	138.030	149.666	79.071	7.177	32.050	21.285	10.084	11.636	82	57.413
2004	143.576	155.979	82.626	7.271	33.424	21.794	10.863	12.403	84	57.845
2005	153.379	166.761	87.415	7.448	34.118	26.030	11.751	13.383	86	58.191
2006	163.709	178.215	93.791	7.666	34.793	29.818	12.147	14.507	87	58.428
2007	161.903	177.286	98.324	7.843	35.125	24.262	11.732	15.383	90	58.787
2008	157.380	172.792	98.569	7.909	36.232	19.121	10.961	15.413	92	59.242
2009	154.524	170.029	98.227	7.808	34.962	17.537	11.495	15.505	94	59.578
2010	153.214	169.235	98.887	7.967	33.866	16.459	12.056	16.021	94	59.830
2011	150.885	166.916	98.725	8.008	33.531	14.763	11.890	16.031	95	60.060
2012	148.936	164.534	93.628	7.894	33.748	17.293	11.970	15.598	96	60.339
2013	144.290	159.384	88.317	7.655	32.164	18.870	12.378	15.095	98	60.783
2014	143.491	158.387	86.053	7.523	30.830	20.576	13.404	14.896	99	60.796
2015	142.988	157.831	84.079	7.446	29.367	22.655	14.283	14.843	99	60.666
2016	141.085	155.987	82.587	7.363	29.048	21.899	15.090	14.902	100	60.589
2017	142.149	157.176	81.602	7.351	28.778	23.603	15.841	15.027	101	60.513
2018	138.203	153.380	80.763	7.303	28.786	20.720	15.807	15.177	102	60.438
2019	142.306	157.749	80.149	7.247	29.387	23.662	17.303	15.442	102	60.362
2020	143.620	159.014	79.355	7.159	30.082	24.174	18.245	15.394	103	60.286

A.3. The aggregate value of business assets and shares

According to international statistical standards, shares of corporations owned by households are always shown as financial assets in the financial accounts of the household sector under the asset class "shares and other equity". These corporation shares could be either listed or unlisted. For listed shares a direct observation of a market price exists whereas for unlisted shares a market price is inferred based on similar characteristics of listed corporations.

The manual for Italian financial accounts published by the Bank of Italy (Banca d'Italia, 2018) states that "Unlisted shares are usually reported in their financial statements at nominal value, and are not therefore directly usable in the financial accounts, which adopt as their valuation criterion market value. To estimate their market value, a method provided in the ESA manuals under which the valuation of shares and other equity investments issued by unlisted companies is carried out using the average stock market prices of listed companies belonging to the same industry. From the ratio of market capitalization to the balance sheet equity of the listed companies, coefficients are obtained for each industry and applied to the book value of unlisted companies to estimate their market value. In order to overcome the low representativeness of listed companies compared to the universe of Italian corporations, market price valuation is applied only to unlisted companies with a size comparable to that of listed companies and limited to branches of business with a sufficient number of listed companies. For the remaining unlisted companies, the valuation on the basis of balance sheet equity is retained." (2018, p. 32, translation by the authors from Italian). Moreover, the Bank of Italy's manual points to additional statistical adjustments needed to obtain quarterly estimates for the financial accounts. It is wort noting that balance sheets of corporations are available in the Cerved - Italian Chambers of Commerce - archives on an annual basis and the financial statements typically become available with a delay of approximately 18 months from the reporting date, due to the time required to collect and reclassify information. "To overcome these two drawbacks, estimation techniques are used both to obtain an updated annual figure and to temporally disaggregate the historical series; both of these processes exploit the dynamics and statistical properties contained in related time series, mainly those of listed stocks." (2018, p. 32, translation by the authors from Italian).

Things are more complicated for unincorporated businesses which belong to either the non-financial corporations sector (as 'quasi-corporations') or to the households sector (as 'producer households'), depending on size and other legal characteristics.

As detailed in Rodano and Signorini (2008), "Unincorporated businesses fall into two categories for the purposes of statistical classification. According to international recording standards as set out in ESA95, some of them are called "quasi-corporations" and are included in the non-financial corporations sector. Quasi-corporations are defined as organizations not having independent legal status, that keep a full set of accounts, and whose economic and financial behaviour is different from that of their owners. This is a rather general description and it has to be operationalised at the national level. In Italy, the operational definition of nonfinancial quasi-corporations includes all firms that take the more formal types of unlimited liability partnerships (società in nome collettivo, società in accomandita semplice) regardless of size; it also includes simpler partnerships (società semplici, società di fatto) and sole proprietorships (ditte individuali), provided they have more than five employees. Enterprises falling within this category are assumed to possess the character of a quasi-corporation and are therefore to be

recorded in the non-financial corporations sector. The rest (i.e., simple partnerships and sole proprietorships with up to five employees) are to be recorded in the producer households sub-sector."

The estimation of the market value of quasi-corporations (total market value excluding the value of buildings) in the Italian financial accounts is made on the basis of information collected in the SHIW survey by the Bank of Italy. As reported in the Financial Accounts manual (Banca d'Italia, 2018), "Households are asked to report the market value of the quasi-corporations they own, together with the number of employees. The sum of the market values, weighted by the household's sample weight, is divided by the number of employees, also weighted by the sample weight, yielding a value of the firm per employee. This ratio, obtained from the micro-data of the Italian Survey of Household Income and Wealth, is multiplied by the number of employees in the quasi-firms that results from Istat so as to obtain the market value total of these enterprises.".[52]

In the case of producer-households firms, financial assets and liabilities, such as bank accounts or loans received, are recorded directly in the financial accounts of households and bundled with the households' holdings; the value of land used in agriculture and other non-residential buildings belonging to the personal enterprise are also bundled within the same real asset classes belonging to households; the value of plant, machinery, equipment, inventories, and goodwill are included in a separate class of real assets called 'fixed capital' and are ignored in the financial accounts. Such production assets are valued at substitution price net of depreciation.

Cannari et al. (2008) describe this process in detail: "First, an initial value of the net capital stock of producer households at current prices is estimated for 1990, the base year. Producer household investments are then added to this value and depreciation subtracted, calculated by Istat at current prices for producer households and deflated using the National Accounts implicit deflators of fixed investment and of depreciation. In this way an estimate is obtained of the stock of net capital at constant prices for the producer household sector in each of the years considered. The net capital stock series at substitution prices is then reconstructed using the relevant deflators calculated by Istat for the whole economy." (p. 124).

Figure A.2 shows the total value of financial shares and other equities accounting for €1010 billions in 2020 and €314 billions in 1995 (growing from 7.8% to 11.3% of total net wealth of the household sector from 1995 to 2020). Financial shares in listed and unlisted corporations accounted roughly for 75% of total value with the remainder going to financial shares in quasi-corporations. The value of fixed capital only accounted 0.33% of total net wealth in 1995 and this share declined to 0.11% in 2020.

**A.4. Total Financial Assets: The Contribution of Volume vs Price Changes**

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52. The question available in SHIW to evaluate personal businesses is the following: "How much do you believe your business would be worth if you were to sell it, ceasing to be involved in the business, counting the equipment used in the activity, inventory and goodwill but not the value of the buildings used?'

FIGURE A.2. The aggregate value of business assets and shares in the household sector
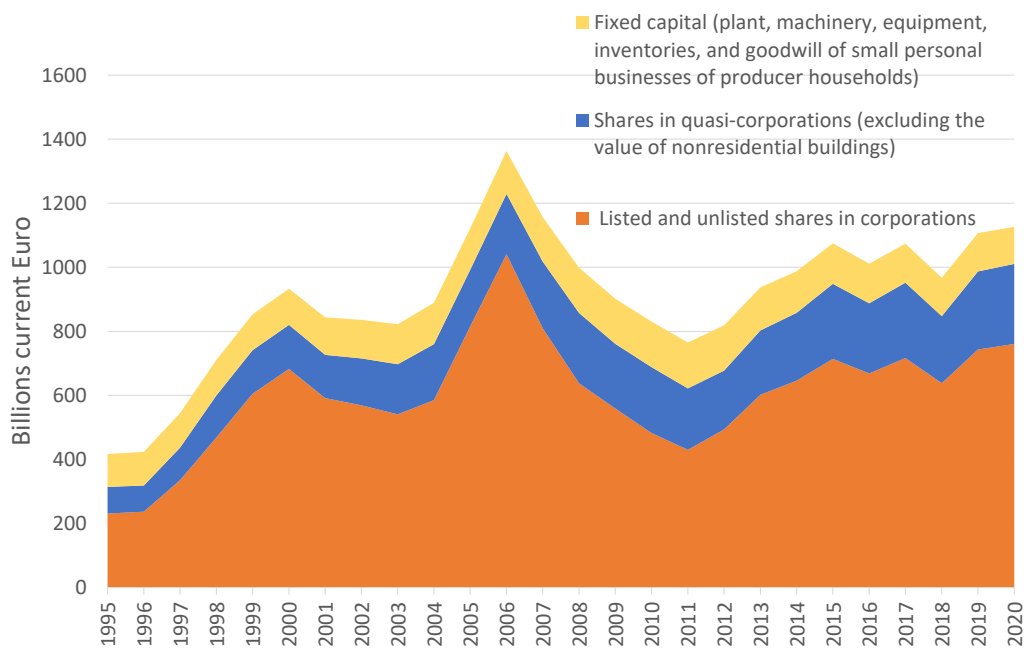
Note: The figure shows the aggregate value of Fixed assets from the balance sheets of the household sector and the aggregate value of "shares and other equities" from the financial accounts of the household sector (excluding the Non Profit Institutions Serving Households). Fixed assets are real assets valued at substitution price net of depreciation. Shares in listed corporations are valued at market price. Shares in unlisted corporations are valued at market price estimated from listed corporations of similar characteristics. Shares in quasi-corporations are valued at market price estimated based on self-reported valuations in survey data.

FIGURE A.3. Price vs Volume Changes of Total Financial Assets: 1996-2021
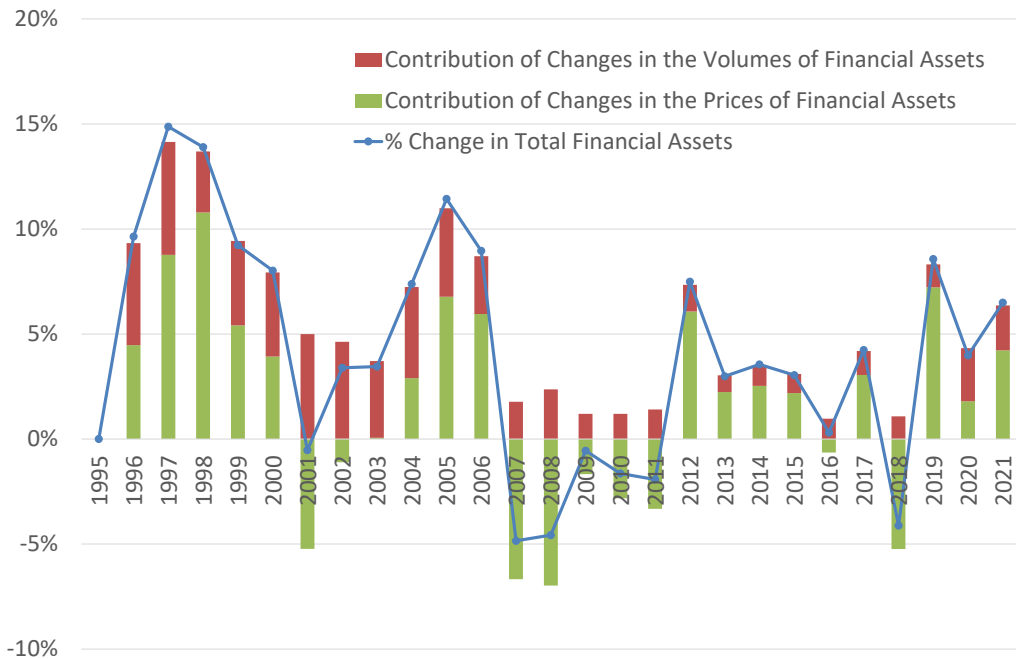
Note: Using detailed quarterly data from the Financial Accounts published by the Bank of Italy we could decompose total change in the valuation of each financial asset class into price adjustments and financial flows. The figure shows that the overall contribution of price changes for total financial assets is relatively dominant in almost all years from 1995 to 2021. The estimates are consistent with the work of Caprara et al. (2020) and effectively extend their series to 2021.
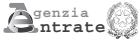
Appendix B: Data sources on reported wealth at death in Italy

Data used in this paper come from the full inheritance tax returns, referred to as "successions," opened between 1995 and 2016. The tax return is filed by the estate executor (one of the heir, or a legal representative) within twelve months of death and is then submitted to the office of the revenue agency (*Agenzia delle Entrate*) in the province where the deceased had residence. The time limit was set to 6 months up to 2003. Our data are evaluated at year of death. The data are considered to be consolidated after two years following the year of death.[53] The information contained in the first page of the paper tax form (the so-called "Modello 4.") are digitized by the Ministry of Economy and Finance (see figure B.1). The last data update in this paper was obtained in May 2020. A set of 19,200 tax returns presented in 2017 and 2018 with the new electronic form, but related to deaths that occurred in 2016, were included in the data. Microdata are transformed into detailed tabular form by the statistical office of the Ministry of Economics and Finance and shared.

The main tabulations provided have 34 net wealth ranges, from negative values to the highest range worth €20 million or more. The demographic information is provided by seven age groups (i.e., under 20, 20 to 40, 40 to 50, 50 to 60, 60 to 70, 70 to 80, and over 80), two gender groups (i.e., males, females), and three Italian macro areas (i.e., south and islands, north, and center). A gender not stated and age not stated groups also appear when needed. Tabulations by more refined age classes (every 5 years, from under 5 to 100 years old and above) were also provided with for a subset of years, namely for 1995 and for the post-2012 period, confirming that the use of more coarse age groups has a negligible effect on the application of the mortality multiplier method. Four asset classes are identified in the tabulations: Housing and land; business and financial assets; other assets (including current and saving deposits, valuables, etc.); and liabilities and deductible expenses. Similarly, the tabulations identify the taxes paid (on the global value of the estate as well as on the inherited shares), the value of assets sold within six months from death (reported between 1990 and 2000), and the capitalized value of all gifts and donations done in life.

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53. This is done because the heirs might miss the 12-month deadline, or the assessing procedure by the Revenue Agency might last several months for the most complex inheritances.

FIGURE B.1. The first page of the Modello 4 - Inheritance tax form

MOD. 4

DICHIARAZIONE DI SUCCESSIONE

Direzione Provinciale di ....

Ufficio Territoriale di ....

PARTE RISERVATA ALL'UFFICIO

ESTREMI DELLA PRESENTAZIONE (barrare la casella che interessa)

NUMERO [ ]   **VOLUME** [ ]

- 1 PRIMA DICHIARAZIONE
- 2 DICHIARAZIONE MODIFICATIVA
- 3 DICHIARAZIONE INTEGRATIVA
- 4 DICHIARAZIONE SOSTITUTIVA
- 5 DICHIARAZIONE AGGIUNTIVA

DICHIARAZIONI PRECEDENTI

	NUMERO	VOLUME
	NUMERO	VOLUME
	NUMERO	VOLUME

DATI ANAGRAFICI DEL DEFUNTO

Data di apertura della successione   giorno mese anno

Codice fiscale

Cognome (1)   Nome (1)

Comune o Stato estero di nascita (1)   Prov. (2)

Data di nascita   giorno mese anno   Sesso (3)

Ultima residenza: Comune (1)   Prov. (2)

Via o Piazza   N. Civico

Celibe/Nubile [ ]   Coniugato/a [ ]   Regime patrimoniale   Comunione [ ]   Vedovo/a [ ]   Divorziato/a [ ]
                                                             Separazione [ ]

Eredità devoluta per: Legge [ ]   Testamento [ ]

Testamento per notaio   pubblicato il: giorno mese anno

registrato a:

ASSE EREDITARIO

Immobili e diritti reali immobiliari [ ]

Aziende, azioni, obbligazioni e quote societarie [ ]

Altri cespiti [ ]   Totale [ ]

                                               Passività [ ]

                                               Totale beni venduti negli ultimi 6 mesi [ ]

Firma per esteso e generalità del dichiarante   Qualità e indirizzo completo del dichiarante

(1) Senza abbreviazioni
(2) Sigla automobilistica
(3) M o F
— Le parti evidenziate con fondino colorato sono riservate all'Ufficio
AVVERTENZA : Ove i quadri risultino insufficienti compilare quadri aggiuntivi.

Note: document retrieved from https://www.agenziaentrate.gov.it

Appendix C: Re-weighting the population of the deceased using the mortality multiplier method

We make use of the information reported to the tax authorities for the administration of inheritance or estate taxes as well as detailed mortality rates by a set of socio-demographic characteristics. The inverse of the mortality rate of each decent group i (e.g. multiplier is defined as $m_i \equiv \frac{1}{p_i}$, where p_i is the mortality rate of group i) represents the number of living individuals with similar socio-demographic characteristics. In this paper we multiply the number of decedents and their reported wealth value by the relevant mortality multiplier m_i for each specific socio-demographic group i. This procedure reshapes the decedent population, creating a representation of the living population to estimate its distribution of wealth.

We define the estate value of each decedent as $w_{E,i}$ and arranged them in descending order, so that $w_{E,i} \geq w_{E,j}$, if $i < j$. The population of decedents is N_E and the total value of their estates is defined as W_E and takes the following form:

$$W_E = \sum_{i=1}^{N_E} w_{E,i} \,. \tag{C.1}$$

The application of the mortality multiplier provides the following result:

$$W = \sum_{i=1}^{N_E} m_i w_{E,i} \,. \tag{C.2}$$

where W is the total wealth among the living population of the group i.

Figure C.1, illustrates how the age distribution of wealth holdings is affected by the application of mortality multipliers, shifting from the population of decedents (panels (a) and (d)) to the population of the living (panels (b) and (e)). Figure C.1 also illustrates, in the panels (c) and (f), how the share of prevalent age groups differs across the wealth distribution by zooming into the richest 1%. The population of decedents is clearly skewed towards the individuals aged 80 and above, whereas the application of mortality multipliers rescales the population in favour of middle-aged groups. Yet, on average, wealthy individuals belonging to the top 1% tend to be older than the overall population.

Figure C.1. From the population of decedent to that of living wealth holders using mortality multipliers: distribution by age groups over time
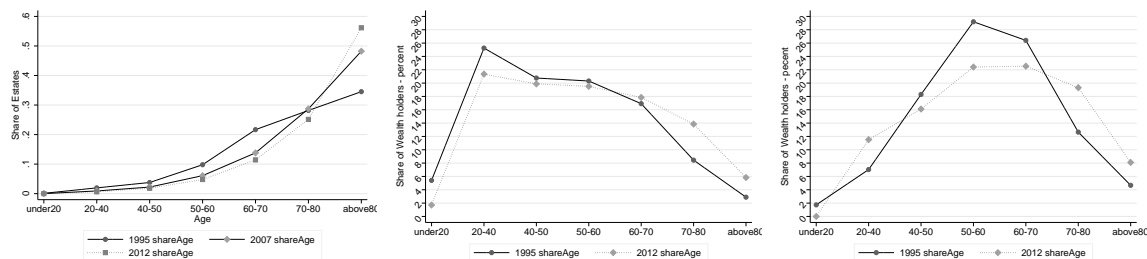
(a) Decedent wealth holders filing inheritance tax returns

(b) Identified wealth holders

(c) Identified wealth holders - above P99
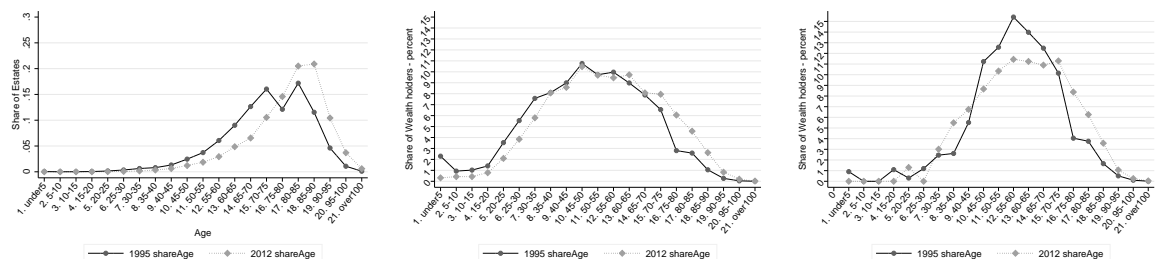
(d) Decedent wealth holders filing inheritance tax returns-5 year age classes

(e) Identified wealth holders-5 year age classes

(f) Identified wealth holders-5 year age classes - above P99

Source: Panels a) and d) represent the age distribution of decedents whose wealth is represented on MEF micro data on inheritance tax returns. Panels b) and e) represent the age distribution of living wealth holders derived by multiplying the inheritance tax returns by mortality rates (obtained from ISTAT mortality tables) Panels c) and f) are similar to b) and e) conditioned on having a net wealth value higher than the 99th percentile.

Appendix D: Mortality rates

D.1. Data source

The main source of information for mortality rates in Italy is the database assembled by ISTAT and publicly released online at demo.istat.it. The information on mortality is provided on a yearly basis. It includes age, gender, and geographical location up to the level of province of residence. We use the information at the level of the given five macro-areas of residence (north-est, north-west, center, south, and islands) and consolidate this into three macro-areas: south (including islands), center, and north. The database includes, for each age, gender, year, and location, biometric variables such as the number of deaths, life expectation, survival probability, and the probability of death. These biometric details are estimated out of a synthetic population of 100,000 individuals.

Once the database of mortality rates is structured, we invert the rates to obtain mortality multipliers. The heterogeneous pattern of mortality rates and multipliers by age can be observed in figure D.1 comparing the evidence in 1995 and 2016 for Italian men. As seen in panels (a) and (b), the probability of death raises exponentially above the 70 year-old threshold, and the average reduction of mortality rates occurred between 1995 and 2016 can be visibly observed as

the 2016 line lies below the 1995 one especially for older groups. The mortality multipliers, by construction, show large heterogeneity for younger groups, especially below 30 years old. Panels (c) and (d) of figure D.1, also reveals that imperceptible changes in mortality rates for younger cohorts would generate substantial variation in multipliers. Equally, more substantial changes in mortality rates for older cohorts is not necessarily reflected in substantial changes in mortality multipliers.

We further group age information to mimic the structure of tax tabulated information on estate left at death. Tax tabulations are structured in 7 age groups : under 20, between 20 and 40, between 40 and 50, between 50 and 60, between 60 and 70, between 70 and 80, and above 80 years old. We discard mortality observations below 10 years old and above 103 years old to avoid outliers. We also create 20 age groups, in 5-year ranges, to mimic the set of more detailed tax tabulations available in 1995 and yearly between 2012 and 2016. In this case, no age information is discarded.

The average mortality rate, as computed for individuals between 10 and 103 years old, was 1.27 percent in 1995 and declined slightly to 1.20 in 2016. The resulting mortality multipliers range from 78 in 1995 to 83 in 2016. These trends can be seen in figure D.2. The number of deaths are close to 600,000 individuals per annum in the most recent years, up by approximately 50,000 units from 1995.
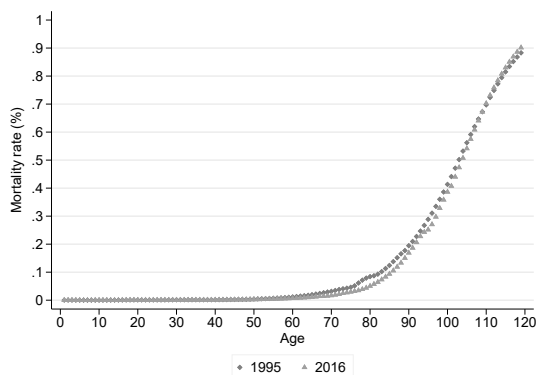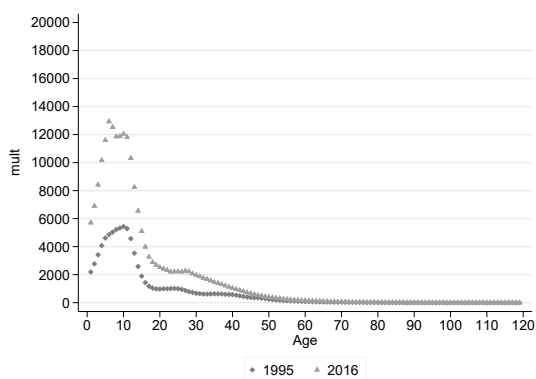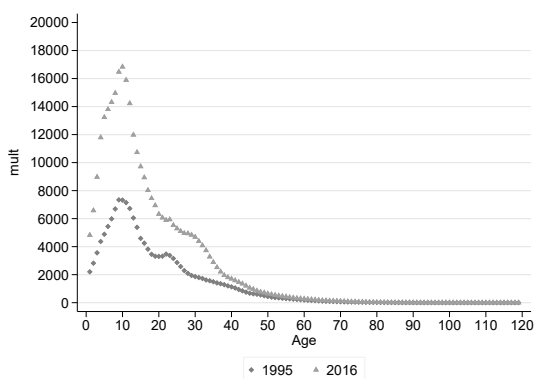
(a) Mortality rates - Males
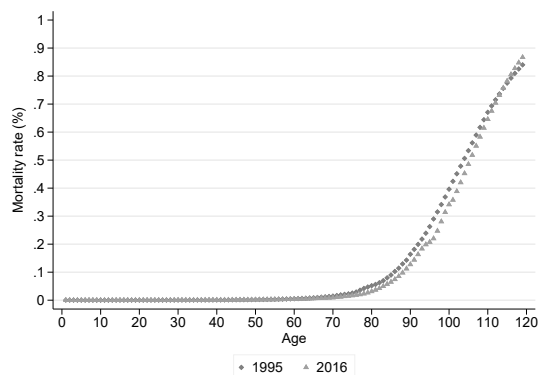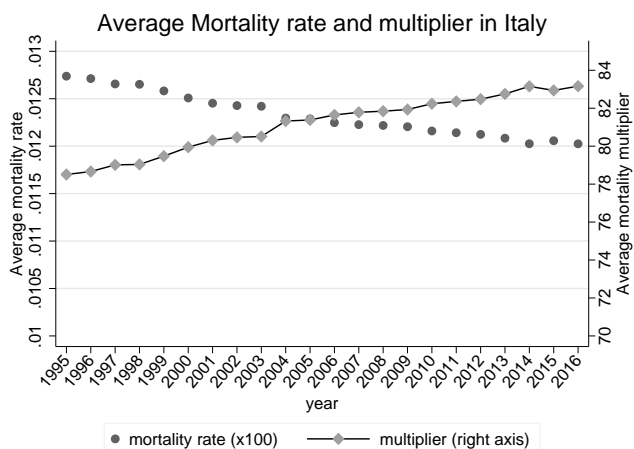
(b) Mortality rates - Females

(c) Mortality multipliers - Males

(d) Mortality multipliers - Females

Source: Own computation from ISTAT mortality tables. Mortality multiplier is defined as the inverse of the mortality rate.

FIGURE D.2. The evolution of average mortality rates and multipliers: 1995-2016

Source: Own computation from ISTAT mortality tables. Mortality multiplier is defined as the inverse of the mortality rate.

Appendix E: Adjusting the value of real estate in the inheritance tax records

E.1. The aggregate market to cadastral value ratio

Real estate assets are declared using a notional valuation (i.e. cadastral value) for inheritance tax purposes, rather the current market value. As Italian real estate cadastral values are typically well below market values, the use of unadjusted amounts declared in the inheritance tax returns will lead to distorted distributional information as well as an underestimation of the value of personal wealth. Ideally, one would want to substitute the cadastral value for its equivalent market price for every building recorded within tax data. However, this would require an extremely refined and sophisticated set of data which is not possible to access. To overcome this problem, instead, we multiply the cadastral values by an annual adjustment factor derived as the share of average national nominal house price and cadastral value.

The derived ratio of average market price to cadastral value of housing is observed to be constant over the years 2009-2012 and equal to 3.3. In the following years, and following the reduction of housing prices, the ratio declined to 3.2 in 2013, 3.0 in 2014-2015 and 2.9 in 2016. The detailed time series of adjustment factors applied to our data for 2009-2012 is shown in table E.1.

Table E.1. The evolution of average cadastral and market values for housing

	2009	2010	2011	2012
Cadastral rent - total value	13,060,818,875	13,354,007,469	13,824,649,519	14,047,787,404
N. of owners	26,742,044	27,058,332	28,269,412	28,502,721
Average rent	488	494	489	493
Market value - total value (current Euro)	4,983,370,521,246	5,107,630,342,488	5,319,036,384,226	5,294,979,063,776
N. of owners	26,757,715	27,063,237	28,278,342	28,511,215
Average market value (current Euro)	186,241	188,729	188,096	185,716
		1.010496435	0.990893001	1.007822964
	488	494	489	493

	2009	2010	2011	2012
Calculation Cadastral value = (cadastral rent* 110 * 1,05)	1,508,524,580,063	1,542,387,862,670	1,596,747,019,445	1,622,519,445,162
N. of owners	26,742,044	27,058,332	28,269,412	28,502,721
Average cadastral value	56,410	57,002	56,483	56,925
Ratio Market Value/cadastral value	3.30	3.31	3.33	3.26
Ratio Market Value/cadastral value (one decimal point)	3.3	3.3	3.3	3.3

Average annual market value of properties for the years 2009-2016 is obtained from the "Osservatorio del Mercato Immobiliare - OMI", published by the Revenue Agency/Nomisma. Similarly, data on the average annual cadastral rent of houses owned by physical persons are derived from the internal data of the Revenue Agency and the Ministry of Economics and Finance, "Analisi Patrimonio Immobiliare - API", used for the annual publication by the Ministry of Economy and Finance, "Gli immobili in Italia."

The average cadastral values are then derived multiplying average cadastral rents by tax coefficients used for the inheritance tax base. For owner-occupying houses the coefficient equals 100 up to 2003 and 110 since 2004, and since 1997 an additional flat re-valuation of cadastral value of 5 percent is applied for tax purposes.[54]

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54. The cadastral value for year 2013, as an example, would therefore be derived as the cadastral rent in 2013 times 110 times 1.05.

TABLE E.2. Adjustment coefficient for cadastral value of real estates

	year	annual percentage change house nominal price (BIS)	annual percentage increase cadastral rents (MEF)	Inheritance tax coefficients on cadastral rent (owner occupied houses)	Inheritance tax revaluation coefficient of cadastral rent	Market value/ cadastral value
Estimates based on cadastral rend and market price evolution	1995	0.01	0.004	100	1	2.2
	1996	0.04	0.004	100	1	2.3
	1997	0.03	0.004	100	1.05	2.2
	1998	0.00	0.004	100	1.05	2.2
	1999	0.01	0.004	100	1.05	2.2
	2000	0.04	0.004	100	1.05	2.3
	2001	0.06	0.004	100	1.05	2.4
	2002	0.12	0.004	100	1.05	2.7
	2003	0.06	0.004	100	1.05	2.8
	2004	0.06	0.004	110	1.05	2.7
	2005	0.08	0.004	110	1.05	2.9
	2006	0.06	0.004	110	1.05	3.1
	2007	0.05	0.004	110	1.05	3.2
	2008	0.03	0.004	110	1.05	3.3
MEF - Official estimates	2009			110	1.05	3.3
	2010			110	1.05	3.3
	2011			110	1.05	3.3
	2012			110	1.05	3.3
	2013			110	1.05	3.2
	2014			110	1.05	3.0
	2015			110	1.05	3.0
	2016			110	1.05	2.9

Average cadastral value was relatively stable at around €56 thousand between 2009 and 2016, whereas the average marked value declined, over the same period, from €186 thousand to €162 thousand.

Unfortunately, for the years before 2009 we could not resort to the publication "Gli immobili in Italia" and we had to estimate the ratio of market price to cadastral value. To do so, we estimated the average market value by using the observed yearly variation of housing prices (using the Bank of International Settlements - BIS - estimates of nominal growth rate of house price index based on the published figures by the Bank of Italy for more recent years). Similarly, we made use of the average yearly percentage change of average cadastral rent over the period 2007-2013, to estimate the average cadastral value between 1995 and 2009. Cadastral rents increased, on average, by 0.4 percent every year. As explained above, allowance for changes in the tax legislation affecting the cadastral values should also be made. As detailed in table E.2, the derived yearly adjustment factors applied to the cadastral values range between 1.9 in 1995 to 3.3 in 2013.

E.2. The heterogeneity of the market to cadastral value ratio

The use of a yearly national adjustment factor for cadastral values may have a series of shortcomings. The use of a national multiplier could mask potential heterogeneity across the wealth distribution (e.g. the degree of underestimation of real estate market values could be more pronounced for rich individuals). To address this concern, we proceed in four main steps.

First of all we match the full cadastral records including more than 34 million properties to the corresponding OMI market value of the area and to the income tax statistics for more than 32 million tax payers (the OMI market value is the average market price of the micro-zone where the real estate is situated). The exercise, carried out for the year 2014, shows that the

ratio between market and cadastral value is equal to 3.0, the same as the national ratio in that year, for all income classes below euro 55,000 referring to 95.2% of taxpayers owning real estate. It then rises to 3.1 between €55,000 and €120,000 and to 3.2 above the €120,000 income class, referring to 0.9% of taxpayers owning real estate (See Figure E.1 and Table E.3).

FIGURE E.1. Market to cadastral value of properties by individual fiscal income ranges - 2014
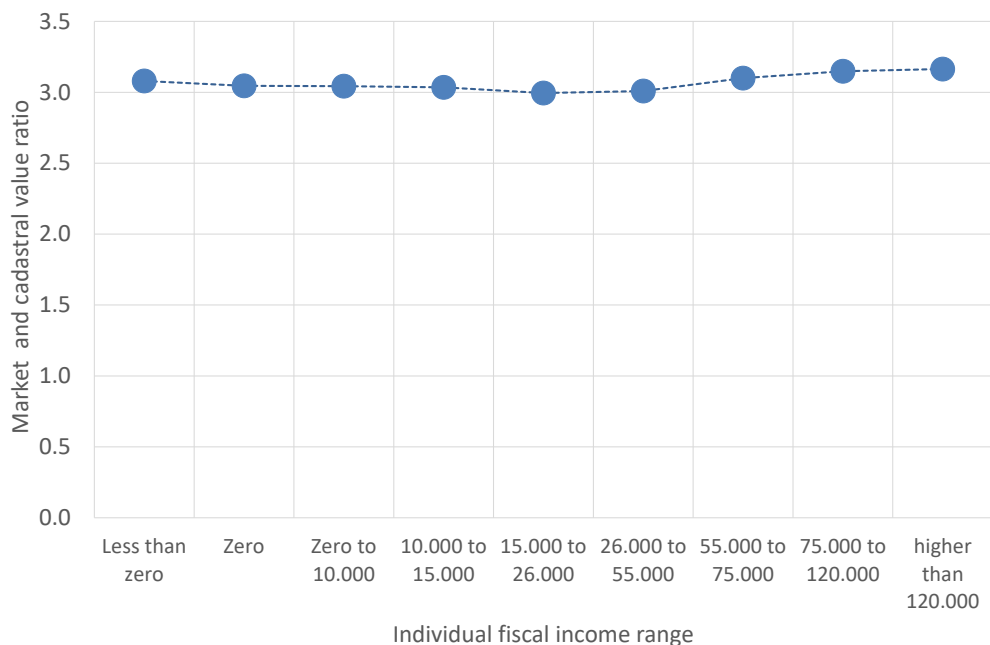
Note: The graph is based on the matching of all property owners to the full cadastral and income records in 2014. Values expressed in current Euro. All properties of cadastral class A are included (excluding A10).

TABLE E.3. Market to cadastral value of properties by individual income classes - 2014

Income Range (Euro)	Number of tax payers (property owners)	% tax pay-ers	Number of properties	Full cadastral rent	Market Value (OMI)	Cadastral value (rent*110*1,05)	Market/Cadastral value
Negative income	102,997	0.3%	93,330	45,117,418	16,046,533,001	5,211,061,807	**3.1**
Zero income	6,297,705	19.5%	6,755,834	2,794,864,119	983,180,390,629	322,806,805,723	**3.0**
Zero to 10000	5,972,644	18.5%	5,546,781	2,421,977,342	851,210,697,656	279,738,382,944	**3.0**
10000 to 15000	3,492,757	10.8%	3,358,884	1,457,382,994	510,904,137,593	168,327,735,854	**3.0**
15000 to 26000	8,347,354	25.9%	8,119,209	3,767,898,827	1,303,244,002,044	435,192,314,550	**3.0**
26000 to 55000	6,515,054	20.2%	7,587,886	4,092,552,587	1,422,226,730,991	472,689,823,755	**3.0**
55000 to 75000	722,676	2.2%	1,089,295	700,704,560	250,837,436,095	80,931,376,704	**3.1**
75000 to 120000	545,070	1.7%	960,090	659,793,403	239,899,949,945	76,206,138,093	**3.1**
More than 120000	288,003	0.9%	1,121,952	759,804,303	277,682,269,245	87,757,397,047	**3.2**
Total	**32,284,260**	100.0%	**34,633,261**	**16,700,095,554**	**5,855,232,147,199**	1,928,861,036,477	**3.0**

Notes: The table matches all property owners to the full cadastral and income records in 2014. Values expressed in current Euro.
All properties of cadastral class A are included (excluding A10). The main owner-occupied housing multiplier is 110 (the so called 'prima casa')

In a second step, we show how the market to cadastral value ratio varies across different regions. If the concern is correct we should observe richer regions to have higher ratios on average. However, as shown in Figure E.1 there is no obvious apparent pattern between average regional income and overall underestimation of market prices. All the regions which individually account for more than 5% of total property stock, and 77% taken together, have an average ratio of market to cadastral value of exactly 3 (e.g. this group includes the most populous regions, namely Campania, Emilia Romagna, Lazio, Lombardia, Piemonte, Puglia, Sicilia, Toscana and Veneto). The only two notable s exceptions are two autonomous and relatively wealthy provinces of Trento and Bolzano, accounting for just under 2% of total properties and where the ratio is estimated to be around 5 In those autonomous provinces the cadastral system is different from the one of the other regions, since it rely on the methods used by the Austrian-Hungarian empire who had the control of those provinces before WWI. Apart those exceptions, all the regions range from the minimum of 2.5 in Puglia and the maximum of 3.5 in Toscana and Marche and the majority of the regions are within the interval of confidence of 10% around the average.

FIGURE E.2. Market to cadastral value of properties by average fiscal income across regions - 2014
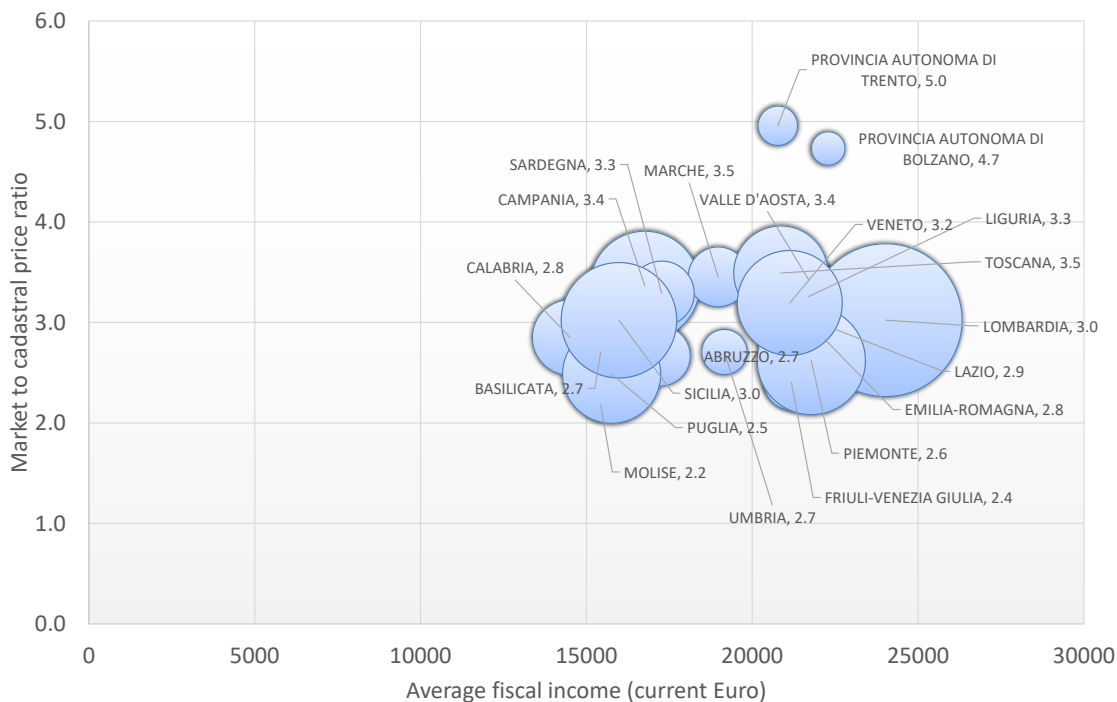
Note: Values expressed in current Euro. All properties of cadastral class A are included (excluding A10).

Third, we leverage the entire castral record and rank individual real estates by their OMI market prices and derive the market to cadastral value ratio across the distribution of housing

74

TABLE E.4. Market to cadastral value of properties by classes of real estates at market value (OMI) classes - 2014

Classes of real estates at market price (OMI) - Current Euro	Number of buildings	Cadastral Rent	Market value (OMI)	Cadastral value (rent* 110*1,05)	Market/Cadastr value
up to 10.000	280,123	19,106,807	1,878,587,178	2,206,836,209	0.9
10.000 to 20.000	729,738	37,346,340	11,114,051,197	4,313,502,270	2.6
20.000 to 30.000	872,911	74,975,975	21,939,585,826	8,659,725,113	2.5
30.000 to 40.000	1,027,085	126,370,117	36,098,550,155	14,595,748,514	2.5
40.000 to 60.000	2,593,168	462,591,191	130,835,787,005	53,429,282,561	2.4
60.000 to 80.000	3,175,807	773,805,411	223,024,187,967	89,374,524,971	2.5
80.000 to 100.000	3,422,501	1,038,517,848	308,144,438,625	119,948,811,444	2.6
100.000 to 130.000	4,925,638	1,831,702,125	565,028,179,288	211,561,595,438	2.7
130.000 to 150.000	2,876,633	1,256,359,469	402,049,648,980	145,109,518,670	2.8
150.000 to 170.000	2,466,185	1,196,422,683	393,896,811,718	138,186,819,887	2.9
170.000 to 190.000	2,067,183	1,100,290,670	371,391,063,991	127,083,572,385	2.9
190.000 to 210.000	1,703,027	985,103,238	340,070,769,836	113,779,423,989	3.0
210.000 to 230.000	1,387,001	865,885,101	304,626,558,366	100,009,729,166	3.0
230.000 to 250.000	1,142,768	763,212,172	273,755,544,792	88,151,005,866	3.1
250.000 to 270.000	946,501	673,192,598	245,752,324,279	77,753,745,069	3.2
270.000 to 300.000	1,102,653	843,270,004	313,506,304,195	97,397,685,462	3.2
300.000 to 330.000	825,981	683,969,276	259,548,102,207	78,998,451,378	3.3
330.000 to 380.000	959,696	872,515,760	338,928,482,455	100,775,570,280	3.4
380.000 to 460.000	872,893	909,845,184	362,879,553,435	105,087,118,752	3.5
460.000 to 600.000	683,775	863,787,856	355,022,544,800	99,767,497,368	3.6
higher than 600.000	650,368	1,351,657,285	604,541,885,572	156,116,416,418	3.9
Total	**34,711,635**	**16,729,927,110**	**5,864,032,961,867**	**1,932,306,581,205**	**3.0**

value at market price. Although such ranking is not directly relevant to the focus of this paper (i.e., ranking of individual total wealth holdings), the exercise reveals that individual buildings in the value range of €600,000 and above have a market to cadastral value ratio as high as 3.9 (see table E.4)

Finally, we made use of an integration of the survey EU-SILC with data from the cadastre and from OMI market value (carried out internally at the Ministry of Economy and Finance to run a microsimulation model) in order to rank individuals in deciles of total real estate wealth observed at OMI market values, and, for all real estates, compute the ratio market value/cadastral value for each decile. In this exercise the cadastral values were expressed in line with the municipal tax on real estate, so for an easier comparison we simply converted the multipliers proportionally to the ones used for inheritance tax and for our study. The EU-SILC survey data are reported to the whole population using appropriate weights. When we observe the data by deciles of the individuals included in the sample, classified by real estate wealth at market values, we found that, the first five quintiles of the survey do not have any real estate. In the other quintiles, moving upwards, we observe a slightly increasing underestimation of the cadastral values. Only the top decile has a multiplier slightly higher than the global one, 3.2 instead than 3.0. Quintiles 7th and 8th have 2.6 and 2.7 respectively (around 10% lower than the global one) and quintile 6th has 2.3, around 20% lower than the global one, however this quantile owns only 1.9% of the total real estate of the EU-SILC sample. If we focus, rather than on deciles, on top 5% and top 1% individuals, using the same classification, we discover

a multiplier of 3.2 and 3.3 respectively. In the highest case, this is 10% higher than the overall multiplier. The result of this exercise is similar to the one based on PIT income classes and on houses only.

TABLE E.5. Ratios of market values/cadastral values by deciles of total real estate wealth. Evidence from matched EU-SILC survey data and tax records - 2017

Individuals ranked by the market value of real estate - Deciles	N. of real estates	Average cadastral value of real estate owned in euros [inheritance tax values]	Average market value of real estate owned in Euro (in OMI market values)	Ratio between market and cadastral values [using inheritance tax values]
1st	0			n.a.
2nd	0			n.a.
3rd	0			n.a.
4th	0			n.a.
5th	0			n.a.
6th	2,184,434	15,937	36,655	2.30
7th	5,148,575	31,049	80,728	2.60
8th	6,961,123	37,860	102,221	2.70
9th	8,959,226	44,207	128,201	2.90
10th	19,465,274	51,602	165,128	3.20
Total population	**42,718,633**	**43,511**	**130,391**	**3.00**
Focus on the upper tail:				
Top 5%	13,148,626	54,443	174,216	3.20
Top 1%	5,065,590	59,575	196,599	3.30

Source: Ministry of Economy and Finance microsimulation model based on a sample (EU-SILC) reported with weights to the whole population.

Overall, the main results suggest that although the full heterogeneity across locations and rankings in the real estate or income distribution is ignored, the use of a national multiplier should only marginally affect estimates of wealth concentration. Our distributional results are likely to represent conservative estimates as controlling for the full heterogeneity discussed above would have likely increased the level of wealth concentration even further, albeit marginally. An example can help here understanding. Consider, for simplicity that an individual with a total value of net wealth equal to €20 million, enough, on its own, to belong to the Top 0.01% of the net wealth distribution. We also know that only around 10% of total net wealth of this person is held under the form of housing and land assets (i.e., 2 out of 20 million). The 'correct' market value of properties for this individual should be $2*(3.3/3) = 2.2$ million. Assuming that such an underestimation of property value applies to the entire group consisting of around 5000 individuals (and no overestimation applies to the groups below) this would mechanically lead to an approximate upward adjustment of a mere 0.012 percentage points in the top 0.01% wealth share (i.e. assuming a total wealth of 9000 billion for this simple back-of-the-envelope calculation, the top 0.01% wealth share would be equal to €20 millions $*5000/$€9000 billions $= 1\%$ which has to be compared to a "correct" share of €22 millions $*5000/$€9000 billions $= 1,12\%$).

It is also worth mentioning that another potential problem relates to the fact that we have also adopted a unique adjustment factor across cadastral classes. However, different cadastral classes has different cadastral adjustment coefficients to be applied to the cadastral rent for tax

purposes. As written above, as of January 2004, 110 is the multiplier applied to the main owner-occupied housing (the so called 'prima casa', falling within the cadastral classes A/1 to A/11 with the exception of A/10). The coefficient, as of mid 2004, is 120 if the house is not the main residence. These coefficients apply to regular dwellings, to castles, villas, and historical building alike. If most secondary houses were concentrated only in the hands of wealthy individuals, the use of a constant adjustment factor to house cadastral rents, may create a bias. Other things being equal, this may result in a upward bias for our estimates of wealth concentration, as the reported value of a secondary house in the inheritance tax return is 9% higher than the owner occupied house (120/110). However, the final effect on the wealth shares cannot be entirely known in advance as second homes may also have a larger systematic undervaluation of market value. Cadastral multiplier vary according to the type of real estate, 120 also applies to many buildings in the C cadastral categories such as covered car parks, cellars, stores, laboratories and small businesses, with the exception of shops (cadastral category C1), in this case the coefficient is 40.8. On land rents the coefficient is 90 and on offices rent (cadastral category A10) the coefficient is 60. Other cadastral categories mainly apply to public spaces and buildings and may not be relevant for personal ownership of real estates. As a systematic assessment of the market value of all different cadastral categories is not available, it is not possible to assess how the adjustment factor based on the owner-occupied houses we used fits with the degree of underestimation of cadastral values of other real estate categories. Unfortunately, we could not obtain the information about cadastral types from our individual data but we could observe the share composition of different types of buildings owned by different individuals across the income distribution. Although not precise this exercise provides informative results. Indeed, real estate different from housing represent less than 10% of household real estate wealth and is distributed quite evenly across income classes. Despite some existing heterogeneity, the share of houses and apartment structure remains quite high even for the highest income class (86%).

The combination of such empirical evidence and that shown above about the limited systematic heterogeneity of the ratio between market and cadastral values across geographical areas or across the income and wealth classes, we conclude that allowing for different adjustment factors should not produce large biases in our estimates.

Appendix F: The identified population using inheritance tax records

FIGURE F.1. The coverage of decedents people and total adult population using inheritance tax records
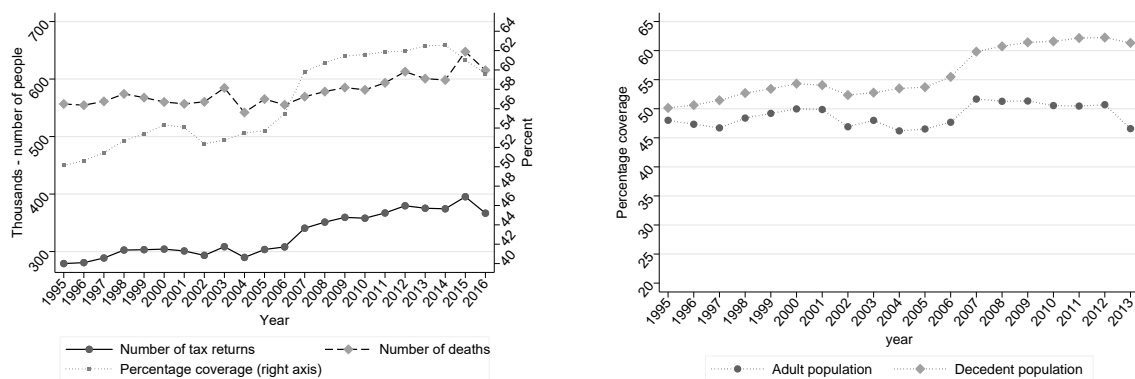
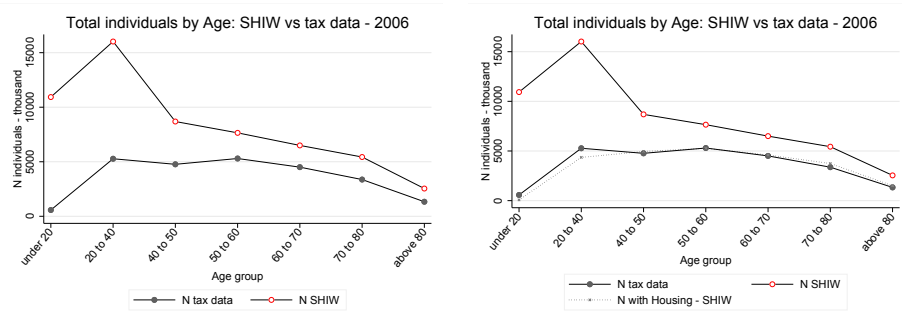(a) N of decedents and filers

(b) % of dead and living adults covered

Note: Panel a) shows the number of inheritance tax returns compared to the number of dead person every year. Panel b) shows the coverage rate of the decedent people through the inheritance tax returns (i.g. the ratio between the number of tax returns and the number of deceased) as well as the coverage rate of the total adult population (i.e. the ratio between the number of identified adults via the mortality multiplier method and the actual number of adults). Population and mortality statistics are obtained from ISTAT.

The missing population is identified as the non-homeowners who have net wealth below the inheritance tax reporting threshold. The assumption here, following the tax code, is that such individuals are likely not to be represented in the inheritance tax records in the event of death. The evidence that the population identified via the mortality method is found to be close to that of the number of homeowners identified in the SHIW, for each age class, corroborates the empirical strategy to recoup the wealth of the missing population. (F.2(b)).

The total population thus derived turns out to be slightly smaller but extremely close to the population within each age class above 20 years old in the SHIW (see F.2(c)). The remainder population gap (mostly young people) is assumed to hold zero net wealth. Additional marginal adjustments warrant that the final numbers are in line with the SHIW by age, gender, and location. The total identified population between 20 and 40, is generally found to be slightly higher than the actual one identified through SHIW. In this case, we reduce the number of individuals in this age group, in equal proportion for each gender, location, and wealth classes, to match the total number derived from SHIW. Such ajustments are marginal and are done so that the final population of the adjusted tax records can fully match the actual population, as reported in SHIW by different age groups, gender, and geographical location.
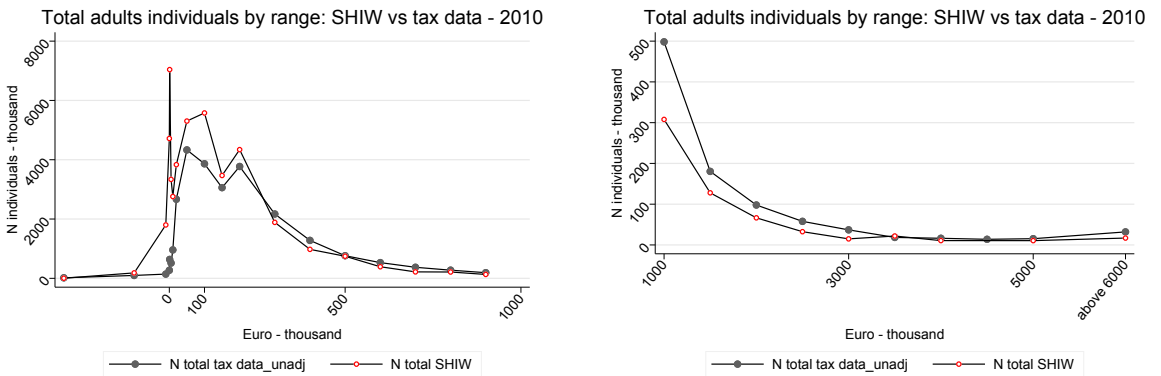
(a) total individuals

(b) total homeowners identified in SHIW
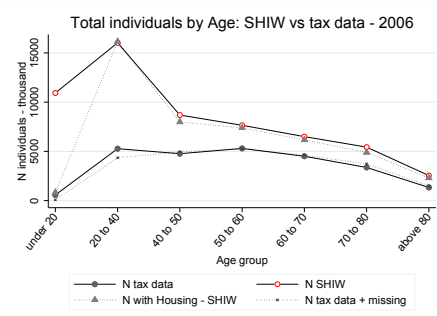
(c) total missing population added to the tax data

FIGURE F.3. Frequency of adults across the wealth distribution: 2010 tax-based identified wealth vs. SHIW
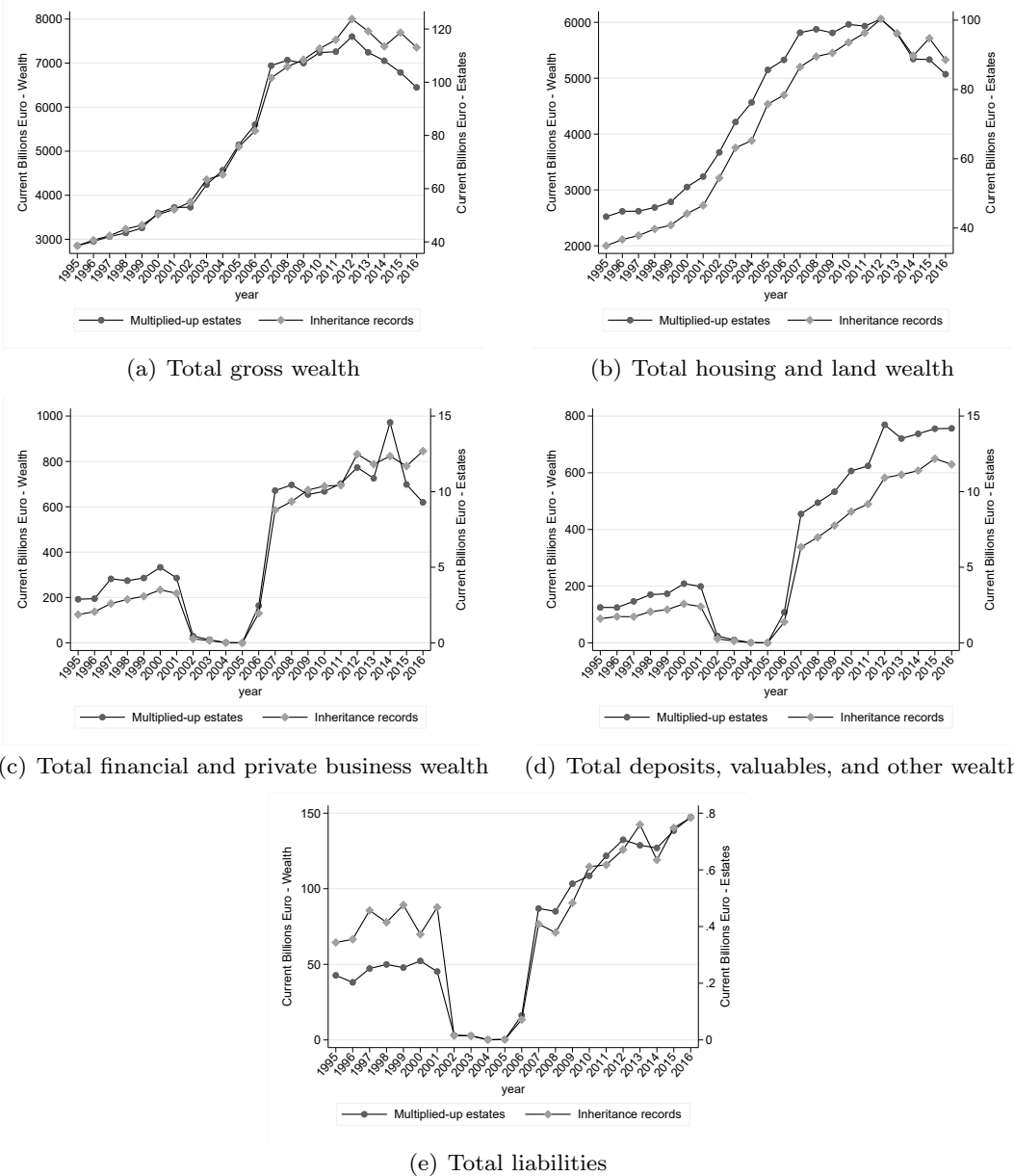

(a) adults with less than €1 million

(b) adults with at least €1 million

Source: The graphs compare, for each wealth range, the number of adults (aged 20 or more) identified from multiplied-up inheritance tax records (i.e. figures re-scaled using mortality multipliers) to that estimated from the SHIW data. Panel a) shows the trimmed distribution below 1 milion Euro. Panel b) shows data above the 1 milion Euro range. Wealth holdings of the households in the SHIW data are allocated to individual adults before comparing it to the tax-based information. The Tax-based information presented here does not allow for the wealth of the missing population or for underreporting of wealth.

Appendix G: Total estates and total identified wealth using inheritance tax records

FIGURE G.1. Total estates and total identified wealth by asset classes

(a) Total gross wealth

(b) Total housing and land wealth

(c) Total financial and private business wealth

(d) Total deposits, valuables, and other wealth

(e) Total liabilities

Note: The figure compares the total value reported on inheritance tax records to the total net wealth identified by multiplying-up the reported net estates with the inverse of mortality rates. The comparison is carried out for total gross wealth (panel a), total market value of land and housing wealth (panel b), total value of financial and private business assets (panel c), total value of deposits, valuables, and other wealth (panel d), and total liabilities (panel e). Note that the inheritance and gift tax was repealed between 2001 and 2006, causing reported values, other than housing and land, to plummet.

FIGURE G.2. Total estates, total wealth and total housing and land wealth: household's sector balance sheet, SHIW, and multiplied-up estates data
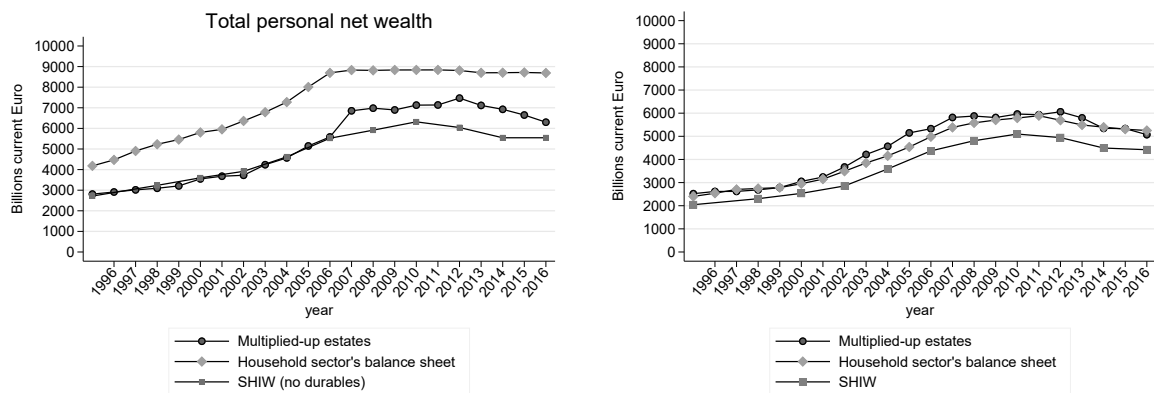
(a) Total wealth: NA, SHIW, and multiplied-up estates

(b) Total housing and land wealth: NA, SHIW, and multiplied-up estates
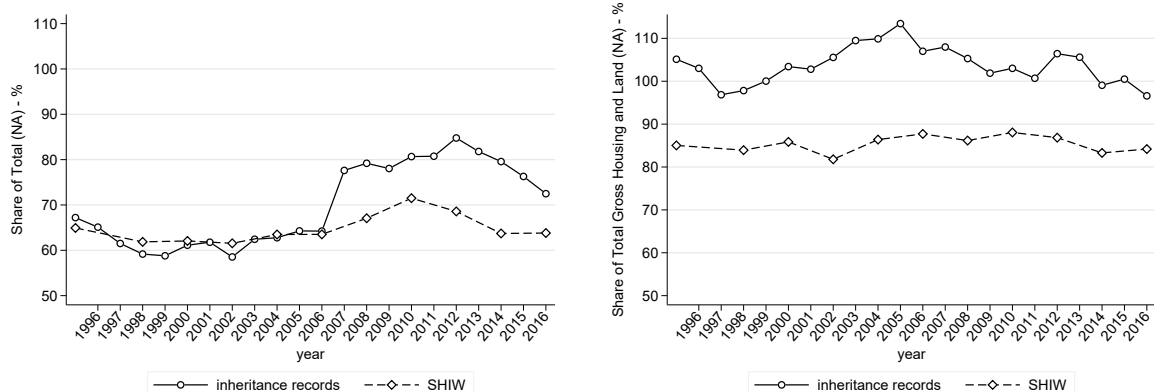
(c) Total wealth: SHIW, and multiplied-up estates - coverage rate (% of NA figures)

(d) Total housing and land wealth: SHIW, and multiplied-up estates - coverage rate (% of NA figures)

Note: Panels a) and b) show values of total households net wealth and total gross value of housing and land using three different independent sources: the household's sector balance sheet (estimated using data from ISTAT and Bank of Italy); the household survey - SHIW (with full coverage of the population), and the total value of wealth reported on inheritance tax records multiplied-up with the inverse of mortality rates (with partial coverage of the population). Note that, at this stage, the only adjustments applied to the inheritance tax data are the transformation of real estate cadastral values into market values.

Appendix H: Imputation of missing wealth

H.1. Estimation and imputation of the wealth of the missing population

The inheritance tax return filing is necessary to legally transfer real estate property rights to the heirs. In the absence of real estate, tax returns should be filed if the total estate (net of liabilities) is above 35.000 Euro. In 2014, the latter threshold was raised to 100.000 Euro. Hence, any individual decedent who has relatively little accumulated financial wealth and no real estate is in principle not be represented in the tax records.

Using the SHIW, we identified the so called 'missing population'. To do so, we first allocate household wealth to each single adult composing the households. Following the work by D'Alessio (2018), we make use of information about individual asset holding to allocate each specific asset to different individuals.[55] Alternatively, we split equally the total household specific asset value between the head of the household and her partner. In the absence of a partner all household wealth is allocated to the head.

Based on information about pension and insurance contributions, we also estimated the outstanding accumulated reserves available in these funds and allocated them to individuals.[56] Once individual asset holding is estimated we identify every head of household or partner who is not in possession of housing and who is below the reporting threshold as required by the inheritance tax legislation: approximately 25.000 Euro, increased to 100.000 Euro from 2014 onward. Everyone who is below this threshold and is not a homeowner is considered to belong to the missing population. This also includes every adult, different than the head of the household or her partner, with wealth below the specified thresholds. In 1995, there were approximately 21 million adults not homeowners and whose wealth is below the specified threshold. This number declined gradually by 1 million till 2010 before starting to raise back again to 1995 levels in 2016.
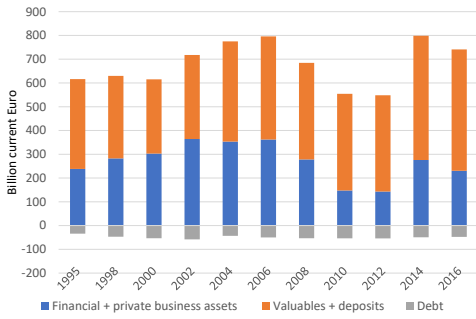
The identified missing population and its net wealth is appended to the tax-based information.

The process consists of two main steps. First we classify the survey-based information about missing wealth into the wealth ranges, age, and gender classes available in the tax data. More precisely we transform the survey microdata into detailed tabulations with 34 net wealth ranges, from negative values to the highest range worth €20 million or more. We have seven 10-year age groups (i.e., under 20, 20 to 40, 40 to 50, 50 to 60, 60 to 70, 70 to 80, and over 80), two gender groups (i.e., males, females), and three geographical areas (south and islands, north, and center). We also classify our wealth holding in four major asset classes: Housing and land; business and financial assets; other assets (including current and saving deposits, valuables, etc.); and liabilities and deductible expenses. Second, we simply append the survey-based estimates of the missing left tail of the wealth distribution to the tax-based wealth tabulations derived by simply applying the mortality multipliers to our tabulations of wealth left at death. To account for underreporting of wealth in the SHIW, we also proportionally adjust reported wealth in the survey data using the ratio of wealth values between the balance sheet and SHIW. This is done for each asset class that is available both in SHIW and in the balance sheet for the household sector only.

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55.   The final exercise slightly differs from D'Alessio (2018) as the information needed to split asset holding is not always readily available in the household survey public use file. The exact procedure used in this paper is explained in the AppendixK and differences in the procedure used by D'Alessio (2018) will be pointed out.

56.   This exercise is explained within the Appendix L.

FIGURE H.1. Number of missing adults and their wealth by asset type

(a) Wealth of the missing population
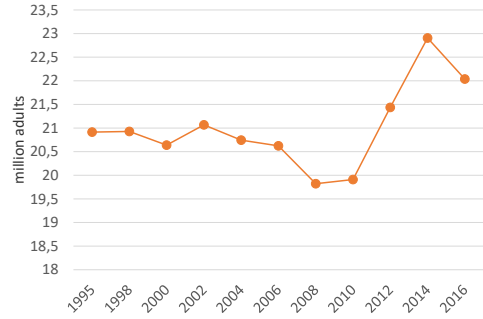
(b) Missing population (number of adults)

Source: Estimates from SHIW data

FIGURE H.2. The identified number and wealth of the missing population by age group, macro area, and wealth range
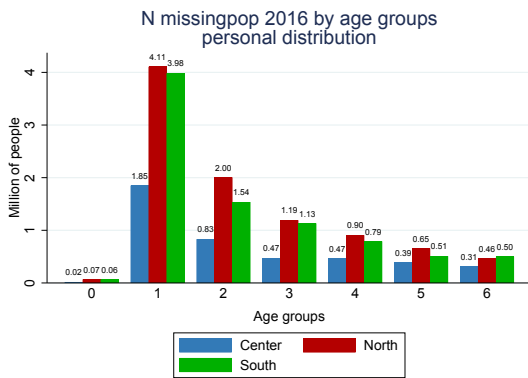
(a) N by age group and macro area
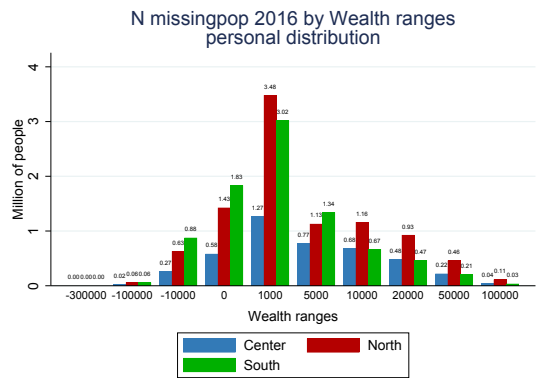
(b) N by wealth range and macro area
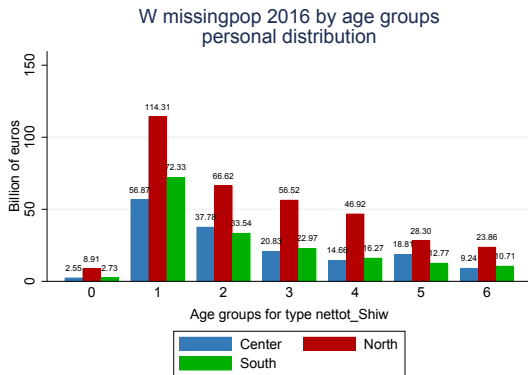
(c) Net wealth by age group and macro area
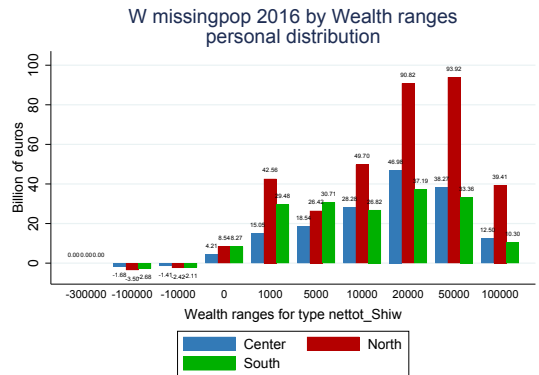
(d) Net wealth by wealth range and macro area

Source: Own computation from based on SHIW data. Adults without real estate ownership and with a level of net wealth below the reporting threshold for inheritance tax purposes (e.g. below 100 thousands Euro after 2014) are considered to be part of the missing population.

H.2. Imputation of tax-exempt assets

To derive a measure of unreported tax-exempt assets we use the tax code and practice in filing. The value of these assets are then imputed. The imputation is based on the observed proportional distribution of joint financial and business assets (observed from the tax data adjusted for the missing population).[57] In particular, we impute the total value of insurance technical reserves net of liabilities (the total value of assets accumulated in pension, life insurance, and severance payment funds), and 50% of Italian government securities. Indeed, the reporting of government bonds is often recommended by tax accountants and most certainly happens in those cases where securities are bundled with other assets in investment funds, as officially documented by banks and other financial intermediaries following death of a legal owner. Such investment bundles can be fully reported on the inheritance tax form, and the tax authority would then compute the relevant tax deductions.We impute 100% of government securities during the years where the estate, gift, and inheritance tax was not in place (e.g. the period included between October 2001 to October 2006). We also include 90% of notes and coins (100% in years where the tax was abolished) in our definition of unreported tax exempted assets, although this is not technically the case. The contribution of this asset is very marginal and makes this choice practically irrelevant.[58]

The total net value of financial tax-exempt assets which are likely to be unreported in the inheritance tax records was worth €320 billion in 1995 and €940 billion in 2016, just above 10% of total personal net wealth in the country (cfr. Figure H.3).

H.3. Matching NA aggregates: imputing the remaining wealth gaps

The derivation of our benchmark series of wealth distribution and concentration requires, by construction, the alignment of our aggregates with those based on the National Accounts household's balance sheet. The imputation of the wealth of the missing population and the unreported tax exempt assets are complemented with the imputation procedure of any remaining discrepancies (positive or negative) between the national accounts aggregates and our data (see Figure H.4). The imputation is based on four macro wealth categories: Financial plus private business assets; valuables, deposits, and others; housing and land assets; and liabilities.

As described above for the imputation of tax exempt assets, the imputation is based on the observed proportional distribution of these assets macro categories (observed from the tax data adjusted for the missing population). Such proportional distributions are visually represented in Figure H.5.

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57.   The value of the shares in unquoted companies is taken at the book value for tax purposes and it is not modified for our distributional exercise.

58.   Unless specifically inventoried, cash money is considered to be evaded by the tax authority (a general rule of thumb is applied to compute tax liabilities, considering notes and coins to amount to 10% of the value of the declared estate).

FIGURE H.3. Total net value of financial assets exempted from inheritance tax and likely to be unreported on inheritance tax forms
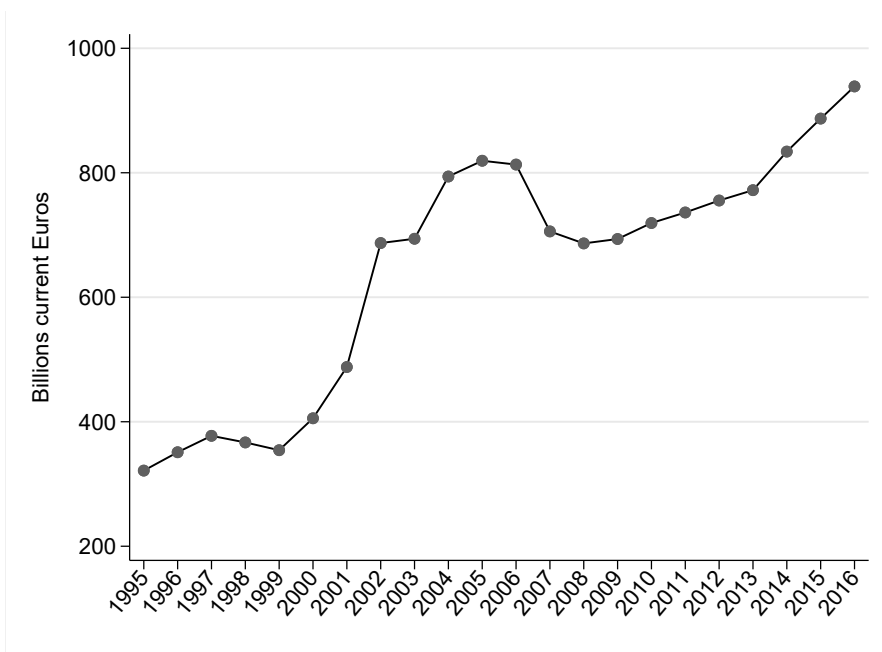
FIGURE H.4. Adjusted identified wealth, SHIW, and the national balance sheet
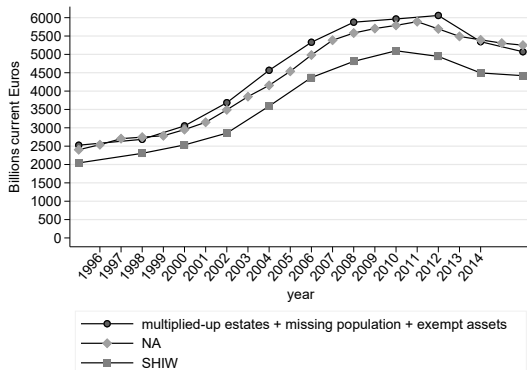
(a) Housing and land assets
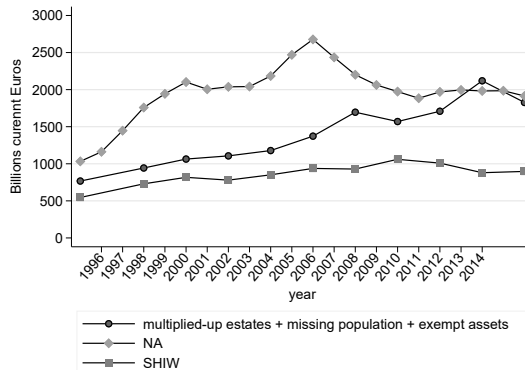
(b) Financial and private business assets
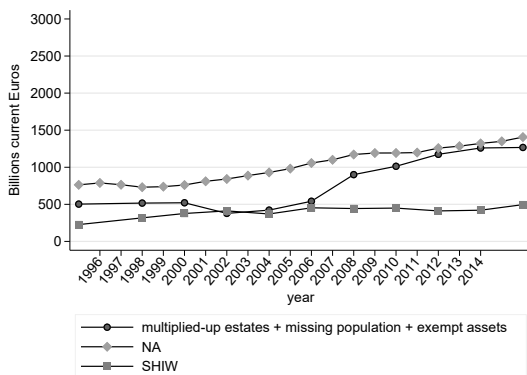
(c) Valuables and deposits
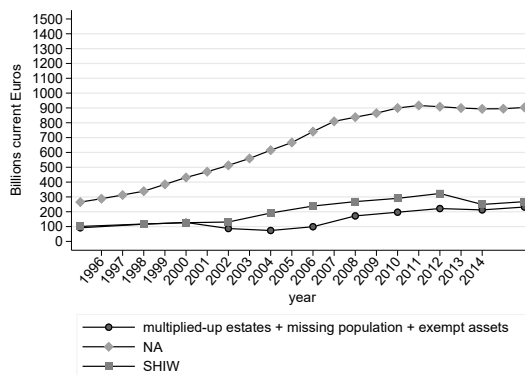
(d) Liabilities

Note: The figures show values of total reported wealth, by asset classes, using three different independent sources: the household's sector balance sheet (estimated using data from ISTAT and Bank of Italy); the household survey - SHIW (with full coverage of the population), and the total adjusted value of wealth reported on inheritance tax records multiplied-up with the inverse of mortality rates. The adjustments to the reported wealth make allowances for the unobserved wealth held by the non-filers (missing population) and for the unreported tax exempt assets. Hence the adjusted values reported here refer to the full population as in SHIW.

Year	Shares, business assets, investment funds, government securities, and Bonds	Life insurance and funded private pension wealth	Financial liabilities	Deposits, CDs, repos, postal savings certificates	Valuables	Cash	Financial and business assets	Housing and Land	Deposits, cash, valuables, credit to other households	Financial liabilities
1995	55,10%	65,88%	38,49%	23,06%	71,93%	17,27%	51,53%	85,03%	28,95%	38,49%
1998	39,15%	74,44%	35,69%	39,02%	74,78%	14,51%	41,61%	83,93%	42,24%	35,69%
2000	37,11%	57,50%	29,95%	43,58%	93,64%	12,53%	38,31%	85,86%	48,45%	29,95%
2002	35,31%	48,16%	26,06%	38,79%	128,06%	15,01%	35,81%	81,80%	47,57%	26,06%
2004	36,21%	39,77%	31,71%	31,11%	113,08%	11,74%	35,06%	86,39%	39,57%	31,71%
2006	32,23%	34,22%	32,20%	33,86%	116,47%		31,20%	88,28%	43,55%	32,20%
2008	39,10%	35,04%	32,04%	32,68%	113,37%	7,99%	36,02%	86,72%	38,81%	32,04%
2010	51,45%	31,58%	32,29%	32,62%	96,76%		43,03%	88,61%	39,11%	32,29%
2012	48,69%	23,83%	35,58%	28,73%	83,91%		39,27%	87,32%	33,98%	35,58%
2014	38,49%	24,81%	27,91%	29,77%	72,86%		32,57%	83,68%	32,73%	27,91%
2016	36,64%	30,33%	29,70%	34,21%	81,37%		32,87%	84,80%	36,48%	29,70%

Notes: data shows the ratio of total value reported in the household survey data (SHIW) with respect to the total value as recored in the household balance sheets macroeconomic statistics. Elaboration of the authors.

FIGURE H.5. Proportional distribution of assets by types and wealth ranges

(a) Housing and land assets
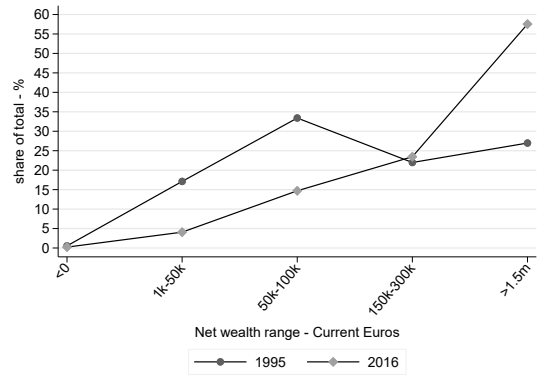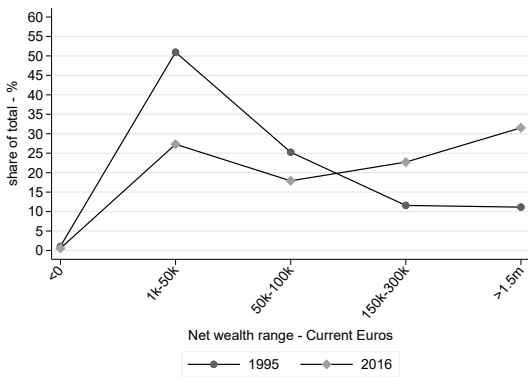
(b) Financial and private business assets

(c) Valuables and deposits
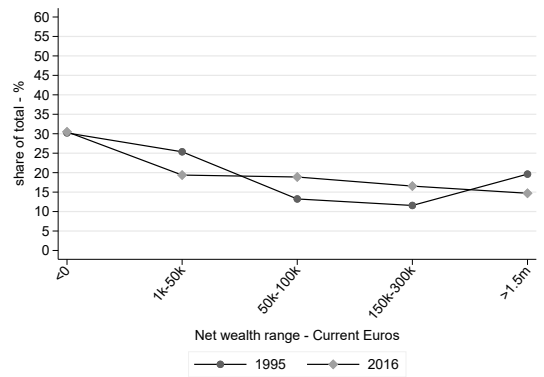
(d) Liabilities

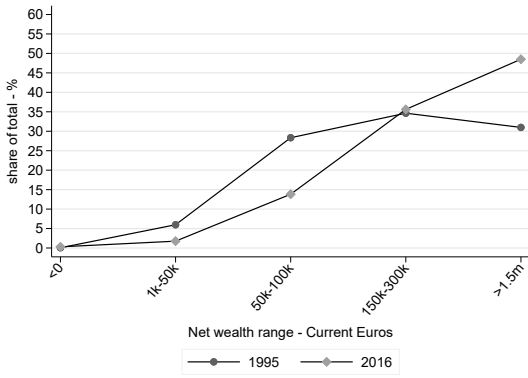Note: The graph shows a simplified representation, for each class of assets, of the proportions of total assets held across the wealth groups (ranked across total net wealth). These proportional factors are used to impute missing assets and liabilities and matching aggregates with the relevant series of the household's sector balance sheets.

Appendix I: The inheritance tax revenue, coverage, and its progressivity structure

FIGURE I.1. The share of total estates subject to taxation

FIGURE I.2. Average tax paid and inheritance tax revenue: 1995-2016
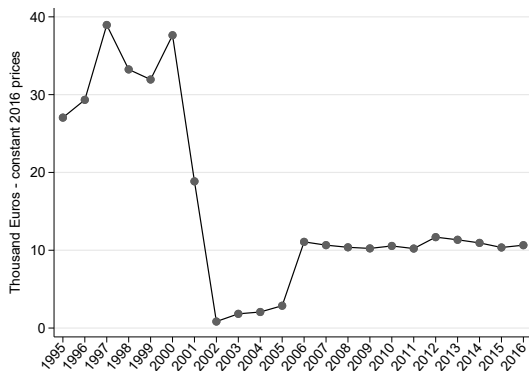
(a) Real average tax paid
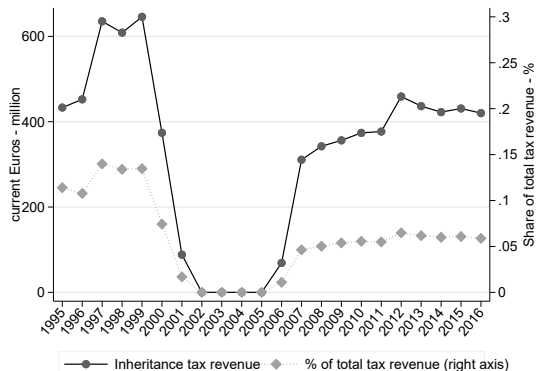
(b) Inheritance tax revenue (% total revenue)
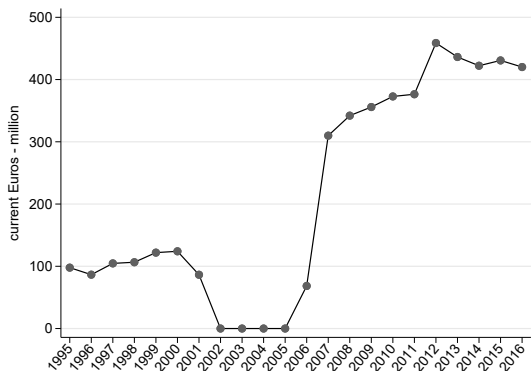
(c) Revenue from inheritance tax only
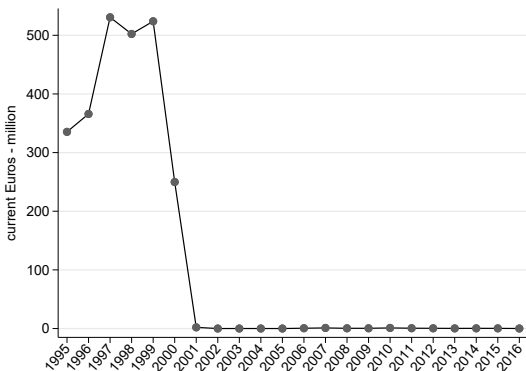
(d) Revenue from the estate tax only

FIGURE I.3. The heterogeneity of the share of estates subject to taxation and the effective tax burden burden: a comparison across three tax regimes (1995-199, 2000, and 2007-2016)
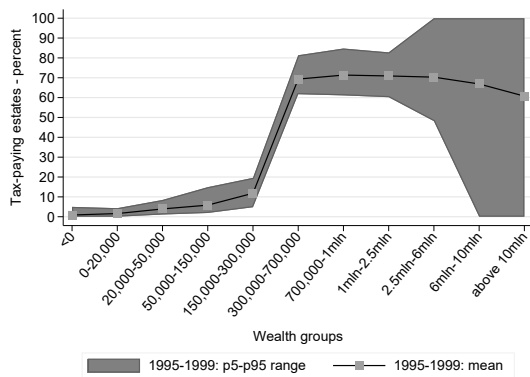
(a) % of estates taxed: 1995-1999
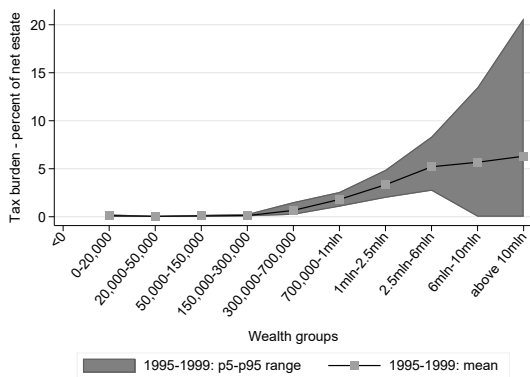
(b) Average tax burden:1995-1999
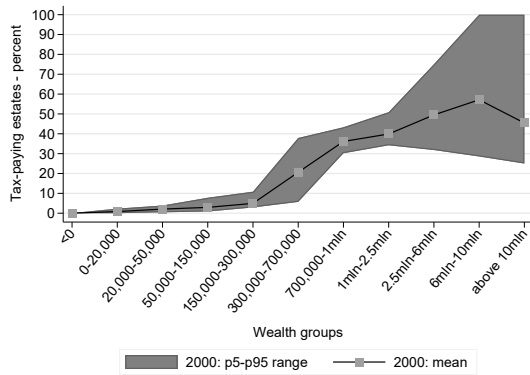
(c) % of estates taxed: 2000
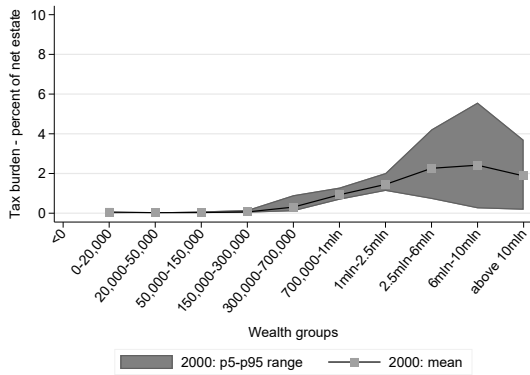
(d) Average tax burden:2000
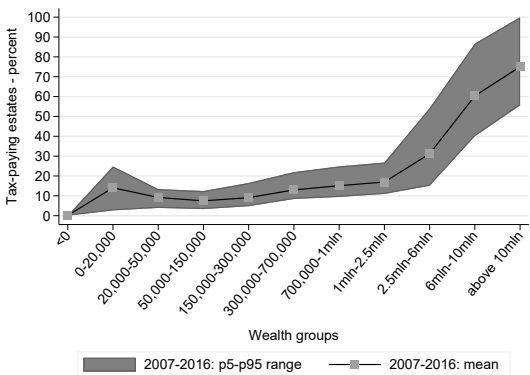
(e) % of estates taxed: 2007-2016
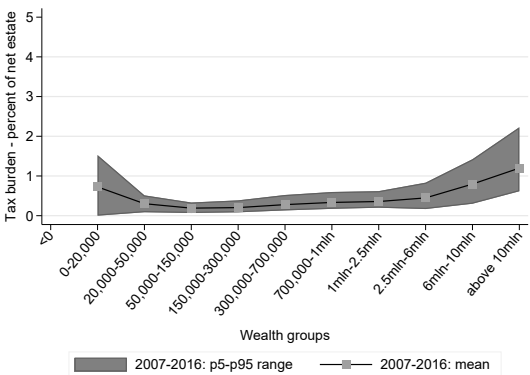
(f) Average tax burden:2007-2016

Appendix J: Total inheritances and gifts

FIGURE J.1. Growing wealth transfers as % of total income
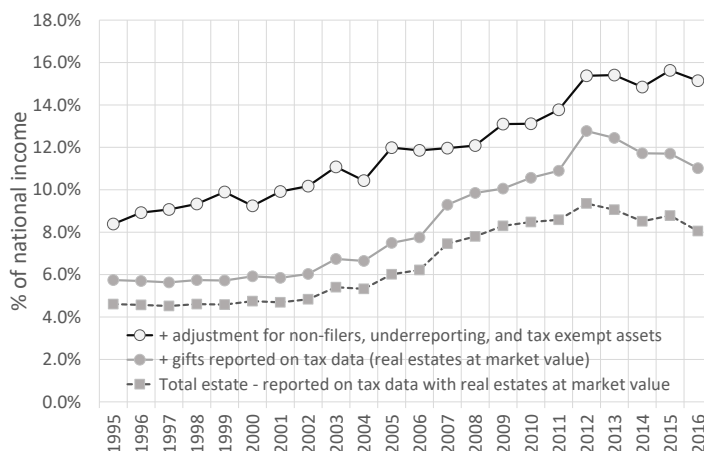
(a) Annual flows of inheritances (and gifts) over national income
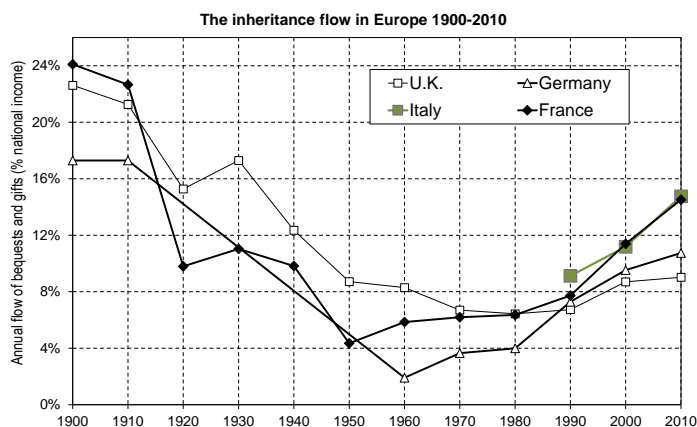
(b) Decennial averages: comparison with other countries

Note: Panel a) estimates the annual flows of inheritances and gifts starting from the information reported on the inheritance tax records and the gift tax records. The reported values of housing and land are adjusted to reflect market value. The final estimate makes allowances for the wealth of non-filers as well as additional underreporting of assets. Panel b) replicates Figure 4. "The inheritance flow in Europe 1900-2010" from the work of Alvaredo et al. (2017), adding the decennial average series for Italy.

Appendix K: Allocating household wealth to individuals using the Survey on Household Income and Wealth

The derivation of the personal distribution of assets from the observations available at the household level can be approximated thanks to information about asset holdings available within the household survey responses to a variety of questions. In doing so, we follow the exercise carried out by D'Alessio 2018. Two main caveat apply. First, as we use the public available survey data, subject to a more restricted set of information, our results slightly differ from D'Alessio 2018. Second, whenever possible, we distribute each asset to the adult members of the household. However, the sum of the components of each asset subgroup is generally slightly different than the aggregate subgroup available in the survey. In fact, the imputations of missing assets carried out by the statistical office of the Bank of Italy are only distributed at a higher level of aggregation and not asset by asset. The observed discrepancy for each subgroup of assets is then distributed to individuals within the households (without changing the derived individual distributional of each asset subgroup). There are ten main asset subgroups relating to different subcategories of real and financial assets and liabilities. Net wealth in the Survey of Household Income and Wealth is defined as total real assets (AR) plus total financial assets (AF) minus total financial liabilities (PF). In turn, AR has three main subgroups (AR1= housing, land and other buildings, AR2 = businesses, AR3 = valuables), AF has four subgroups (AF1= Deposits, CDs, repos, postal savings certificates, AF2= Government securities, AF3= bonds, mutual funds, equity, shares in private limited companies and partnerships, foreign securities, loans to cooperatives, AF4 = Credit due from other households), and PF has three subgroups (PF1= Liabilities to banks and financial companies, PF2= Trade debt, PF3= Liabilities to other households).

The details of the exercise are the following. AR1 is the result of the property value (VALABIT) times the household's ownership share (QPRO). The number of adult owners can also be identified. Each adult owner is given an equal share of the real estate. The amount of advance payments on property that household does not yet own (ANTIC) are also added to the variable AR1 and equally allocated to the adult members of the households.

AR2 is composed of the business equity value, excluding the value of properties. This information is contained in one variable (VALAZ) that can be extracted from three different datasets within the Self-employment income section of the survey: LINB - Self-employment income: until 1989 members of the professions, the self-employed, sole proprietors and entrepreneurs with fewer than 20 employees; LINC - Self-employment income: entrepreneurs with 20 or more employees, after 1989 active shareholder/partner; and LIND - Self-employment income: family businesses. In the first two datasets the personal ownership share of business equity can be directly identified. In the case of family business, we allocate the ownership share proportionally to the number of hours worked in the business (D'Alessio, 2018).

AR3 value is allocated to the households and there is no usable information within the survey that can be used to infer a distribution to individual members of the household. The reported value is equally split among each adult members of the household.

The value of AF1 (e.g. Deposits, CDs, repos, postal savings certificates) can in principle be allocated within the family after "according to the number of owners, selecting the components

ordered by age (adults/non-adults), status in household (head of household, spouse, other member) and income" as described in D'Alessio (2018). However, the variable identify the number of owners within the households is not available in the public database. Hence, we only divide AF1 equally among all adult members of the households, similarly to what D'Alessio in doing for years preceding 2008.

Variables AF2 and AF3 (e.g. Government securities, bonds, mutual funds, equity, shares in private limited companies and partnerships, foreign securities, loans to cooperatives) can also be allocated to members of the households after 2008 by using the variable ICTIT containing information about the number of owners of investment and government securities within the households. Differently from the variable AF1, this can also be done using the public use files, although the information is only available in the annual wave files of the survey and not in the historically harmonized dataset. Following D'Alessio (2018) we distribute the value of AF2+AF3 to the members of the household by sorting them by age, status in household, and income. For year preceding 2008, the total value is divided equally among household adult members.

The variable AF4 is composed of business credits (CREC12d) from two datasets LINB e LIND, plus credits from other households (TCREDIT), which is only available in the annual wave files of the survey and not in the historically harmonized dataset. Hence, we derive the variable TCREDIT in the historically harmonized SHIW dataset as a residual from the difference between AF4 and the sum of the CREC12d from both LIND and LINB databases. The exact individual share of CREC12d can be computed directly from LINB whereas the value of CREC12d from LIND is allocated to individual members of the household based on the number of yearly hours worked in the family business. The variable PF1 is composed of business debts (i.e. DEBC12AB and DEBC12C from LINB and LIND databases) as well as all debts not linked to business activities (i.e. DEB12A; DEB12B; DEB12C; DEB12D; DEB12E; DEB12F; DEB12P from the FAMI database). The individual share of business debts from LINB are directly allocated to household members whereas they are estimated from LIND based on estimated yearly worked hours within the family business. The sum of DEBC12AB from LIND and LINB should match the aggregate DEB12O reported in the FAMI database. This is not the case as imputation procedures are only reported at the higher aggregation level (e.g. DEB12O). The observed discrepancy for each households is distributed to its members using the observed number of yearly hours worked in the family business. The same applies to DEBC12C. The variable DEB12A, linked to housing ownership are allocated to individuals following the same criteria used to allocate housing assets within the household (e.g. method used to allocate AR1). The remaining debts, in the absence of more detailed information, are allocated equally to each adult member of the households. The sum of total sub-components would still be smaller than the estimated value of PF1 for each household as reported in the FAMI database. To match precisely the aggregates, we distribute the observed discrepancy to each household and keep the observed proportions of PF1 across household adult members. The variable PF2 is composed of self-employment and family business debts, DEBC12D from both databases LINB and LIND. As above, the exact individual share of DEBC12D can be identified from LINB whereas we estimate it in LIND by looking at the individual reported yearly hours worked in the family business. Similarly, to what was done for PF1, we distribute within each household, the difference between the household aggregate value of PF2 and the total PF2 derived as the sum of each sub-components. The variable PF3 (Liabilities to other households) was distributed equally among all adult members of the household.

Appendix L: Estimating private pension and life insurance accumulated assets using the Survey on Household Income and Wealth

The SHIW asks households about the value of their accumulated capital private pension and life insurance funds. However, this information is not available in every year and contains lots of missing values. In order to estimate the accumulated reserves into pension and life insurance funds we also resort to additional information about the value of annual payments and contributions into pension funds and life insurance as well as the beginning year of contribution. The information is available at the household level and the information available within annual waves matches precisely the historically harmonized database. The accumulated capital in year t is then computed as the reported or estimated accumulated capital at time t-1 capitalized to time t using a constant 3% return plus the new contributions done between t-1 and t.

For the panel sample of the survey we can compare the reported year when contributions to pension or life insurance funds begins. When the answers are not consistent we consider the first answer available as the 'true' beginning year. If such information is not available or if the information is not consistent with the first reported payment contribution, we consider as the official beginning year of the accumulation, the first year of reported contribution into life insurance (e.g. variable assvita) or pension fund (e.g. variable pensint). If the contributions is reported to begin before the first wave of the survey, we used the year of the first reported contribution as the beginning of the accumulation process (e.g. this would presumably under-estimate the potential asset accumulation of older households).

In some years the variables assvita and pensint do not report any value. However, if any information is reported in both earlier and later years we compute the average between the two values and impute it to the missing observation. In 2016, the survey asks what is the initial contribution to the insurance or the pension fund. If this information is reported we consider this as the correct information to compute accumulated capital.

Appendix M: Accounting for the wealth hidden in offshore accounts

A fraction, perhaps substantial, of financial wealth remains hidden from official statistics and tax agencies. With the help of the wealth management industry and a growing freedom of capital movements, this could generate growing tax revenue losses. Zucman (2013) estimates that the hidden wealth held offshore accounts to \$5.6 trillion, or 10% of the world GDP. The global estimates of portfolio securities held offshore can be derived using two main sources, as described by Zucman (2013). First, one can estimate the total amount of financial wealth managed by Swiss banks on behalf of foreigners (approximately \$2.3 trillion in 2017) using data from the central bank of Switzerland. This is sizeable and the authors suggest this 'data source alone captures a large fraction of the world's total offshore wealth (30–50% in recent years)'. Moreover, to estimate the global amount of offshore portfolio securities, beyond what is held in Switzerland banks, one could track anomalies in global investment statistics, namely the positive discrepancy between global portfolio liabilities and assets, indicating to what extent the portfolio securities are less likely to be reported as assets on the international investment positions of countries.

Until very recently, the information publicly available was not sufficient to reconstruct how the global offshore wealth was distributed across countries and whom this wealth belongs to. The distributional implication of unreported offshoring of wealth was, therefore, difficult to be precisely investigated (see Roine and Waldenstrom, 2008 for a previous attempt to investigate this important issue). A series of recent works, helped to shed light on these important issues.

First, Alstadsæter et al. (2018) approximated the relative distribution of world offshore wealth across countries around 2007. The authors unveil the cross-sectional heterogeneity of the incidence of offshore wealth across different countries in the world. In the abstract of their work the authors write that 'The equivalent of 10% of world GDP is held in tax havens globally, but this average masks a great deal of heterogeneity from a few percent of GDP in Scandinavia, to about 15% in Continental Europe, and 60% in Gulf countries and some Latin American economies'. According to this estimates, Italians held approximately 12% of GDP of financial wealth in offshore accounts in 2007, equivalent to approximately 190 billion of Euro.

This estimate is obtained in two main steps. The most important country-specific information is derived from the Bank for International Settlements who recently disclosed bilateral deposits holdings by foreigners in the most significant offshore financial centers in the world (Switzerland, Hong Kong, Singapore, Cayman Island etc.). In doing so, Alstadsæter et al. (2018) compute the share of total deposits held in most offshore financial centers held by Italians. Bank deposits, however, only account for a small share of total financial wealth held offshore as it excludes portfolios of equities, bonds and mutual fund shares and other securities. In order to overcome this limitation, Alstadsæter et al. (2018) assume the remaining global financial wealth (portfolio securities) held offshore, as estimated in Zucman (2013), is distributed across countries in the same way as offshore bank deposits are. This is clearly an imperfect adjustment although the only feasible one with the current data availability. The authors suggest that "the correlation between the two distributions is likely to be high but imperfect."

To provide an external validation of this tentative estimate an alternative series based on the estimates provided by Pellegrini et al. (2016) who independently attempted to estimate securities financial assets held in offshore centers by investors resident in Italy, Germany, France, the Netherlands, and Spain between 2001 and 2013. In this paper the authors, similarly to what done in Zucman (2013), made use of global discrepancy between the stock of financial assets and liabilities to derive the global stock of financial assets held in offshore centers. The global undeclared amount of undeclared assets was then allocated to different investor countries based on two approaches. The baseline approach distributed undeclared assets according to the official derived liabilities share of each issuing country as declared in the CPIS data (Coordinated Portfolio Investment Survey), implicitly assuming that "investors resident in any given country allocate the unreported foreign wealth to the same portfolio of assets used for the investment of declared wealth" (p.16). This procedure results into an estimated total value of undeclared debt and equity securities of approximately 140 billion Euro in 2007.

In order to compare these figures directly with those provided in Alstadsæter et al. (2018) we further need to estimate the value of undeclared bank deposits held by individual investors in offshore centers. The work by Pellegrini et al. (2016) only derive the global amount of undeclared bank deposits held by non-banking sector in offshore centers as obtained from the cross-border banking statistics released by the Bank of International Settlements. In order to

derive the share of offshore bank deposits held by Italians, we first assume that 1/2 of the undeclared bank deposits are allocated to individuals[59]. We then distribute a share of the global amount of individual bank deposits held offshore according the country's relative share of global GDP. The resulting estimated value of total financial wealth held offshore by Italian investors is approximately 187 billion Euro in 2007. Incidentally this a very similar value to what independently derived by Alstadsæter et al. (2018).

This exercise is carried out also for the remaining years from 2001 to 2013 to derive a time series evolution of Italian financial wealth held in offshore accounts. In order to derive the evolution of offshore wealth for a longer period of time, between 1995 and 2016, we anchor the level of financial wealth held offshore in 2007 as reported in Alstadsæter et al. (2018) and we assume that the time series evolution follows the relative evolution of European offshore wealth. The results indicate that Italian financial wealth held offshore went from 5% of GDP in 1970 to approximately 18% in 2016. We will use the absolute values of this series between 1995 and 2001 and its relative evolution between 2013 and 2016, when no time series and country-specific information can be estimated from Pellegrini et al. (2016).

One important feature to highlight of latter work is the allowance made in their statistics for the voluntary declaration of financial assets held abroad to the Italian tax authority thanks to the Voluntary Disclosure (VD) agreement scheme put in place by the Italian government in 2009/2010. Under very favorable tax and legal conditions, thousands of taxpayers decided to declare approximately 100 billion of financial assets under this VD scheme, leading to subsequent revisions of the official statistics on the international investment positions and the Italian balance of payments.

The resulting final series suggests that Italian financial wealth held in offshore accounts went from 5% of GDP in 1970 to approximately 11% of GDP in 2016. Given the strong relative rise in household wealth over the same period, the choice of the comparator clearly matters. Offshore wealth as a share of total net personal wealth appears to be more stable and oscillating around 2% between 1970 and 2015. The estimation of the time series of financial wealth held offshore by Italian households it is only the first step to investigate its distributional implications. The second step involves the estimation of the share of the financial wealth held offshore that remains undeclared and therefore unaccounted in tax administrative data and the national accounts. The third step requires the estimation of how undeclared financial wealth held offshore is distributed among wealth holders.

Alstadsæter et al. (2019) matched individual tax records on income and wealth to records obtained from tax amnesties in Denmark and Norway as well as recent random leaks from offshore financial institutions (e.g. Panama Papers in 2016 and the "Swiss Leaks" from HSBC Switzerland). The investigation suggests that the 90 to 95% of total wealth held offshore is evading taxes as it goes unreported to tax authorities. Moreover, their findings suggest that

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59. The same share was assumed in Johannesen and Zucman (2014) and appears consistent with more recent works by García Luna and Hardy (2019) who found that at end-March 2019, households (including non-profit institutions serving households) accounted for 51% of Switzerland banks' cross-border liabilities. In the same work, if considering all the countries in the sample, households accounts for only 14% of banks' cross-border liabilities.

FIGURE M.1. The share of financial wealth held offshore as % of GDP, total financial wealth, and total personal net wealth
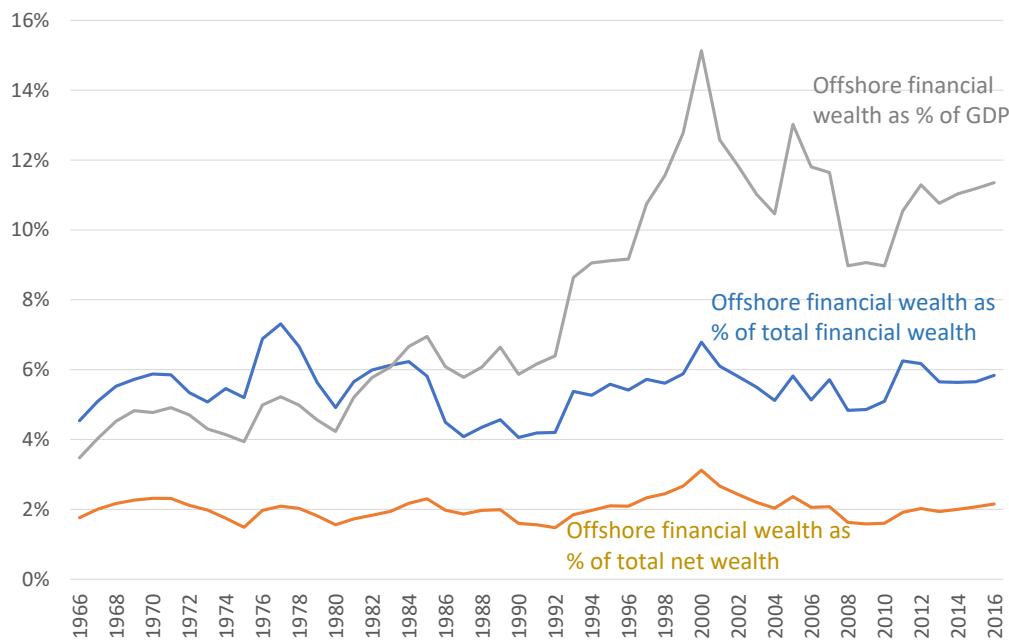
offshore wealth is highly skewed at the top of the wealth distribution being concentrated almost entirely (up to 95%) to the top 1 percent (50% of which being allocated to the richest top 0.01% group alone).

We consequently assume that 95% of offshore wealth is undeclared, this high share is also consistent with data of financial wealth abroad declared to Italian tax authorities in the context of the stamp duty (*IVAFE - Imposta sul Valore delle Attività Finanziare all'Estero*): reported financial wealth held in "black listed" countries in tax year 2016 was only 2.9 billion euros over a total of 114 billion euros of financial wealth held in all foreign countries (source: Italian Ministry of Economy and Finance). Applying the same distribution described above to the Italian data reveals that wealth concentration is even more concentrated than what tax data alone imply. The level of the share of total net wealth held by the richest one percent of the adult population increases by approximately 2 percentage points throughout. This is a sizeable effect that becomes even more visible at the very top of the distribution. The richest one in one thousand individuals saw its share of total net personal wealth increasing by 65% in 1995 (from 1.9 to 3.2 percent) and by 15% in 2016 (from 7.3 to 8.4 percent). The inclusion of unreported offshore financial wealth, however, does not appear to substantially affect the trend of the wealth concentration over the period of investigation.

It would be interesting to observe the future trends of wealth hidden in offshore accounts in the light of the recent achievements in terms of new standards of global exchange of information among tax authorities. While Johannesen and Zucman (2014) find that total bank accounts in International Financial Centers (IFCs) had not declined significantly since the expansion of exchange of information in 2008, more recent OECD work (O'Oreilly et al., 2019) show a significant decline associated to exchange of information on request, automatic exchange of information and FATCA (the US Foreign Account Tax Compliance Act). In particular, automatic exchange of information commencement in 2017 and 2018 is associated with a reduction in IFC bank deposits of 22%. This virtuous process of exchange of information at the international level in the near future might render wealth declared on inheritance tax returns closer to the actual wealth. Further information on this domain can be found on the OECD website[60].

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60. www.oecd.com/tax/exchange-of-tax-information/

Appendix N: Wealth determinants: additional analyses

N.1. Wealth composition across wealth groups

TABLE N.1. Wealth composition across groups - total values and shares: 1995-2008

year	Wealth threshold (thousands 2016 EUR)	Wealth group	Debt (billions 2016 EUR)	Financial & Business assets (billions 2016 EUR)	Deposits & Valuables assets (billions 2016 EUR)	Housing & Land assets (billions 2016 EUR)	Wealth total (billions 2016 EUR)	Debt share	Financial assets share	Deposits & valuables assets share	Housing& land assets share	Wealth total share
1995		Bottom50	239	757	839	830	2429	0,52	0,47	0,53	-0,15	1,00
1995	63	Mid40	68	542	222	1503	2275	1,01	0,36	0,15	-0,05	1,00
1995	281	P90-P95	14	60	22	284	368	1,18	0,25	0,09	-0,06	1,00
1995	386	P95-P99	59	238	52	766	1062	1,10	0,34	0,07	-0,09	1,00
1995	1044	P99.P99.9	14	121	17	186	328	0,87	0,56	0,08	-0,06	1,00
1995	4032	P99.9-P99.99	8	80	10	65	156	0,64	0,79	0,09	-0,08	1,00
1995	11258	Top001	0	1	11	29	41	1,09	0,04	0,40	0,00	1,00
1998		Bottom50	266	558	559	332	1460	0,32	0,53	0,53	-0,25	1,00
1998	94	Mid40	99	1360	334	2042	3732	0,76	0,51	0,12	-0,04	1,00
1998	312	P90-P95	15	107	20	299	429	0,97	0,35	0,07	-0,05	1,00
1998	400	P95-P99	48	330	46	700	1083	0,90	0,42	0,06	-0,06	1,00
1998	1243	P99.P99.9	30	233	25	336	594	0,78	0,55	0,06	-0,07	1,00
1998	4341	P99.9-P99.99	6	93	11	85	189	0,62	0,68	0,08	-0,04	1,00
1998	11993	Top001	4	67	29	12	110	0,15	0,85	0,37	-0,05	1,00
2000		Bottom50	339	1089	634	711	2434	0,39	0,60	0,35	-0,19	1,00
2000	102	Mid40	104	1118	240	1713	3075	0,75	0,49	0,10	-0,05	1,00
2000	321	P90-P95	12	79	19	208	306	0,91	0,35	0,08	-0,05	1,00
2000	460	P95-P99	49	382	73	816	1272	0,86	0,40	0,08	-0,05	1,00
2000	1293	P99.P99.9	58	223	38	345	610	0,76	0,49	0,08	-0,13	1,00
2000	4177	P99.9-P99.99	10	207	15	128	349	0,49	0,79	0,06	-0,04	1,00
2000	17421	Top001	3	140	9	28	178	0,21	1,05	0,07	-0,02	1,00
2006		Bottom50	428	518	566	476	1562	0,35	0,38	0,41	-0,31	1,00
2006	66	Mid40	195	1029	312	2304	3642	0,72	0,32	0,10	-0,06	1,00
2006	377	P90-P95	34	282	71	806	1166	0,79	0,28	0,07	-0,03	1,00
2006	685	P95-P99	79	646	121	1307	2098	0,71	0,35	0,07	-0,04	1,00
2006	1957	P99.P99.9	35	466	62	617	1175	0,60	0,45	0,06	-0,03	1,00
2006	7398	P99.9-P99.99	11	220	44	148	425	0,40	0,59	0,12	-0,03	1,00
2006	22342	Top001	4	108	12	50	267	0,21	0,46	0,05	-0,02	1,00
2008		Bottom50	514	471	543	382	1396	0,30	0,37	0,42	-0,40	1,00
2008	65	Mid40	229	1044	412	2852	4310	0,72	0,26	0,10	-0,06	1,00
2008	412	P90-P95	33	184	64	701	946	0,81	0,21	0,07	-0,04	1,00
2008	665	P95-P99	66	499	124	1244	1868	0,73	0,29	0,07	-0,04	1,00
2008	1645	P99.P99.9	45	475	89	745	1309	0,62	0,40	0,07	-0,04	1,00
2008	6462	P99.9-P99.99	11	193	44	140	377	0,41	0,56	0,13	-0,03	1,00
2008	23796	Top001	1	148	15	21	184	0,12	0,88	0,09	-0,01	1,00
2010		Bottom50	554	356	499	337	1195	0,30	0,32	0,45	-0,49	1,00
2010	58	Mid40	241	892	411	2926	4226	0,74	0,22	0,10	-0,06	1,00
2010	428	P90-P95	33	162	55	576	793	0,77	0,22	0,07	-0,04	1,00
2010	687	P95-P99	60	571	145	1372	2093	0,70	0,29	0,07	-0,03	1,00
2010	1799	P99.P99.9	45	493	99	751	1336	0,60	0,39	0,08	-0,04	1,00
2010	7325	P99.9-P99.99	20	214	34	173	422	0,44	0,54	0,09	-0,05	1,00
2010	18712	Top001	4	102	44	37	183	0,21	0,60	0,26	-0,02	1,00
2012		Bottom50	565	279	455	357	1091	0,34	0,26	0,43	-0,54	1,00
2012	56	Mid40	220	789	399	2761	3950	0,72	0,21	0,10	-0,06	1,00
2012	404	P90-P95	30	189	75	633	894	0,73	0,22	0,09	-0,03	1,00
2012	653	P95-P99	63	550	174	1326	2052	0,67	0,28	0,09	-0,03	1,00
2012	1727	P99.P99.9	35	431	97	625	1155	0,56	0,39	0,09	-0,03	1,00
2012	6234	P99.9-P99.99	18	254	66	164	482	0,35	0,55	0,14	-0,04	1,00
2012	30417	Top001	8	280	53	35	368	0,10	0,79	0,15	-0,02	1,00
2014		Bottom50	523	240	488	400	1127	0,36	0,22	0,44	-0,47	1,00
2014	57	Mid40	216	812	422	2205	3439	0,65	0,24	0,12	-0,06	1,00
2014	375	P90-P95	44	173	98	799	1070	0,76	0,16	0,09	-0,04	1,00
2014	581	P95-P99	57	444	173	1254	1871	0,68	0,24	0,09	-0,03	1,00
2014	1426	P99.P99.9	35	357	94	609	1063	0,58	0,34	0,09	-0,03	1,00
2014	5690	P99.9-P99.99	18	210	33	188	433	0,44	0,49	0,08	-0,04	1,00
2014	31205	Top001	3	559	45	16	617	0,03	0,92	0,07	-0,01	1,00
2016		Bottom50	438	165	393	108	662	0,16	0,25	0,59	-0,66	1,00
2016	50	Mid40	308	1056	570	2522	4148	0,61	0,25	0,14	-0,07	1,00
2016	359	P90-P95	36	173	90	658	921	0,71	0,19	0,10	-0,04	1,00
2016	581	P95-P99	56	481	190	1210	1884	0,64	0,26	0,10	-0,03	1,00
2016	1443	P99.P99.9	34	414	122	608	1147	0,53	0,36	0,11	-0,03	1,00
2016	5422	P99.9-P99.99	17	214	37	132	388	0,34	0,55	0,09	-0,04	1,00
2016	20908	Top001	2	335	16	11	366	0,03	0,92	0,04	-0,01	1,00

TABLE N.2. The evolution of the price index for housing and shares: 1995-2017

year	Housing price index (2010=100) OECD	Shares price index (2010=100) OECD	CPI (OECD) 2016=100
1995	78.1	58.9	66.6
1996	72.6	59.3	69.3
1997	67.8	81.2	70.7
1998	67.9	129.9	72.1
1999	70.3	144.7	73.3
2000	73.7	187.9	75.2
2001	77.6	152.5	77.2
2002	82.7	120.9	79.1
2003	88.6	109.1	81.3
2004	95.1	125.6	83.1
2005	100.2	149.5	84.7
2006	103.9	173.0	86.5
2007	106.9	189.8	88.1
2008	105.4	131.7	91.0
2009	101.9	94.2	91.7
2010	100.0	100.0	93.1
2011	98.5	91.3	95.7
2012	93.5	77.1	98.6
2013	86.4	88.4	99.8
2014	82.1	104.8	100.1
2015	78.8	115.6	100.1
2016	78.9	96.3	100.0
2017	77.1	117.1	101.2
1995-2016 % change	1%	63%	50%
1995-2008 % change	35%	123%	37%

Source: Analytical house prices indicators (Real House Price Indeces) and Monthly Monetary and Financial Statistics (Shares Price Index). Data extracted on 14 Sep 2018 16:00 UTC (GMT) from OECD.Stat.

TABLE N.3. Wealth portfolio decomposition across groups: 1995-2008 and 1995-2016

		billions 2016 EUR							Net wealth growth rate	Decomposition of net wealth growth by asset class				Proportion of net wealth growth of each asset class			
t	P	W_t^P	NW_t^P	Dep_t^P	H_t^P	F_t^P	D_t^P		$\frac{dNW_{t+1}^P}{NW_t^P}$	$\frac{dDep_t^P}{NW_t^P}$	$\frac{dH_t^P}{NW_t^P}$	$\frac{dF_t^P}{NW_t^P}$	$\frac{-dD_t^P}{NW_t^P}$				
year	wealth group	Total gross wealth	Total net wealth	Deposits and Valuables	Housing and Land Assets	Financial and Business Assets	Debt		**Total net wealth**	Deposits and Valuables	Housing and Land Assets	Financial and Business Assets	Debt	Deposits and Valuables	Debt	Housing and Land Assets	Financial and Business Assets
1995	All	6658	6256	1172	3664	1800	403										
2008	All	10390	9491	1292	6085	3013	900	1995-2008	**52%**	*2%*	*39%*	*19%*	*-8%*	4%	-15%	75%	38%
2016	All	9516	8624	1418	5250	2839	892	1995-2016	**38%**	*4%*	*25%*	*17%*	*-8%*	10%	-21%	67%	44%
1995	Bottom 50%	2429	2190	839	830	757	239										
2008	Bottom 50%	1396	882	543	382	471	514	1995-2008	**-60%**	*-13%*	*-20%*	*-13%*	*-13%*	23%	21%	34%	22%
2016	Bottom 50%	662	224	393	108	165	438	1995-2016	**-90%**	*-20%*	*-33%*	*-27%*	*-9%*	23%	10%	37%	30%
1995	Mid 40%	2275	2207	222	1503	542	68										
2008	Mid 40%	4310	4081	412	2852	1044	229	1995-2008	**85%**	*9%*	*61%*	*23%*	*-7%*	10%	-9%	72%	27%
2016	Mid 40%	4148	3840	570	2522	1056	308	1995-2016	**74%**	*16%*	*46%*	*23%*	*-11%*	21%	-15%	62%	32%
1995	Top 10%	1954	1858	111	1330	501	95										
2008	Top 10%	4684	4527	337	2851	1498	157	1995-2008	**144%**	*12%*	*82%*	*54%*	*-3%*	8%	-2%	57%	37%
2016	Top 10%	3785	4560	455	2620	1617	145	1995-2016	**145%**	*19%*	*69%*	*60%*	*-3%*	13%	-2%	48%	41%
1995	Top 1%	524	502	37	281	203	22										
2008	Top 1%	1870	1812	149	906	815	58	1995-2008	**261%**	*22%*	*125%*	*122%*	*-7%*	9%	-3%	48%	47%
2016	Top 1%	1901	1848	175	752	963	53	1995-2016	**268%**	*28%*	*94%*	*151%*	*-6%*	10%	-2%	35%	57%
1995	Top 0,1%	196	188	20	95	82	8										
2008	Top 0,1%	561	548	60	161	340	12	1995-2008	**192%**	*21%*	*35%*	*138%*	*-2%*	11%	-1%	18%	72%
2016	Top 0,1%	754	735	53	143	549	19	1995-2016	**291%**	*17%*	*26%*	*249%*	*-6%*	6%	-2%	9%	85%

Notes: The decomposition exercise of the growth of net wealth follows equation (5). The asset portfolio composition used in the exercise are taken from Table N.1

TABLE N.4. Wealth growth decomposition across groups: Savings vs Capital Gains

		billions 2016 EUR												Net wealth growth rate / Decomposition of net wealth growth by asset class							Proportion of net wealth growth				
t	P	W_t^P	NW_t^P	Dep_t^P	D_t^P	H_t^P	F_t^P	ΔDep_t^P	ΔD_t^P	$q_t^H H_t^P$	$q_t^F F_t^P$	RS_t^P	Period	$\frac{dNW_{t+1}^P}{NW_t^P}$	$\frac{\Delta Dep_t^P}{NW_t^P}$	$\frac{-\Delta D_t^P}{NW_t^P}$	$\frac{q_t^H H_t^P}{NW_t^P}$	$\frac{q_t^F F_t^P}{NW_t^P}$	$\frac{RS_t^P}{NW_t^P}$		Deposits and Valuables	Debt	Capital gains - housing and land assets	Capital gains - financial and business assets	Residual savings
year	wealth group	Total gross wealth	Total net wealth	Deposits and Valuables	Debt	Housing and Land assets	Financial and Business Assets	Deposits and Valuables	Debt	Capital gains - housing and land assets	Capital gains - financial and business assets	Residual Change (residual savings)	Period	Total net wealth	Deposits and Valuables	Debt	Capital gains - housing and land assets	Capital gains - financial and business assets	Residual savings						
1995	All	6658	6256	1172	403	3664	1800																		
2000	All	8223	7649	1029	574	3949	3238	-143	172	-210	3939	-2021													
2008	All	10390	9491	1292	900	6085	3013	264	325	1702	-969	1169													
2012	All	9991	9052	1317	939	5901	2773	25	40	-690	-1249	1515	1995-2008	52%	2.7%	-8.1%	27.4%	36.3%	-6.7%		5%	-16%	53%	70%	-13%
2016	All	9516	8624	1418	892	5250	2839	101	-48	-920	690	-346	1995-2016	38%	3.1%	-6.7%	13.0%	27.2%	1.3%		8%	-18%	34%	72%	4%
1995	Bottom 50%	2429	2190	839	239	830	757																		
2000	Bottom 50%	2434	2094	634	339	711	1089	-205	100	-48	1159	-902													
2008	Bottom 50%	1396	882	543	514	382	471	-90	175	307	-228	-1026													
2012	Bottom 50%	1091	526	455	565	357	279	-88	51	-43	-137	-37	1995-2008	-60%	-10.0%	-11.1%	13.1%	21.9%	-73.6%		17%	18%	-22%	-37%	123%
2016	Bottom 50%	662	224	393	438	108	165	-62	-127	-56	49	-360	1995-2016	-90%	-17.3%	-1.7%	4.5%	15.6%	-91.0%		19%	2%	-5%	-17%	101%
1995	Mid 40%	2275	2207	222	68	1503	542																		
2000	Mid 40%	3075	2971	240	104	1713	1118	18	36	-86	830	39													
2008	Mid 40%	4310	4081	412	229	2852	1044	172	125	739	-234	558													
2012	Mid 40%	3950	3730	399	220	2761	789	-14	-9	-323	-303	279	1995-2008	85%	9.1%	-7.5%	32.3%	22.5%	28.6%		11%	-9%	38%	26%	34%
2016	Mid 40%	4148	3840	570	308	2522	1056	172	88	-431	137	320	1995-2016	74%	11.1%	-8.3%	16.7%	18.1%	36.3%		15%	-11%	23%	24%	49%
1995	Top 10%	1954	1858	111	95	1330	501																		
2000	Top 10%	2714	2584	155	131	1524	1031	-44	35	-76	1098	-216													
2008	Top 10%	4684	4527	157	157	2851	1498	182	26	657	-309	1395													
2012	Top 10%	4951	4796	463	155	2782	1706	126	-2	-323	-621	1084	1995-2008	144%	10.4%	-3.2%	33.0%	36.0%	67.3%		7%	-2%	23%	25%	47%
2016	Top 10%	3785	4560	455	145	2620	1617	-8	-9	-434	424	-227	1995-2016	145%	12.4%	-3.0%	21.5%	32.7%	81.8%		8%	-2%	15%	23%	56%
1995	Top 1%	524	502	37	22	281	203																		
2000	Top 1%	1137	1066	62	70	501	570	25	48	-16	576	27													
2008	Top 1%	1870	1812	149	58	906	815	87	-13	216	-222	653													
2012	Top 1%	2005	1850	215	62	823	966	66	4	-103	-439	518	1995-2008	261%	21.0%	-9.0%	33.9%	94.8%	120.2%		8%	-3%	13%	36%	46%
2016	Top 1%	1901	1848	175	53	752	963	-40	-8	-128	313	-155	1995-2016	268%	22.8%	-8.9%	22.6%	89.7%	141.7%		9%	-3%	8%	33%	53%
1995	Top 0,1%	196	188	20	8	95	82																		
2000	Top 0,1%	527	514	24	13	156	347	4	4	-5	232	100													
2008	Top 0,1%	561	548	60	12	161	340	36	0	67	-135	66													
2012	Top 0,1%	850	788	118	26	198	535	59	14	-18	-183	397	1995-2008	192%	13.7%	-2.3%	18.7%	84.7%	76.9%		7%	-1%	10%	44%	40%
2016	Top 0,1%	754	735	53	19	143	549	-65	-7	-31	-108	144	1995-2016	291%	20.4%	-4.8%	16.6%	59.4%	199.2%		7%	-2%	6%	20%	68%

Notes: The decomposition exercise of the growth of net wealth follows equation (7). Capital gains for housing and financial assets were computed using Real House Price Index and Shares Price Index from OECD.Stat as described in Table N.2. The asset portfolio composition used in the exercise are taken from Table. N.1

N.2. Wealth shares and asset price changes

FIGURE N.1. The role of asset prices and the households saving rate
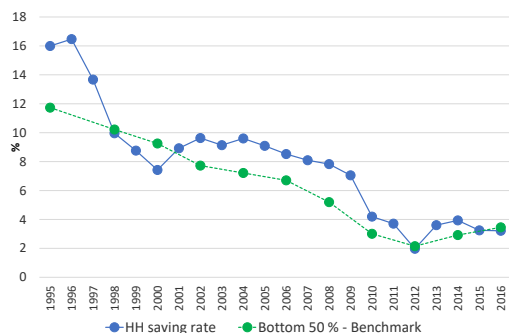
(a) Bottom 50% and the household saving rate
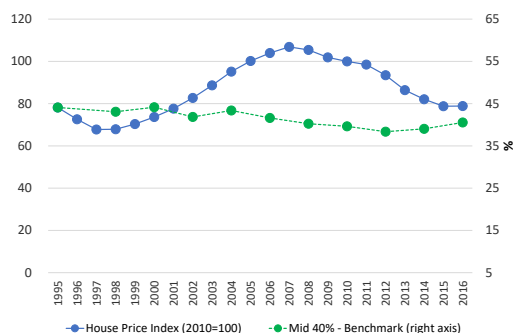
(b) Mid 40% and the house price index
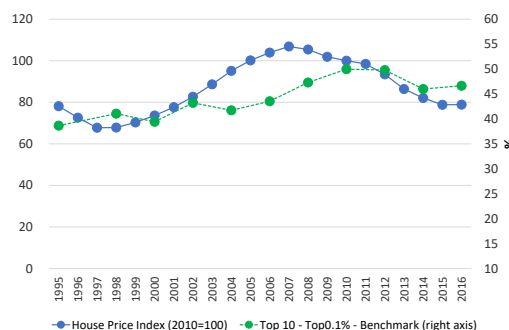
(c) Top 10 - Top 0.1% and the house price index
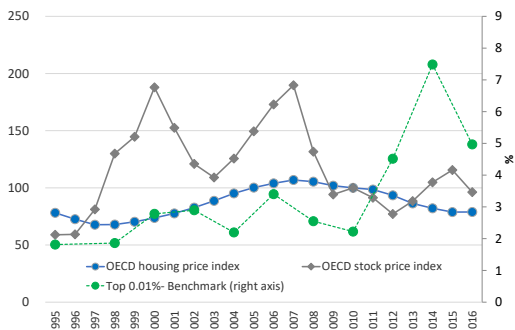
(d) Top 0.01%, the house price and the stock price indexes

Source: Real House Price Indeces and Shares Price Index from OECD.Stat as described in Table N.2.

Appendix O: Wealth concentration with alternative imputation decisions

In this paper we rely on a number of assumptions based on the observed wealth holdings aggregated by the four large macro-categories of assets available in the digitized tax records. These imputations could not be carried out asset by asset based on micro-level evidence and can appear controversial. For the benchmark series, we recall, (i) we first multiply-up the estates distribution using mortality multipliers; (ii) we then append an estimate of the wealth of the missing population based on the households' survey; and finally (iii) we distribute the remaining wealth gap with respect to the NA according to the relative distribution of asset classes in the identified wealth from tax records complemented with that of the missing population from survey data.

One must wonder to what extent the benchmark results are driven by specific imputation choices in steps (ii) and (iii). To address this concern we discuss here two alternative imputation scenarios, doing as in the benchmark case but making changes in the second (ii) and third (iii) steps.

In the first alternative approach, the relative distribution of each asset class, used for imputing the unobserved wealth from the national accounts, are derived from the estimated distribution of wealth of the living without allowing for the wealth of the missing population. In the second alternative approach, instead, we impute the wealth gap using the relative distribution derived from the estimated distribution of wealth of the living allowing for the wealth of the missing population. In doing so, we follow very closely the approach used for the benchmark series. However, we use slightly different estimates of the wealth of the missing population. Rather than adjusting the information reported on the survey data regarding the non-housing assets as done in our benchmark approach, we take the reported values of asset holding as it is.

Essentially, both approaches attach more weight to wealth reported in the tax records, which is on average more concentrated than what would appear if one takes into consideration smaller wealth holdings that cannot come to notice to the tax authority. Hence, the alternative set of imputations, when compared to our benchmark series, generally imply higher wealth concentration at the top and a lower share for the bottom 50% of the population (figures O.1(a)- O.1(d)). In this respect, our benchmark series is likely to provide conservative estimates of wealth concentration at the top.

FIGURE O.1. Wealth shares with alternative imputation procedures

(a) Top 10 %

(b) Top 1 %
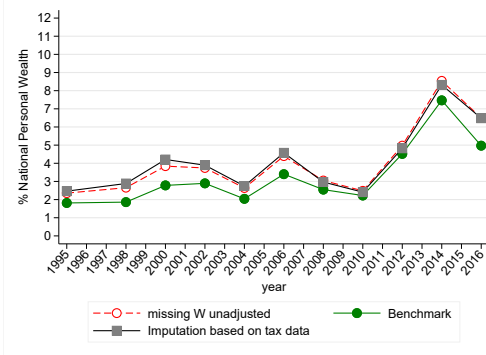
(c) Top 0.01 %
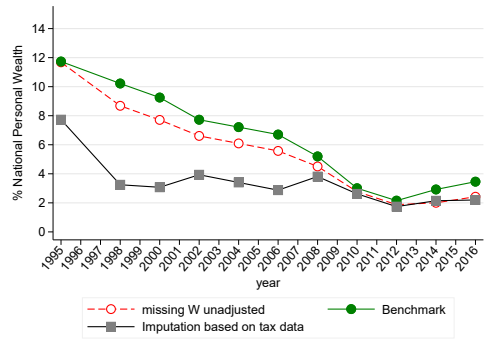
(d) Bottom 50%

FIGURE O.2. Proportional distribution of assets by types and wealth ranges: benchmark approaches compared to alternative assumptions in 2016
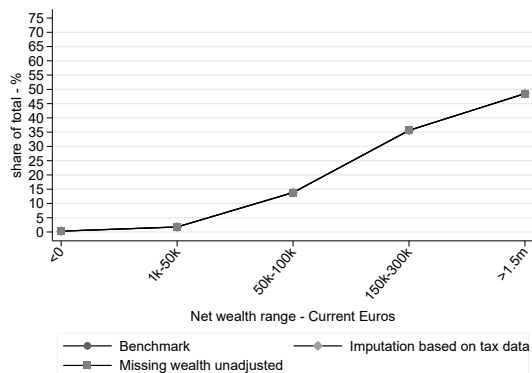
(a) Housing and land assets
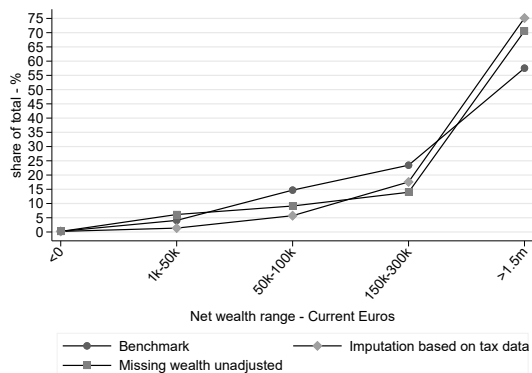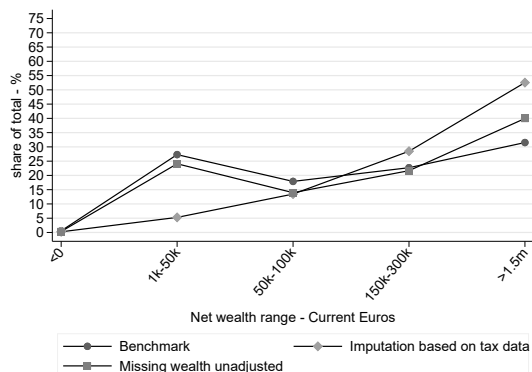
(b) Financial and private business assets

(c) Valuables and deposits
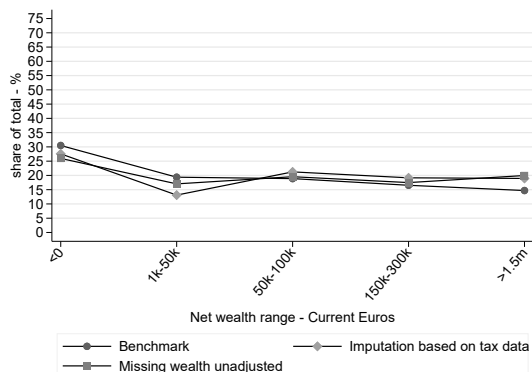
(d) Liabilities

Note: The graph shows a simplified representation, for each class of assets, of the proportions of total assets held across the wealth groups (ranked across total net wealth). These proportional factors are used to impute missing assets and liabilities and matching aggregates with the relevant series of the household's sector balance sheets. The figure presents, for the year 2016, three alternative imputation factors. In the benchmark approach we impute wealth using the relative distribution derived from the estimated distribution of wealth of the living allowing for the wealth of the missing population from the SHIW, adjusted for potential underreporting. In an alternative approach we allow for the wealth of the missing population from the SHIW taking the information on the SHIW as given, making no adjustments. In the third alternative approach, the relative distribution of each asset class, are derived from the estimated distribution of wealth of the living, directly from inheritance tax data without allowing for the wealth of the missing population.

Appendix P: Estimates with no imputations

We derive estimates of wealth shares without resorting to imputations of any kind, that is, by applying the mortality method to the reported estates on the inheritance tax records. As mentioned in the main text of the paper, estimates for the UK in Atkinson and Harrison (1978) and Alvaredo et al. (2018), for instance, followed this path. Importantly, this can be done using both *internal* and *external* wealth totals. Typically, researchers use external data (e.g., the National Accounts) on total wealth that bear no relation to tax data. However, when the population coverage of inheritance tax records is particularly high (like in the case of Italy or the UK), one can also rely on the multiplied-up estates as well as the estimated wealth of the missing population to derive an internal measure for total wealth (as in Alvaredo et al., 2018, Atkinson and Harrison, 1978).

In the main text we presented the results for the top 1% share. Here, additional wealth shares are reported in Figures P.1(a)-P.1(d). The role of imputations appears stronger when the external total is used, especially in those years where the underlying inheritance tax data are much less complete (i.e., between 2001 and 2006). The derivation of the bottom 50% share appears to be particularly sensitive to imputations and the use of an external total.

FIGURE P.1. Wealth shares without imputations vs. benchmark series

(a) Top 10 %

(b) Top 0.1 %

(c) Top 0.01 %

(d) Bottom 50%
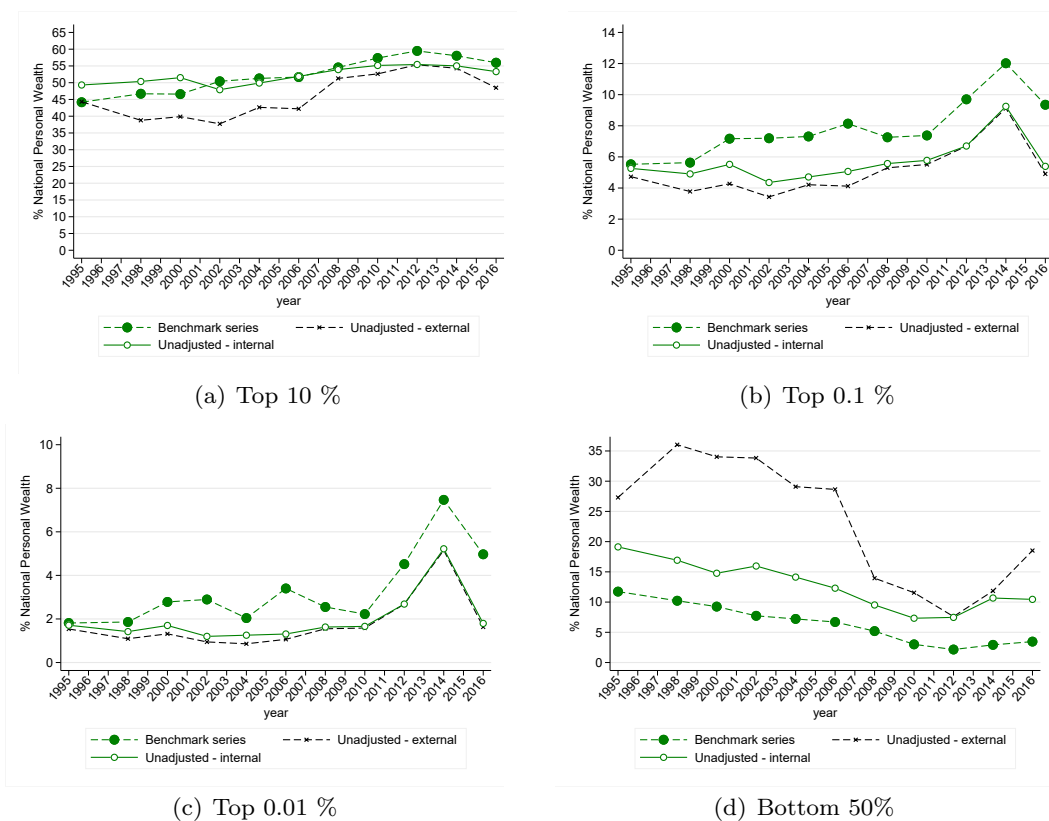
FIGURE P.2. The Top 1% without imputations vs. SHIW
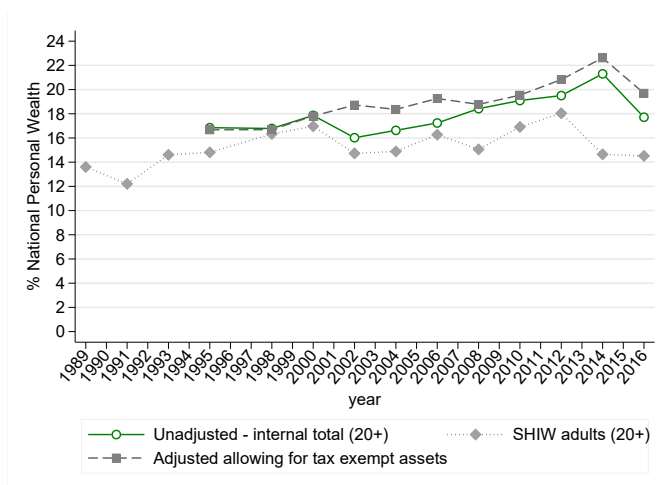
## P.1. External total: Total net wealth excluding likely unreported tax exempt assets

This is obtained by subtracting an estimate of unreported tax-exempt assets from the total net wealth from the households sector. To derive a measure of unreported tax-exempt assets we use the tax code and practice in filing. In particular, the missing tax-exempt financial assets are derived as follows: 100% of insurance technical reserves value (e.g. private pensions, life insurance and accumulated reserves for severance payments are non-taxable assets according to the inheritance and gift tax legislation), 50% of Italian government securities (e.g. the government bonds are tax exempt and the tax authority suggest to include them in the tax form, and they are typically reported if bonds are included within an investment fund together with other securities), 90% of notes and coins (e.g. we assume that most of cash holding is not reported, as generally done by the tax authority who assumes that 10% of total estate is held in cash to compute tax liability). During the months when inheritance and gift tax was abolished (October 2001 to October 2006), we assume that 100% of above-mentioned assets are not reported.

P.2. Internal total: total net wealth identified from tax returns corrected for the wealth of the missing population

The internal measure of total net wealth is computed by adding an estimate of the wealth of the missing population (i.e. those not represented by the inheritance tax information, scaled-up according to the mortality multiplier method) to the net wealth of the identified population. The estimation of the wealth of the missing population is described in Appendix H.1.

Appendix Q: Alternative mortality rates

Q.1. The application of mortality rates by refined age groups

To check whether our main results are robust to the use of more refined mortality multipliers we make use of tabulations containing finer disaggregation by geographical location and age classes (every 5 years, from under 5 to 100 years old and above) which were provided to us for a subset of years, namely for 1995 and for the post-2012 period. Multipliers in 1995 were lower in the north of the country compared to the south and the islands. By 2016 it was the opposite. Theoretically, not accounting for such heterogeneity may bias downward the increasing trend in wealth concentration, given that the northern areas are the wealthiest.

We conduct this robustness exercise on the estate tabulations where no imputations are carried out. Figure Q.1 shows that the main results for top 1% are robust in the presence of such refinements confirming that the use of more coarse age groups has a negligible effect on the application of the mortality multiplier method.

FIGURE Q.1. Top 1% derived using mortality multipliers based on more refined age groups and geographical areas
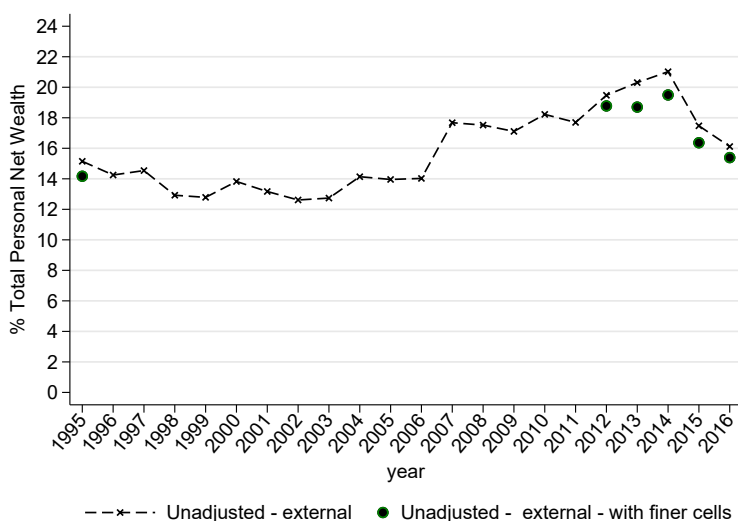
Note: The graph compares the unadjusted series with no imputation and external wealth total to a top 1% derived using more refined mortality multipliers and making use of estate tabulations containing finer disaggregation by geographical location and age classes (every 5 years, from under 5 to 100 years old and above). The refined tabulations were only available for a subset of years, namely for 1995 and for the post-2012 period. Tabulations were also differentiated across three main macro areas: North, South and Islands, and Center.

Q.2. The application of mortality rates by wealth level of education groups

FIGURE Q.2. Mortality rates and life expectancy by age and education groups: 2012
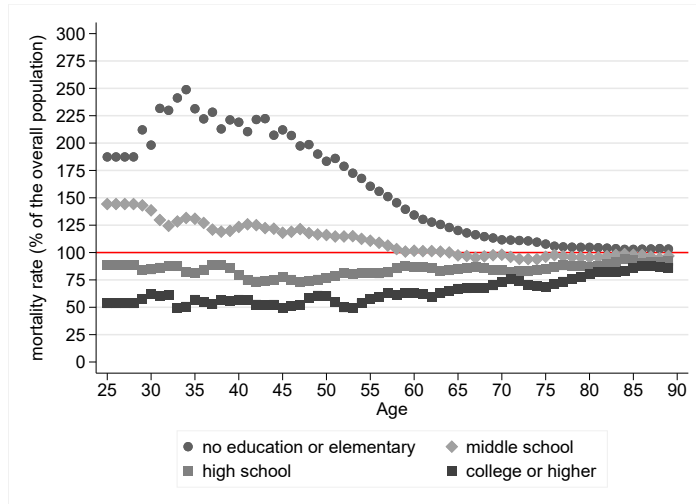
(a) Mortality rates by age and education groups (% of the population)
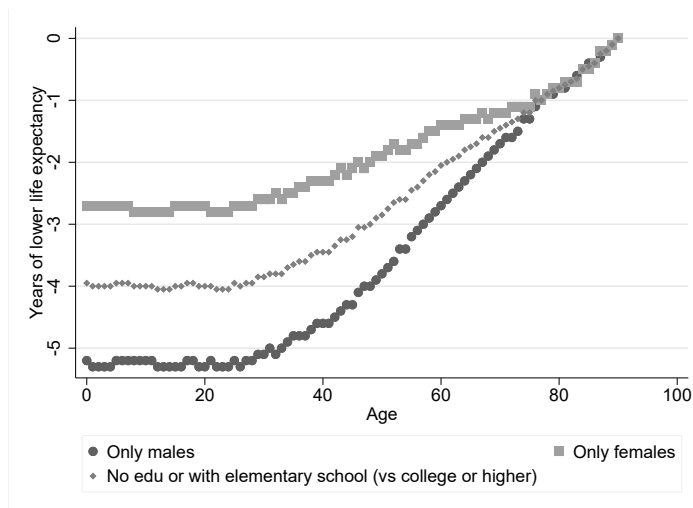
(b) Number of years of lower life expectancy (low vs high education groups)

Notes: data on mortality rates and life expectation from ISTAT. Elaboration of the authors.

TABLE Q.1. 2012 Mortality rates by education level as a share of overall population

Age group	Mortality rate in population - percent	No education or elementary (%)	Middle School (%)	High school (%)	College or higher (%)
			All		
20	0.0005	208.8	119.9	92.2	67.6
40	0.0013	196.9	118.8	77.5	61.7
50	0.0034	150.6	106.6	83.9	64.3
60	0.0090	115.9	98.6	87.2	70.6
70	0.0252	106.1	95.3	85.9	75.9
80	0.0948	102.7	95.7	91.4	86.6
			Females		
20	0.0003	243.7	108.2	99.6	75.3
40	0.0010	181.7	116.0	81.8	73.8
50	0.0025	134.2	102.4	86.9	75.5
60	0.0061	106.7	99.2	90.9	79.9
70	0.0180	103.6	94.3	86.1	80.4
80	0.0780	102.3	93.5	89.8	85.5
			Males		
20	0.0006	193.8	125.0	89.0	64.3
40	0.0016	206.0	120.4	74.9	54.5
50	0.0044	159.8	108.9	82.3	58.1
60	0.0118	120.5	98.4	85.4	65.9
70	0.0324	107.4	95.8	85.7	73.4
80	0.1117	103.0	97.3	92.5	87.4

Notes: data on mortality rates from ISTAT. Elaboration of the authors.

Appendix R: The distribution of wealth left at death and lifetime wealth transfers

In this section we provide evidence about the distribution of estates left at death and about the the inheritances and lifetime gifts received by heirs. We rely on the benchmark wealth distribution of the entire population reconciled with the national household's balance sheet as derived in the paper with total wealth holdings by gender, location, and age groups. Each wealth group is multiplied with the relevant mortality rate (as estimated by the national statistical office - ISTAT). Such exercise represents a reverse engineering of the mortality multiplier method, estimating the entire deceased population and its wealth holdings every year.

To derive information about the recipient distribution we assume that every estate is split equally between two heirs. We also add the lifetime donations to the total estate value as reported on tax records allowing us to obtain the distribution of lifetime wealth transfers.

We also report measures of top shares and the relevant percentile thresholds for both estates and lifetime wealth transfers.

TABLE R.1. The distribution of estates left at death - adjusted values

Year	Range of Estates - 2016 €	Number of decedents	Net estate (billion - 2016 €)	Total number of decedents	Total net estates (billion - 2016 €)	Overall Mean Net estates - 2016 €	Share of total decedents (%)	Share of total net estate (%)
1995	<0-50k	352906	13,37	593181	85,77	144597	59,49	15,59
1995	50k-300k	214276	42,18	593181	85,77	144597	36,12	49,18
1995	300k-500k	13753	7,93	593181	85,77	144597	2,32	9,24
1995	500k-1mln	8267	8,47	593181	85,77	144597	1,39	9,88
1995	1mln-1.5mln	2155	3,98	593181	85,77	144597	0,36	4,64
1995	1.5mln-5mln	1628	6,35	593181	85,77	144597	0,27	7,41
1995	5mln-10mln	151	1,60	593181	85,77	144597	0,03	1,87
1995	>10mln	46	1,88	593181	85,77	144597	0,01	2,19
1998	<0-50k	260307	8,36	574742	102,13	177695	45,29	8,19
1998	50k-300k	279867	53,20	574742	102,13	177695	48,69	52,09
1998	300k-500k	16329	9,37	574742	102,13	177695	2,84	9,17
1998	500k-1mln	11990	11,79	574742	102,13	177695	2,09	11,55
1998	1mln-1.5mln	2787	4,95	574742	102,13	177695	0,48	4,85
1998	1.5mln-5mln	3067	9,37	574742	102,13	177695	0,53	9,17
1998	5mln-10mln	343	3,22	574742	102,13	177695	0,06	3,15
1998	>10mln	51	1,87	574742	102,13	177695	0,01	1,83
2000	<0-50k	199016	3,92	567956	106,15	186891	35,04	3,69
2000	50k-300k	326055	54,10	567956	106,15	186891	57,41	50,97
2000	300k-500k	20322	10,34	567956	106,15	186891	3,58	9,75
2000	500k-1mln	15742	14,09	567956	106,15	186891	2,77	13,28
2000	1mln-1.5mln	3398	5,90	567956	106,15	186891	0,60	5,56
2000	1.5mln-5mln	2921	8,60	567956	106,15	186891	0,51	8,10
2000	5mln-10mln	353	3,40	567956	106,15	186891	0,06	3,21
2000	>10mln	149	5,78	567956	106,15	186891	0,03	5,44
2006	<0-50k	243634	5,23	573215	144,49	252075	42,50	3,62
2006	50k-300k	246506	43,20	573215	144,49	252075	43,00	29,90
2006	300k-500k	37230	16,99	573215	144,49	252075	6,49	11,76
2006	500k-1mln	26375	20,63	573215	144,49	252075	4,60	14,28
2006	1mln-1.5mln	7662	10,40	573215	144,49	252075	1,34	7,20
2006	1.5mln-5mln	10512	27,52	573215	144,49	252075	1,83	19,05
2006	5mln-10mln	990	9,04	573215	144,49	252075	0,17	6,26
2006	>10mln	307	11,48	573215	144,49	252075	0,05	7,95
2008	<0-50k	244966	3,91	622628	143,38	230286	39,34	2,73
2008	50k-300k	273234	44,59	622628	143,38	230286	43,88	31,10
2008	300k-500k	53266	21,86	622628	143,38	230286	8,56	15,25
2008	500k-1mln	30792	22,49	622628	143,38	230286	4,95	15,68
2008	1mln-1.5mln	10545	13,42	622628	143,38	230286	1,69	9,36
2008	1.5mln-5mln	8470	21,97	622628	143,38	230286	1,36	15,32
2008	5mln-10mln	1061	7,19	622628	143,38	230286	0,17	5,02
2008	>10mln	294	7,95	622628	143,38	230286	0,05	5,55
2010	<0-50k	257077	3,79	644018	150,28	233354	39,92	2,53
2010	50k-300k	275889	43,47	644018	150,28	233354	42,84	28,92
2010	300k-500k	53348	21,44	644018	150,28	233354	8,28	14,27
2010	500k-1mln	35424	25,65	644018	150,28	233354	5,50	17,07
2010	1mln-1.5mln	11563	14,88	644018	150,28	233354	1,80	9,90
2010	1.5mln-5mln	9356	24,73	644018	150,28	233354	1,45	16,46
2010	5mln-10mln	980	7,44	644018	150,28	233354	0,15	4,95
2010	>10mln	382	8,87	644018	150,28	233354	0,06	5,90
2012	<0-50k	247549	2,83	649959	155,71	239568	38,09	1,82
2012	50k-300k	288122	43,21	649959	155,71	239568	44,33	27,75
2012	300k-500k	54788	21,67	649959	155,71	239568	8,43	13,92
2012	500k-1mln	37114	26,14	649959	155,71	239568	5,71	16,79
2012	1mln-1.5mln	11527	14,94	649959	155,71	239568	1,77	9,60
2012	1.5mln-5mln	9291	24,09	649959	155,71	239568	1,43	15,47
2012	5mln-10mln	1176	8,30	649959	155,71	239568	0,18	5,33
2012	>10mln	392	14,54	649959	155,71	239568	0,06	9,34
2014	<0-50k	242461	1,59	643520	145,18	225602	37,68	1,09
2014	50k-300k	282302	41,50	643520	145,18	225602	43,87	28,58
2014	300k-500k	62356	23,86	643520	145,18	225602	9,69	16,43
2014	500k-1mln	34507	23,07	643520	145,18	225602	5,36	15,89
2014	1mln-1.5mln	12867	16,00	643520	145,18	225602	2,00	11,02
2014	1.5mln-5mln	7833	20,05	643520	145,18	225602	1,22	13,81
2014	5mln-10mln	749	5,13	643520	145,18	225602	0,12	3,53
2014	>10mln	444	13,99	643520	145,18	225602	0,07	9,64
2016	<0-50k	268419	2,31	693499	154,93	223404	38,71	1,49
2016	50k-300k	303921	46,10	693499	154,93	223404	43,82	29,76
2016	300k-500k	62448	23,88	693499	154,93	223404	9,00	15,41
2016	500k-1mln	37904	25,53	693499	154,93	223404	5,47	16,48
2016	1mln-1.5mln	11910	15,32	693499	154,93	223404	1,72	9,89
2016	1.5mln-5mln	7684	19,90	693499	154,93	223404	1,11	12,85
2016	5mln-10mln	814	5,52	693499	154,93	223404	0,12	3,56
2016	>10mln	399	16,36	693499	154,93	223404	0,06	10,56

Notes: The distribution of adjusted estates left at death is derived as following: the benchmark wealth distribution of the entire population reconciled with the national household's balance sheet by gender, location, and age groups is multiplied with the relevant mortality rate (as estimated by the national statistical office - ISTAT) and regrouped.

TABLE R.2. Top estates shares - adjusted values

Year	Top 10%	Top 5%	Top 1%	Top 0,5%	Top 0,1%	Top 0,05%	P90 - threshold €	P95 - threshold €	P99 - threshold €	P99.5 - threshold €	P99.9 - threshold €	P99.95 - threshold €
1995	44,52	34,49	17,75	13,09	6,20	4,50	185937	285439	798016	1201105	2871519	4350045
1996												
1997												
1998	46,11	35,06	17,44	12,32	5,73	4,02	246782	369013	1054693	1613141	3460139	6111170
1999												
2000	47,11	36,52	19,46	14,68	8,52	6,53	253281	406332	1118282	1699114	4636993	8050764
2001												
2002	42,47	33,60	16,56	12,56	6,59	4,99	279851	640449	1365533	3241002	6000091	9790918
2003												
2004	46,09	35,39	17,88	13,12	6,32	4,51	403163	647747	1764857	2581841	6895540	10505874
2005												
2006	45,60	34,95	17,73	13,07	6,58	4,87	415769	745435	2179107	3376816	8763015	11113835
2007												
2008	49,86	38,12	19,04	14,15	6,73	5,16	462641	774013	2080682	2882205	6628258	10073532
2009												
2010	50,81	38,82	19,35	14,24	6,67	4,80	495874	812631	2298047	3028751	8230044	11220128
2011												
2012	53,72	41,97	22,85	17,76	10,06	8,11	487874	784708	2133580	3515103	7956617	12487201
2013												
2014	51,13	39,62	21,48	16,71	9,83	7,90	479733	761285	1937881	3175344	8257895	13758595
2015												
2016	50,46	39,42	22,11	17,59	10,99	9,22	483950	779373	2020145	3158932	7748275	11380024

Notes: The distribution of adjusted estates left at death is derived as following: the benchmark wealth distribution of the entire population reconciled with the national household's balance sheet by gender, location, and age groups is multiplied with the relevant mortality rate (as estimated by the national statistical office - ISTAT) and regrouped.

TABLE R.3. The distribution of wealth transfers (inheritances and lifetime gifts received) - adjusted values

Year	Range of net wealth transfers received - 2016 €	Number of heirs	Net wealth transfers (billion - 2016 €)	Total number of heirs	Total net wealth transfers (billion - 2016 €)	Overall Mean net wealth transfers - 2016 €	Share of total heirs (%)	Share of total net wealth transfers (%)
1995	<0-50k	705813	13,49	1186362	86,17	72632	59,49	15,65
1995	50k-300k	445915	46,90	1186362	86,17	72632	37,59	54,43
1995	300k-500k	19394	7,51	1186362	86,17	72632	1,63	8,71
1995	500k-1mln	10919	7,73	1186362	86,17	72632	0,92	8,97
1995	1mln-1.5mln	1717	2,15	1186362	86,17	72632	0,14	2,50
1995	1.5mln-5mln	2329	5,43	1186362	86,17	72632	0,20	6,30
1995	5mln-10mln	190	1,14	1186362	86,17	72632	0,02	1,33
1995	>10mln	85	1,81	1186362	86,17	72632	0,01	2,10
1998	<0-50k	602175	11,65	1149484	102,59	89250	52,39	11,36
1998	50k-300k	501371	56,49	1149484	102,59	89250	43,62	55,06
1998	300k-500k	22864	8,67	1149484	102,59	89250	1,99	8,45
1998	500k-1mln	16152	11,27	1149484	102,59	89250	1,41	10,99
1998	1mln-1.5mln	4046	4,90	1149484	102,59	89250	0,35	4,77
1998	1.5mln-5mln	2511	6,28	1149484	102,59	89250	0,22	6,12
1998	5mln-10mln	288	1,66	1149484	102,59	89250	0,03	1,62
1998	>10mln	77	1,68	1149484	102,59	89250	0,01	1,64
2000	<0-50k	639381	14,06	1135912	106,64	93878	56,29	13,18
2000	50k-300k	444546	52,58	1135912	106,64	93878	39,14	49,31
2000	300k-500k	28494	10,57	1135912	106,64	93878	2,51	9,91
2000	500k-1mln	16646	11,58	1135912	106,64	93878	1,47	10,86
2000	1mln-1.5mln	4165	5,18	1135912	106,64	93878	0,37	4,86
2000	1.5mln-5mln	2035	4,90	1135912	106,64	93878	0,18	4,59
2000	5mln-10mln	467	3,03	1135912	106,64	93878	0,04	2,84
2000	>10mln	178	4,73	1135912	106,64	93878	0,02	4,43
2006	<0-50k	632283	12,17	1146431	144,73	126244	55,15	8,41
2006	50k-300k	430108	55,70	1146431	144,73	126244	37,52	38,49
2006	300k-500k	42259	16,90	1146431	144,73	126244	3,69	11,67
2006	500k-1mln	28245	20,95	1146431	144,73	126244	2,46	14,47
2006	1mln-1.5mln	5512	7,38	1146431	144,73	126244	0,48	5,10
2006	1.5mln-5mln	7046	18,18	1146431	144,73	126244	0,61	12,56
2006	5mln-10mln	654	4,20	1146431	144,73	126244	0,06	2,90
2006	>10mln	324	9,26	1146431	144,73	126244	0,03	6,40
2008	<0-50k	629495	9,99	1245257	143,95	115601	50,55	6,94
2008	50k-300k	531080	65,82	1245257	143,95	115601	42,65	45,73
2008	300k-500k	41764	16,28	1245257	143,95	115601	3,35	11,31
2008	500k-1mln	29173	20,19	1245257	143,95	115601	2,34	14,03
2008	1mln-1.5mln	7669	9,45	1245257	143,95	115601	0,62	6,56
2008	1.5mln-5mln	5390	13,75	1245257	143,95	115601	0,43	9,55
2008	5mln-10mln	529	4,40	1245257	143,95	115601	0,04	3,06
2008	>10mln	156	4,07	1245257	143,95	115601	0,01	2,83
2010	<0-50k	643263	9,17	1288036	150,97	117207	49,94	6,08
2010	50k-300k	551211	66,08	1288036	150,97	117207	42,79	43,77
2010	300k-500k	44198	17,06	1288036	150,97	117207	3,43	11,30
2010	500k-1mln	31057	20,19	1288036	150,97	117207	2,41	13,37
2010	1mln-1.5mln	11492	13,90	1288036	150,97	117207	0,89	9,21
2010	1.5mln-5mln	5954	15,13	1288036	150,97	117207	0,46	10,02
2010	5mln-10mln	714	5,56	1288036	150,97	117207	0,06	3,68
2010	>10mln	148	3,89	1288036	150,97	117207	0,01	2,58
2012	<0-50k	665725	9,33	1299918	156,47	120371	51,21	5,96
2012	50k-300k	533257	63,69	1299918	156,47	120371	41,02	40,70
2012	300k-500k	53937	20,15	1299918	156,47	120371	4,15	12,88
2012	500k-1mln	32677	23,03	1299918	156,47	120371	2,51	14,72
2012	1mln-1.5mln	6651	8,30	1299918	156,47	120371	0,51	5,30
2012	1.5mln-5mln	6769	16,77	1299918	156,47	120371	0,52	10,72
2012	5mln-10mln	536	4,04	1299918	156,47	120371	0,04	2,58
2012	>10mln	366	11,17	1299918	156,47	120371	0,03	7,14
2014	<0-50k	660531	7,74	1287039	146,09	113512	51,32	5,30
2014	50k-300k	538642	66,46	1287039	146,09	113512	41,85	45,49
2014	300k-500k	44064	16,33	1287039	146,09	113512	3,42	11,18
2014	500k-1mln	32410	22,41	1287039	146,09	113512	2,52	15,34
2014	1mln-1.5mln	4462	5,34	1287039	146,09	113512	0,35	3,66
2014	1.5mln-5mln	6002	13,52	1287039	146,09	113512	0,47	9,25
2014	5mln-10mln	767	5,29	1287039	146,09	113512	0,06	3,62
2014	>10mln	160	9,00	1287039	146,09	113512	0,01	6,16
2016	<0-50k	707483	8,61	1386998	155,92	112413	51,01	5,52
2016	50k-300k	588086	71,05	1386998	155,92	112413	42,40	45,57
2016	300k-500k	49681	18,63	1386998	155,92	112413	3,58	11,95
2016	500k-1mln	29160	20,34	1386998	155,92	112413	2,10	13,05
2016	1mln-1.5mln	5921	7,01	1386998	155,92	112413	0,43	4,49
2016	1.5mln-5mln	5870	13,82	1386998	155,92	112413	0,42	8,86
2016	5mln-10mln	599	4,34	1386998	155,92	112413	0,04	2,79
2016	>10mln	198	12,12	1386998	155,92	112413	0,01	7,77

Notes: To derive information about the recipient distribution we assume that every estate is split equally between two heirs. We also add the lifetime donations to the total estate value as reported on tax records allowing us to obtain the distribution of lifetime wealth transfers.

TABLE R.4. Top wealth transfers shares (inheritances and lifetime gifts received) - adjusted values

Year	Top 10%	Top 5%	Top 1%	Top 0,5%	Top 0,1%	Top 0,05%	P90 - threshold €	P95 - threshold €	P99 - threshold €	P99.5 - threshold €	P99.9 - threshold €	P99.95 - threshold €
1995	49,41	38,89	19,05	14,07	6,67	4,92	86482	137058	391953	602720	1371975	1911417
1996												
1997												
1998	50,76	37,89	18,23	12,97	5,80	4,14	116616	189468	524378	757132	1919170	2527797
1999												
2000	52,16	39,52	20,69	15,66	9,06	6,93	128659	206938	560929	855613	1791934	3054023
2001												
2002	47,04	36,65	17,91	13,59	7,24	5,37	164242	319069	781438	1565123	3505714	4961483
2003												
2004	51,06	38,61	19,34	14,20	6,95	4,85	171159	314028	821646	1220441	3327494	5185167
2005												
2006	50,51	38,13	19,18	14,14	7,23	5,24	214352	384304	1105977	1683401	3692892	5409083
2007												
2008	55,26	41,97	21,01	15,57	7,72	5,66	195767	354370	1011848	1402608	3332077	4858459
2009												
2010	56,89	43,24	21,72	15,87	7,62	5,45	218583	385479	1040684	1442423	3682226	5380164
2011												
2012	58,46	45,50	24,83	19,24	10,92	8,78	217544	384024	1037778	1585517	3802639	5942958
2013												
2014	56,92	43,89	23,67	18,49	10,92	8,69	207632	372853	940396	1570518	4115822	5782337
2015												
2016	57,18	44,25	24,70	19,66	12,23	10,19	207175	359747	946780	1465016	3658285	5366860

Notes: To derive information about the recipient distribution we assume that every estate is split equally between two heirs. We also add the lifetime donations to the total estate value as reported on tax records allowing us to obtain the distribution of lifetime wealth transfers.

Appendix S: Wealth held in trusts

In Italy, incomes accrued to "opaque" trusts (i.e. national and foreign trusts operating in Italy whose beneficiaries are not identified) are taxed annually under Corporate Income Tax (CIT) directly at the trust level. Incomes accrued to "transparent" trusts (i.e. national or foreign trusts whose resident beneficiaries are identified) are passed-through to the beneficiaries and taxed under Personal Income Tax at the individual level. However, in both cases some forms of investment incomes might be subject to substitute taxation (i.e. withdrawn at the source), and not captured neither in CIT or PIT tax returns.

The number of trusts operating in Italy and required to file a tax record increased from 65 in 2009 to 151 in 2019 (14 of which were foreign trusts) according to data accessed at the Ministry of Economy and Finance. Using the universe of income tax files, we can observe the capital incomes accrued to "transparent" trusts (i.e. national or foreign trusts whose resident beneficiaries are identified) that are passed-through (i.e. imputed) to the beneficiaries and taxed under Personal Income Tax at the individual level. Moreover, we could also observe capital incomes accrued to "opaque" trusts (i.e. national and foreign trusts operating in Italy whose beneficiaries are not identified) which are taxed annually under Corporate Income Tax (CIT) directly at the trust level. Capital incomes from transparent trusts account on average for 89% of total capital incomes from trusts observed in tax records. Total capital incomes from trusts are then capitalized to derive a total wealth value in the range of €166 and 332 million for the year 2016 and between €263 and 526 million.[61] Such estimated wealth values account for between 0.002% and 0.004% of total net personal wealth in 2016 for additional details on capital incomes from trusts and the estimates of wealth held in trusts).
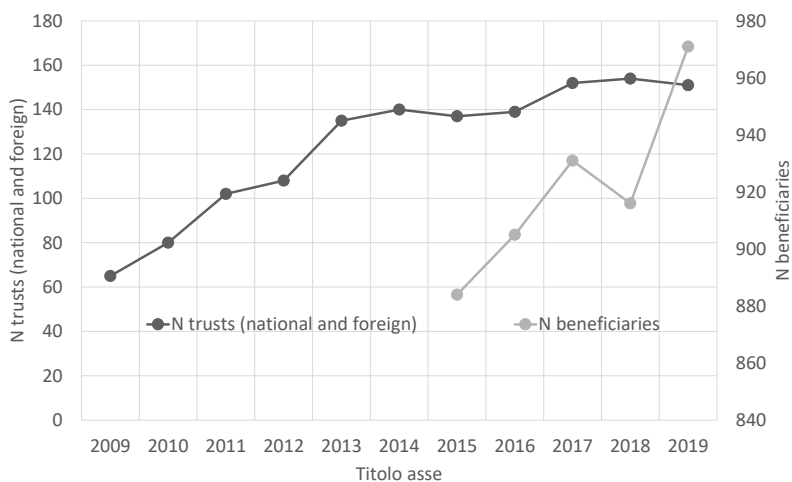
TABLE S.1. Estimates of personal wealth held in trusts - evidence from the tax records

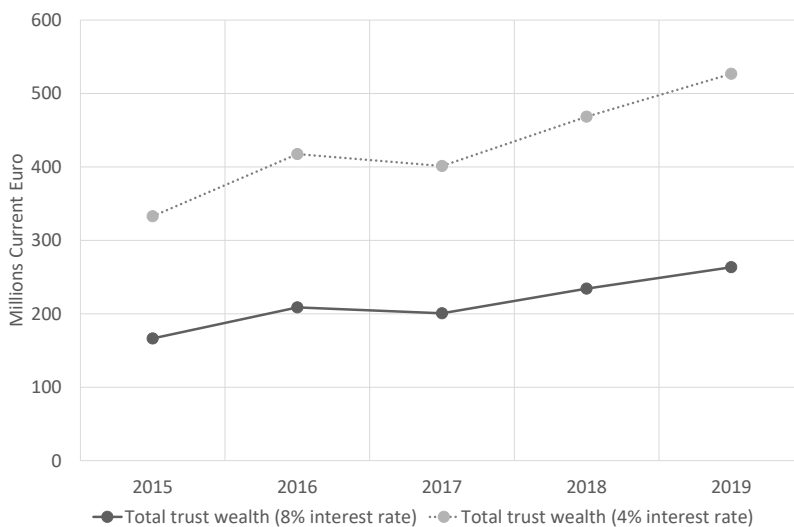|	Personal Income Tax - PIT - Capital incomes imputed from transparent trusts (section I-B)		Corporation Income Tax - CIT - Capital incomes from opaque trusts (distributed and retained)							
Year	N benefi-ciaries	Total capital income (Euro)	N trusts	Tot net capital income (gross income minus losses) - Euro	% capital incomes in trans-parent trusts	Tot wealth in trusts (8% rate) - million Euro	Tot wealth in trusts (4% rate) - million Euro	Tot personal net wealth (billion Euro)	% of personal net wealth (8% rate)	% of personal net wealth (4% rate)
2009			65	195,174						
2010			80	361,490						
2011			102	-176,484						
2012			108	-757,201						
2013			135	9,031						
2014			140	1,669,782						
2015	884	12,773,041	137	542,436	95.93%	166.44	332.89	8734.79	0.0019%	0.0038%
2016	905	15,023,143	139	1,676,874	89.96%	208.75	417.50	8655.97	0.0024%	0.0048%
2017	931	13,913,434	152	2,136,442	86.69%	200.62	401.25	8673.82	0.0023%	0.0046%
2018	916	16,258,526	154	2,474,701	86.79%	234.17	468.33			
2019	971	18,504,380	151	2,567,016	87.82%	263.39	526.78			

Notes: Data extracted from corporate income tax (CIT) declarations of trusts (both national and foreign) operating in Italy and by personal income tax (PIT) declarations of national residents benefiting from national and foreign trusts. The imputed capital incomes in the tax records is capitalized with alternative interest rates to derive estimates of wealth held in trusts.

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61. Two main rates of returns are used in the capitalization exercise, 4% and 8%, similar to what done in Saez and Zucman (2016). Previous works by Kopczuk and Saez (2004) and Alvaredo et al. (2018) used an interest rate of 7.5% and of 5.6% for the U.S. and the UK respectively.

(a) Number of national and foreign trusts operating in Italy

(b) Estimated personal wealth held in trusts

Notes: Data extracted from corporate income tax (CIT) declarations of trusts (both national and foreign) operating in Italy and by personal income tax (PIT) declarations of national residents benefiting from national and foreign trusts. The imputed capital incomes in the tax records is capitalized with alternative interest rates to derive estimates of wealth held in trusts.

Appendix T: Detailed treatment of assets in the tax records and in our benchmark series

TABLE T.1. Treatment of assets: Housing and Land, Cash and deposits, Bonds and debt securities

	Housing and Land	Cash and deposits	Bonds and debt securities
Reported on tax records	YES. Reported at cadastral value (validated with official cadastral records by the tax agency).	YES. Savings and current account deposits self-reported at balance value as officially documented by financial institution statements. Cash, however, may be heavily underreported.	YES, although government bonds are tax exempt and may not be always fully reported.
Included in the benchmark series?	YES. Final estimate aligned with household sector balance sheets: at Market value	YES. Final estimate aligned with household sector balance sheets: At balance value	YES. Final estimate aligned with household sector balance sheets: at Market value
Imputations for the missing population using survey data (i.e. the missing population is identified as the adults without real estates and with wealth levels below the reporting threshold)	No imputations as all individuals dying with real estates are assumed to be captured by the tax records (consistently with tax legislation).	Individual Cash and deposits value in the survey (SHIW), reported by the missing population is appended to the tax-based data (the reported value is scaled up by the ratio between the aggregate value in the household sector balance sheets and that reported in SHIW)	Individual Debt securities value in the survey (SHIW) reported by the missing population is appended to the tax-based data (the reported value is scaled up by the ratio between the aggregate value in the household sector balance sheets and that reported in SHIW)
Main imputation methodology of the missing wealth gap w.r.t. the household sector balance sheets (i.e. after imputing the wealth of the missing population)	The very small difference between the value of housing and land in the household sector balance sheets and that identified from inheritance tax data is distributed to the whole adult population in proportion of the "housing and land assets" reported in each age, gender, and location cell	The difference between the value of cash and deposits in the household sector balance sheets and that identified from adjusted inheritance tax data (with missing wealth holders imputed from survey data) is distributed to the whole adult population in proportion of the total "other assets" reported in each age, gender, and location cell.	The difference between the value of debt securities in the household sector balance sheets and that identified from adjusted inheritance tax data (with missing wealth holders imputed from survey data) is distributed to the whole adult population in proportion of the total "financial assets" reported in each age, gender, and location cell.

TABLE T.2. Treatment of assets: Life insurance and private pension assets, Shares and other equities, Liabilities

	Life insurance and private pension assets	Fund shares and equities in incorporated and unincorporated businesses.	Liabilities
Reported on tax records	NO. Tax exempt assets and hence not reported on tax records	YES. Mutual fund shares and listed shares reported at market value (validated by tax agencies using official ownership certificates). Shares in unlisted corporations and quasi-corporations reported at book value (this asset class is mostly tax exempt but reporting remains mandatory).	YES. At value reported on tax records as validated by Tax agencies (verified deductible expenses may be cumulated with the total value of liabilities)
Included in the benchmark series?	YES. Final estimate aligned with household sector balance sheets: at reserve value	YES. Final estimate aligned with the sum of two asset classes of the household sector balance sheets ('Mutual Fund Shares' and 'Shares and other equity'): at Market value.	YES. Final estimate aligned with household sector balance sheets.
Imputations for the missing population using survey data (i.e., the missing population is identified as the adults without real estates and with wealth levels below the reporting threshold)	Individual values of life insurance and pension assets value in the survey (SHIW) (estimated using the reported values of annual payments and contributions into pensions funds and life insurance) are appended to the tax-based data (the reported value is scaled up by the ratio between the aggregate value in the household sector balance sheets and that reported in SHIW)	Individual values of business shares and other equities in the survey (SHIW) reported by the missing population are appended to the tax-based data (the reported value is scaled up by the ratio between the aggregate value in the household sector balance sheets and that reported in SHIW)	Individual Liabilities value in the survey (SHIW) reported by the missing population is appended to the tax-based data (the reported value is scaled up by the ratio between the aggregate value in the household sector balance sheets and that reported in SHIW)
Main imputation methodology of the missing wealth gap w.r.t. the household sector balance sheets (i.e., after imputing the wealth of the missing population)	The difference between the value of life insurance and pension assets in the household sector balance sheets and that identified from survey data is distributed to the whole adult population in proportion of the total 'financial assets' reported in each age, gender, and location cell.	The difference between the sum of 'Shares and Other Equity' and 'Mutual Fund Shares' assets in the household sector balance sheets and that identified from adjusted inheritance tax data (with missing wealth holders imputed from survey data) is distributed to the whole adult population in proportion of the total 'financial assets' reported in each age, gender, and location cell. The value of 'Fixed capital' such as plant, machinery, equipment, inventories, and goodwill of small personal businesses of producer households was also imputed in the same way.	The difference between the value of liabilities in the household sector balance sheets and that identified from adjusted inheritance tax data (with missing wealth holders imputed from survey data) is distributed to the whole adult population in proportion of the total 'liabilities (plus deductible expenses)' reported in each age, gender, and location cell.

TABLE T.3. Treatment of assets: Wealth held in Trusts, Financial Assets held in offshore accounts, Valuables and durable goods, Public pension assets

	Wealth held in Trusts	Financial Assets held in offshore accounts	Valuables and durable goods	Public pension assets
Reported on tax records	NO.	YES. In practice, however, offshore accounts are for a large part excluded as they are often used as tools to minimize tax liability.	YES. Valuables, boats and aircrafts should be self-reported. However, cars are excluded as they are exempt from inheritance tax.	NO.
Included in the benchmark series?	NO. However, we estimate the total value of wealth held in trusts amounting up to 0.005% of total personal wealth. (see Appendix S)	NO. Alternative series including estimates of financial assets held by Italian residents in offshore accounts are presented in the paper (see Appendix M)	YES for valuables. NO for durable goods. Alternative series including estimates of consumer durables are presented in the paper (see section 6.2)	NO. The estimation of total public pension assets and its distribution are beyond the scope of the paper (see detailed discussion in section 1)
Imputations for the missing population using survey data (i.e. the missing population is identified as the adults without real estates and with wealth levels below the reporting threshold)	None	None. The total estimated value of financial assets held offshore are assumed to be held above the 99th percentile of the wealth distribution, thus not owned by the missing population (at the bottom of the distribution).	Individual reported holdings of durable goods and vehicles in the survey (SHIW) for each age, gender, location, and wealth range cell, are added to the wealth distribution identified using the tax-based data after full imputations of all assets.	None
Main imputation methodology of the missing wealth gap w.r.t. the household sector balance sheets (i.e. after imputing the wealth of the missing population)	None	We assume that that 95% of total estimated value of offshore financial assets are undeclared. This estimate is then distributed almost entirely (up to 95%) to the top 1 percent (50% of which being allocated to the richest top 0.01% group alone)	None	None

Appendix U: Wealth Inequality - Gini Coefficient: Age Adjustment

FIGURE U.1. Wealth Inequality: Adjusting for Age

(a) Using tax-based data

(b) Using survey-based data from SHIW
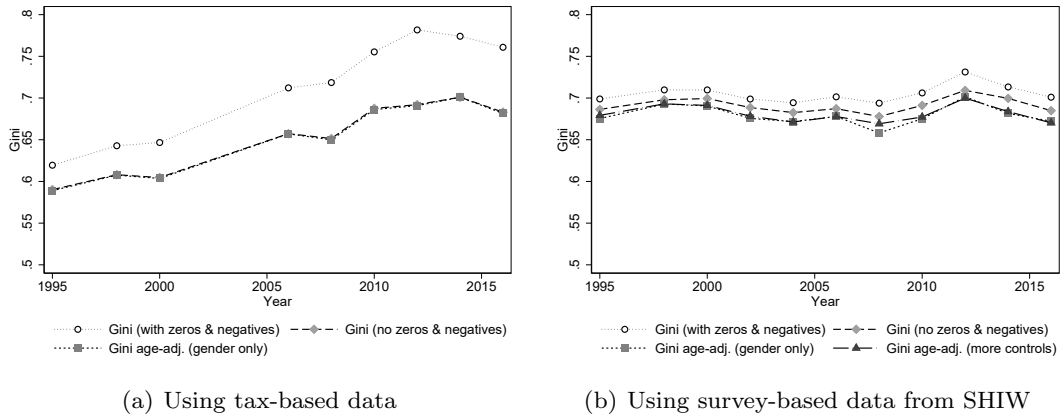
Notes: The graph compares the age-adjusted Gini coefficient on individual wealth to unadjusted measures. In order to isolate the net effect of age on inequality we used a multivariate regression model as suggested in Almas et al. (2012). The adjustment procedure proposed by Almas et al. (2012) rely on calculations of the Gini coefficients without negatives and substituting all zeros with 1. We apply this exercise to our tax-based data (where we can only condition on gender) as well as to the survey data (where we can use a richer set of controls such as gender, type of work, sector of work, and education). The graph also shows, as memorandum item, the actual Gini coefficient when we include zeros and negatives obtained using the *sgini* STATA command (however these values cannot be directly compared to the age-adjusted Gini coefficient).

TABLE U.1. Gini Coefficients: Age-adjusted vs. Unadjusted Figures

	Tax-based data			Survey-based data (SHIW)			
	No negative values and all zeros set =1		memorandum item	No negative values and all zeros set =1			memorandum item
	Gini - individual adults	Age-adjusted Gini - gender as control variable	Gini on net wealth - individual adults	Gini-individual adults	Age-adjusted Gini - gender as control variable	Age-adjusted Gini - multiple controls	Gini on net wealth - individual adults
1995	0.590184	0.588978	0.619459	0.686407	0.675407	0.679247	0.698887
1998	0.608059	0.607516	0.642783	0.697914	0.692873	0.693015	0.709756
2000	0.604673	0.603584	0.646654	0.699417	0.690472	0.691148	0.709724
2006	0.657288	0.657048	0.712158	0.687247	0.677941	0.677835	0.701433
2008	0.651482	0.649896	0.718549	0.677851	0.658159	0.669152	0.69385
2010	0.687589	0.686177	0.755325	0.691145	0.67513	0.677256	0.70613
2012	0.692029	0.690886	0.781668	0.709156	0.701588	0.699917	0.731235
2014	0.70099	0.700863	0.774072	0.699623	0.681551	0.683731	0.713276
2016	0.683111	0.68157	0.760869	0.684899	0.672182	0.670274	0.701013

Notes: The table compares the age-adjusted Gini coefficient on individual wealth to unadjusted measures. In order to isolate the net effect of age on inequality we used a multivariate regression model as suggested in Almas et al. (2012). The adjustment procedure proposed by Almas et al. (2012) rely on calculations of the Gini coefficients without negatives and substituting all zeros with 1. We apply this exercise to our tax-based data (where we can only condition on gender) as well as to the survey data (where we can use a richer set of controls such as gender, type of work, sector of work, and education). The table also shows, as memorandum item, the actual Gini coefficient when we include zeros and negatives obtained using the *sgini* STATA command (however these values cannot be directly compared to the age-adjusted Gini coefficient).