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Abstract

This paper utilises the Italian Treasury Dynamic Microsimulation Model (T-DYMM) to project individual and household economic trends up to 2070, focusing on the intergenerational trasmission of wealth inequality. To analyse the impact of intergenerational transfers (IGTs) on wealth inequality, various scenarios are compared to a baseline. Results suggest that net wealth inequality will remain stable until 2040, when it is expected to rise progressively, especially due to the rising role of IGTs. Demographic factors like increased life expectancy and declining fertility are the main explanations for this phenomenon. Finally, while some assumptions, like accounting for no behavioural adjustments in response to tax changes, have limitations, this study provides valuable insights into potential effects and timelines for inheritance tax reforms on long-term inequality transmission.

Keywords: intergenerational transfers, inheritance, taxation, wealth inequality, capital income, dynamic microsimulation.

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1 Introduction

The ratios of wealth to income are rising all over the world (Piketty and Zucman, 2014). The growing role of wealth has been paralleled by the rise in wealth inequality, which remains steady and consistent across Western countries (Cannari and D'Alessio, 2018). As a component of wealth, inter-generational transfers (IGTs), in the form of inheritances and *inter vivos* gifts, have been increasing their weight on total private wealth over the last few decades (Alvaredo et al., 2017; Acciari et al., 2021), a phenomenon that Atkinson (2018) defined as "the return of inheritance".

These trends have revived an interest in the distribution of wealth and IGTs as a source of inequality persistence and transmission mechanism (Nekoei and Seim, 2022). From a generational perspective, IGTs may reduce inequality between cohorts but may conversely also exacerbate economic disparities within cohorts. Either way, they may be an important (in)equality transmission channel. The literature analysing the role of IGTs in shaping wealth inequality has reached more solid conclusions on the limited but non-negligible magnitude of the effect rather than its sign. See, for instance, the contributions by Wolff and Gittleman (2014) and Palomino et al. (2021), for a comparison of different results in terms of the sign, inequality-decreasing the first and inequality-increasing the second.

Differently from this strand of literature, we focus on a forward-looking approach and investigate the long-term relationship between IGTs and wealth. Starting from observed distributions and external projections on macroeconomic and demographic developments, we use dynamic microsimulation techniques to identify what the pattern in long-term wealth inequality will be if accumulation and transmission behaviours do not significantly change given the current institutional context and alternative settings. Dynamic microsimulation models (DMMs) seem particularly suited for studying IGT-related outcomes, given the full modelling of the demographic processes underpinning the transmission of wealth. The number of heirs is crucial to understanding to which extent IGTs affect wealth redistribution (e.g. if all households have only one heir, the inequality in the wealth transmitted by parents would equal the inequality in the wealth received by heirs).

Italy constitutes an interesting case study for a series of reasons: *i*) in the last forty years, it has seen a considerable rise in the wealth-to-income ratio (WIR), from 3.1 in 1980 to 6.7 in 2020, primarily due to the surging role of finance in the Italian economy (Caprara et al., 2018); *ii*) it has one of the lowest projected fertility rates in the EU and a population that will further shrink in the years to come, according to official statistics (EU Commission, 2021; ISTAT, 2022); *iii*) the ratio between IGTs and income aggregates rose from 10% in 1995 to 18% in 2016 (Acciari et al., 2021); and *iv*), according to OECD (2021), tax revenue related to IGTs are rather low in absolute terms and form a very small share of total tax revenue (0.1%), well below the OECD average (0.36%).

Given the above, the present paper aims to shed light on the likely future evolution of wealth inequality in Italy and the peculiar role of IGTs in this specific respect. The analysis builds on the recent release by Conti et al. (2023) of the last version of the Italian Treasury DYnamic Microsimulation Model (T-DYMM), a DMM owned by the Department of the Treasury (DT) of the Italian Ministry of Economy and Finance (MEF). The model stands out for the comprehensiveness of simulated processes and events with respect to comparable DMMs presently operating for Italy (Maitino et al., 2020; Bronka and Richiardi, 2022), in particular for the inclusion of a module for the modelling of wealth accumulation and transmission mechanisms. The starting dataset at the basis of T-DYMM's simulations is derived by linking survey data with a vast richness of administrative information at individual and household levels. We provide a thorough description of the complex data cleaning and ordering processes that led to the baseline wealth distribution. We stress the importance of such an exercise in a world of limited access to high-quality wealth data.

To the best of our knowledge, no research has yet explored the long-term relationship between IGTs and wealth inequality in a dynamic microsimulation setting. In particular, we compare T-DYMM's baseline scenario with different counterfactual scenarios that help disentangle the effect of IGTs on wealth inequality. We also draw some initial considerations on the role of the inheritance and gifts tax in Italy by focusing on the first-order inequality and budgetary effects of a policy switch to the French tax in the Italian context.

The remainder of the paper is structured as follows. In Section 2 we propose a review of related studies. Section 3 describes the steps undertaken in the construction of the wealth dataset that serves as the basis for our simulations. Section 4 briefly sketches the structure of T-DYMM and goes into detail about the structure of the wealth module. Section 5 presents the simulation results. Section 6 offers concluding remarks.

2 Literature review

Following the empirical results put forward by Piketty (2011) and subsequent papers regarding the return of inheritances, there has been a recent wave of research analysing the relationship between IGTs and wealth inequality. Wolff and Gittleman (2014) and Bönke et al. (2017) rely on the recall capacity of respondents to distinguish between inherited and not inherited wealth. These studies point out an equalising effect of IGTs on wealth inequality for the US and EU, respectively. Boserup et al. (2016) and Elinder et al. (2018) conclude that inheritances contribute to the reduction of wealth inequality in relative terms at the cost of an increase in absolute dispersion.

The opposite view is suggested by the works of Fessler and Schrz (2018) and Palomino et al. (2021). In the first paper, the authors found that in European countries IGTs strongly determine the position in the wealth distribution, using decomposition regression analysis. In contrast, by constructing counterfactual distributions, the latter study pointed out that IGTs explain around 30% of wealth inequality in four major OECD countries. See also the works by Nolan et al. (2021) and Morelli et al. (2021) for analogous findings. A similar approach to the one employed in Palomino et al. (2021)'s work is adopted by Feiveson and Sabelhaus (2018), who compare the observed wealth distribution in the US with one in which the wealth attributable to IGTs is distributed equally across the population. By doing so, they show that the wealth share of the top 10% of US households sorted by wealth would fall from 73% to 57%.

The recent contribution by Nekoei and Seim (2022) constitutes a remarkable step ahead, since it derives a theoretical framework for understanding the relationship between IGTs and wealth inequality. By focusing on depletion rates, they suggest that IGTs have a higher impact on wealth inequality when intergenerational mobility is low, inheritances are rather unequally distributed and pre-inheritance wealth inequality is also high.

One closely related topic regards the role of inheritance (or transfer) taxes in tackling wealth inequality attributable to IGTs. Regarding Italy, Jappelli et al. (2014) estimate that abolishing transfer taxes would rise the probability of making real-estate transfers for rich donors as opposed to poorer ones. Krenek et al. (2022) developed INTAXMOD, a model that can simulate wealth transfers and inheritance tax revenue up to 2050 for a selection of European countries. The authors project that inheritance tax revenue in Italy will double by 2040, before France and Germany, which will reach this mark by 2050. Our study complements these results by fully exploiting the potentialities of DMMs in terms of sample representativeness and distributive analysis.

3 Constructing a reliable wealth dataset for Italy

The starting dataset is the Italian component of the European Union Survey on Income and Living Conditions (IT-SILC) for 2016. In its original release, the sample includes 48,316 individuals for a total of 21,325 households. Sociodemographic characteristics refer to the year of the interview (i.e. 2016), while income amounts are collected for the year before the interview. The dataset is enriched with administrative information on working careers and public pensions from the Italian Institute of Social Security (INPS) archives and with tax data for the 2015 year from the Italian Department of Finance (DF) of MEF. These merging procedures are conducted via exact matching of individual tax codes (*codici fiscali*). We also include information on financial wealth available in the 2016 Survey on Household Income and Wealth (SHIW) held by the Bank of Italy through statistical matching, subsequent to a correction procedure related to under-reporting issues.

We then calibrate the original IT-SILC sample weights following Deville and Särndal (1992)'s raking procedures to improve the representativeness of a series of sociodemographic characteristics and gross income distributions relating to the end of the 2015 year.[1] To allow for the easy use of alignment procedures within the model, the last step involves the expansion of the sample by duplicating individuals on the basis of the newly calibrated weights. We draw with replacement 100 samples of 100,000 households and select the one that best fits the external totals used in the calibration procedure. As a result, the base year dataset is comprised of 238,431 individuals.

In what follows we describe the wealth-related data preparation and merging procedures involved in the construction of T-DYMM's base year dataset. We also provide a comparison between derived wealth totals and official statistics from NA in order to validate our starting dataset for simulation. We refer to Conti et al. (2023) for further details regarding the validation of other sociodemographic variables and income aggregates.

3.1 Administrative data on house wealth

Information on house wealth is derived from DF archives. These consist of tax returns and cadastral data relative to individuals surveyed in IT-SILC for 2016. Among cadastral records, which contain information on real estate owned[2], we are provided with the market value of the residential dwelling units according to the Italian Observatory of the Real Estate Market (*Osservatorio del Mercato Immobiliare*, OMI). This piece of information allows to correct the value of real estate to align the cadastral values reported for taxation purposes with the market prices, while reproducing a rather precise territorial price variability. Hypotheses and intensive elaborations were necessary to clean up raw data from inaccuracies, missing information and duplicates, then to pass from the cadastral data to personal property and, finally, to aggregate information at the household level.

In Table 1 we present a summary of house wealth statistics for Italy according to different data sources. T-DYMM reduces the discrepancy with NA in terms of total amounts compared to SHIW, the latter being the survey with the largest informational content about wealth in the Italian context (Ceriani et al., 2013). Regarding inequality, we obtain a distribution that is slightly more unequal than the SHIW-based distribution as measured by the Gini index. T-DYMM's base year dataset underestimates the share of first houses over total houses relative to NA, although the definition of first house adopted is different between data sources. Major differences arise when looking at second

[1] As a result, we scale back the age of the sample units to the year before the interview, leading to the exclusion of individuals born in 2016.

[2] The available variables are the following: municipality where the real estate unit is located; cadastral category; cadastral value; surface in square meters; share of possession. The cadastral category is the key information to distinguish between residential and non-residential units.

houses, as SHIW significantly under-reports multiple ownership. We can conclude that administrative information on house wealth used in this paper overall contributes to the adherence with NA totals while preserving distributional traits relative to SHIW.

Table 1 House wealth statistics

Source	Total amount	Gini index	First houses (%)	HH with other houses (%)
T-DYMM	5,029	0.577	53.1	50.5
SHIW	4,191	0.569	66.3	17.2
NA	5,333	-	62.1	-

Notes: Total amounts are expressend in millions of euros. "HH with other houses (%)" indicates the share of households who own at least one second house.

3.2 Correction for under-reporting of net financial wealth in SHIW

The second component of total wealth is the net financial wealth. For this component, since we do not have access to administrative records, we use the Survey on Households Income and Wealth (SHIW, held by the Bank of Italy), attached to our data through statistical matching (the detailed procedure is described in the next paragraph). The SHIW is the main source of information on household wealth in Italy. However, as is well known in the literature (Bonci et al., 2005), survey data are plagued by under-reporting in ownership and total amounts, especially for information on financial wealth. Indeed, typically, the weighted totals of financial wealth do not match the amounts reported in the National Accounts (NA). For instance, in 2015, the total amount of financial wealth in Italy was 690 billion according to the SHIW using sample weight, whereas 3,284 billion according to NA (excluding insurance reserves and standard guarantees), with a ratio of one fifth between the former and the latter.[3] This phenomenon is not uniformly distributed among the respondents and, typically, also gives rise to an underestimation of inequality and to a distortion in the estimates for the other moments of the distribution. To take this problem into account, preliminary to our simulation analyses we carried out a correction procedure of financial wealth at the household level.[4] The same procedure has been applied to liabilities.

The correction procedure involves three steps, as in Boscolo (2019):

1. Correction for possession, following Brandolini et al. (2009);
2. Attribution of financial wealth to households who are "new" owners;
3. Correction for the amount of financial wealth owned, following D'Aurizio et al. (2006).

In the first step, we proceed to study the probability of owning the specific financial instruments that are part of financial wealth, such as liquidity, government bonds, corporate bonds, stocks, mutual funds, insurance. We run a multinomial model to determine the probability of owning a more or less sophisticated investment portfolio. Then, we use logistic models to analyse the impact of socio-economic and financial variables on the probability of owning a specific instrument. We run a separate univariate regression for the ownership of liabilities. In the Appendix (Table A1) we show some descriptive results of the first step of our correction procedure, the one regarding ownership, using SHIW 2016.

In the second step, we impute the value of financial activities for households that formerly were not but become owners after the first step through matching (using Mahalanobis distance metrics). The variables adopted for the imputation, computed for any

[3] In terms of total net wealth (real wealth plus financial wealth minus liabilities), the SHIW accounts for about 53% of the NA value.

[4] Even though the procedure has been applied to all the recent SHIW waves in order to improve the estimates used in the simulation, we show results for 2016 only, since it is the one adopted to attribute financial wealth information to the starting sample by means of a statistical matching.

single financial activity, are: household income quartiles, number of income earners, occupational status, housing ownership, gender, geographical area of residence, age class, education level.

Finally, we use the ratios between "true" and declared values found in SHIW 2002 by D'Aurizio et al. (2006) to adjust the levels of financial activities for both original and new owners. We run regressions with households' demographic and socio-economic characteristics as explanatory variables for each of the instruments in order to attribute a new value of financial wealth in the more recent waves that we use for the estimates and for the starting sample of the simulations.

The final outcome of the correction procedure can be reviewed in Table 2 that compares original SHIW totals with corrected totals and the national accounts from the Bank of Italy. The total amount of financial wealth after the correction amounts to 2,409 billions, while the total amount of liabilities amount to 374.7 billions. We can see from the last two columns of the Table how the adjusted figures relate to the original SHIW totals and to the National Accounts totals. The most relevant correction regards corporate bonds, followed by government bonds, stocks and, finally, liquidity. It becomes apparent, in terms of NA ratios, that among the various forms of financial wealth available to a household, liquidity is closer to the national totals, while government bonds is farthest. Liabilities provide the less satisfying results after the correction, since we the new totals account for 54% of the national account total.

Table 2 SHIW weighted totals (€ billion)

	Original	After correction	NA	Ratios	
	(1)	(2)	(3)	(1/2)	(2/3)
Financial wealth	697.0	2,461	3,146.9	0.283	0.782
Liquidity	390.3	1,029.8	1,273.0	0.379	0.809
Govt. bonds	59.9	270.4	412.2	0.221	0.656
Corporate bonds	66.4	511.8	-	0.130	-
Stocks	180.4	649.1	1,461.7	0.278	0.794
Liabilities	250.9	368.5	692.1	0.681	0.532

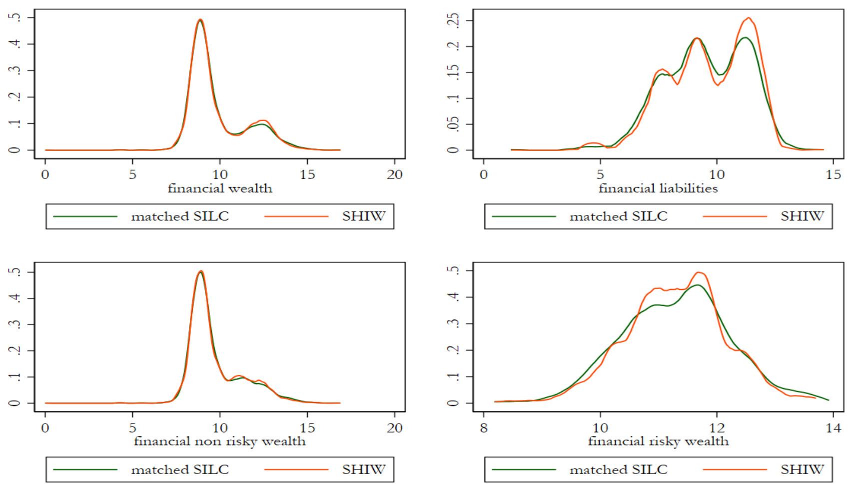
Notes: Financial wealth is the sum of liquidity, government bonds, corporate bonds and stocks. In the National Accounts it was not possible to distinguish between stocks and corporate bonds, therefore in the ratio (2/3) we consider these two categories jointly. *Source*: authors' elaborations on SHIW 2016

3.3 Statistical matching for integrating financial wealth information on AD-SILC

The connection between the SHIW dataset and AD-SILC is achieved through a matching technique performed at the household level. In this procedure, AD-SILC is the *recipient* sample and SHIW the *donor* of some missing information. We adopted a Propensity Score Matching technique (PSM, Rosenbaum and Rubin, 1983) following Pisano and Tedeschi (2014), who combined the SHIW with the Household Budget Survey (HBS). The link function is based on a set of common characteristics surveyed in both surveys and properly recodified to make them the most homogeneous. As for the matching unit, the reference is the household. However, the definition of household head is fairly different between the two datasets. To this end, a recodification of the reference person for matching aims is performed. We assume that, if existing, husband/male partner is the household head, except in case the female spouse/partner is the major earner among the partners. In the Appendix (Table A2) we propose a comparison between the two datasets, by summarizing their main variables (adopted for setting the matching algorithm). To control for systematic differences between the two samples and obtain a more accurate matching we divide the joint dataset in 45 cells (or strata) obtained by the combination of household real wealth quintiles and nine household typologies. Then we proceed to matching those units which are included in the same cell only. The choice was guided by both statistical fit and economic considerations since a higher correlation between real and financial wealth can be found compared to other variables (e.g. income). The matching algorithm[5] uses the common information between the two datasets to match the units in the donor and recipient datasets (subject to the cell constraint explained above). The vector of control/balancing variables includes the household head's gender, age, citizenship, marital status, geographical area, educational level, real estate ownership, labour income, household income, number of income earners, professional status, sector of employment and qualification, educational level and partner's age, if any. The wealth variables imported from SHIW in the synthetic AD-SILC file are financial assets held values (liquid assets, government securities, bonds and stocks) and liabilities.[6]

Next, we aim to compare the distributions of financial activities and liabilities between the *donor* dataset and the *recipient* one. Figure 1 shows the comparison between kernel densities of the (unconditional) distribution from SHIW data and the matched AD-SILC file. The four sub-figures refer to financial wealth (overall and broken up by risky and non-risky components) and liabilities. At the lowest level of validity of a data fusion procedure (i.e. preserving marginal distribution), the distributions are supposed to be almost identical to have a good matching. In our case the distribution of financial wealth and that of non risky wealth seem to overlap rather well, although there are some differences in the kernel distributions of liabilities and risky wealth.

Figure 1 Distribution of matched AD-SILC Vs. SHIW financial wealth and liabilities



Notes: The figures show the kernel densities of matched SILC data (green) and SHIW data (orange).
Source: Authors' elaborations based on SHIW and AD-SILC data (2016).

3.4 Final data comparison with National Accounts

Finally, in Table 3 we summarize the complex data construction process by comparing the wealth weighted totals of our dataset (AD-SILC) with the National Accounts provided by the Bank of Italy. Unfortunately the detailed distribution from official statistics is not available to be compared. In terms of net wealth our measure of total net wealth constitutes about 93% of the total by the NA. The major precision is provided by the house wealth coming from the administrative data, whose total equals the 94% of the

[5] *Psmatch2* command in Stata developed by Leuven and Sianesi (2003).

[6] Other auxiliary variables are the value of the installment paid in 2015, number of children outside the family and the level of savings.

national accounts. On the contrary, the financial wealth and liabilities, although we have adopted the correction for the under-reporting, are well below than the national totals.

Table 3 Wealth dataset weighted totals (€ billion)

	AD-SILC	NA	Ratio
House wealth	5,020.3	5,333.3	0.941
Financial wealth	2,534.6	3,146.9	0.805
Liabilities	340.3	692.1	0.492
Net wealth	7,214.6	7,788.1	0.926

Notes: Financial wealth is the sum of liquidity, government bonds, corporate bonds and stocks. *Source*: authors' elaborations on AD-SILC (2015).

4 Modeling wealth and intergenerational transfers with a dynamic microsimulation model

This section briefly illustrates the current structure of the baseline version of T-DYMM 3.0 and focuses more deeply on how wealth evolves within the model. The model is organized in five modules: demographic, labour market, pension, wealth and tax-benefit, which are fully described in Conti et al. (2023). Here, we provide a summary of the main characteristics, given that later in the Section we focus on the description of the Wealth module and how wealth is accumulated within the model, which constitutes one of the main novelties of this version. The model operates sequentially with its modules, even though each module may interact with each other. The starting sample is set in 2015 and simulations run yearly from 2016 until 2070.[7] Individual and household choices are simulated using estimates from micro-data regressions and are later aligned to institutional data. The alignments ensure the stability of the model in the long-run, for instance by keeping the level of employment in line with projections, while also setting the macroeconomic path of the modeled economy, e.g. by deciding how wages evolve over time.[8]

In Table 4 we present the main alignments, with information on the data sources as well as some figures that illustrate the trends in the simulation period. In the period between 2016 and 2021 we use official historical statistics for the alignments, taken from different sources, whose details are available in Conti et al. (2023). From 2022 to 2070 the alignments follow macroeconomic assumptions. The demographic and macroeconomic framework is aligned to European Commission official statistics for the 2016-2021 period, while it is aligned to the baseline scenario underlying the 2021 Ageing Report from 2022 onwards. The saving rate is linked to ISTAT data in the 2016-2021 period and related to MEF macro assumptions from 2022 onwards. The returns on financial wealth are aligned to S&P 500 figures both in the historical and projected simulation period, while for house wealth returns we look at information coming from OMI.

The demographic assumptions highlight the secular increase in life expectancy as well as the positive net migration flow that are well-established facts in the upcoming Italian society. The same holds for the low fertility rate, that, combined with the expected death of the great part of the so-called boomer generation, induces the strong decline in the overall number of individuals. The macroeconomic assumptions in this baseline scenario depict a flat trend in the main economic variables such as GDP, productivity, inflation and saving rate, a part from 2020 that is an exceptional year due to pandemic outbreak.

Then, moving to the more detailed description of the wealth accumulation processes,

[7]The simulation horizon coincides with the projection horizon of the 2021 Ageing Report by the European Commission.

[8]In the baseline scenario wages, after the historical alignment (2021), grow with labour productivity as standard in economic theory.

Table 4 Baseline scenario, economic and demographic framework

		2020	**2030**	**2040**	**2050**	**2060**	**2070**
Demographic	Life expectancy at 65	21.3	22.2	23.1	24.0	24.8	25.6
	Total fertility rate	1.3	1.4	1.4	1.4	1.5	1.5
	Net migration flow (thousands)	160.7	224.0	217.2	214.3	210.5	206.6
	Total population (millions)	60.3	59.9	59.3	58.0	55.9	53.9
Macroeconomic	Real GDP	-9.0	0.4	1.1	1.5	1.4	1.3
	Labour productivity	0.4	1.3	1.7	1.7	1.6	1.5
	Inflation	-0.1	2.0	2.0	2.0	2.0	2.0
	Avg. propensity to save	15.6	7.8	7.6	7.5	7.4	7.4
Financial	Total return on gov. bonds	2.7	0.3	0.8	1.4	1.6	1.7
	Total return on cor. bonds	7.7	0.8	1.3	1.8	2.1	2.1
	Total return on stocks	11.7	3.4	3.9	4.5	4.7	4.8
	Return on house wealth	4.2	2.0	2.6	3.1	3.3	3.4

Notes: The returns on financial activities and house wealth are composed by an income and capital gain component. They are expressed in real terms. *Source*:Eurostat, European Commission, ISTAT, OMI, S&P 500.

we start with some definitions: net wealth is the sum of real and financial wealth net of liabilities. House ownership is the only form of real wealth in our model, and mortgages are the only source of liabilities. Financial wealth is divided into four activities: liquidity, government bonds, corporate bonds and stocks. Private pensions are not considered as part of the net wealth.

The entire Wealth Module, interacting with the other modules of the micro-simulation model, shapes the evolution of household net wealth. Every step of the Wealth Module involves choices made at the household level that are modelled through regressions and alignments. The estimates adopted in the model are based on the SHIW micro-data (waves 2002-2016). We use discrete choice models (logit) for discrete transitions (for instance buying/selling houses, making/receiving inter-generational transfers, renting second dwellings), continuous regressions for quantities (either (log)levels or ratios of income or financial wealth).

The starting processes involve intergenerational transfers, *inter vivos* (donations) and *mortis causa* (inheritances). The second process is the one updating the amount of yearly wealth. Household savings and the severance pay (*TFR, Trattamento di Fine Rapporto* in Italian) are summed up to the existing financial accrues, and the values of house wealth and financial wealth evolve over time depending on nominal rates of returns. The level of returns varies by the type of financial investment decision that is made (included the opportunity of investing in house wealth and earning through rental). The returns inserted in the baseline version of the model do not incorporate any standard deviation at the household level. Subsequently, every household is assigned a probability of buying and selling house wealth.[9] The process of financial investment decision splits the financial wealth into its four components (liquidity, government bonds, corporate bonds and stocks). Finally, the last process in the Wealth module is the household consumption decision. At the end of the simulation period, every household is endowed with an amount of disposable income and the model assigns a certain level of consumption that may or may not exceed the household disposable income; in the first case, the household will use its financial wealth as a supplementary source to finance its expenditures.

Given the process of wealth accumulation just depicted, the simplified dynamics of wealth depends on a limited number of factors, namely the level of savings (and therefore,

[9] Every year of simulation, the number of houses bought equals the number of houses sold. Moreover, the total value of houses bought equals the total value sold.

the saving rate), the returns on financial and house wealth and finally, on the intergenerational transfers with a residual role played by the severance pay.

The savings rate is computed by difference with the consumption decision and then aligned to an average propensity to save. As already mentioned, the average savings rate in the model is decreasing in the simulation time span, following an historical trend.[10] Still, the propensity to save depends on household characteristics, such as the level of household income, financial wealth, the number of components and income earners as well as the age of the head of household and whether the head of household is retired or not. The estimations are based on panel regression using SHIW data for the period 2002–2016.

The second source of household wealth accumulation is constituted by the level of returns on wealth, in its capital gain component. We operate on the assumption that government bonds and house wealth evolve in their values as driven by the level of inflation: therefore, most of this component is due to the capital gains in corporate bonds and stocks. These returns, as shown in Table 4, follow a stable and positive path.

4.1 The role of IGTs in wealth accumulation

In this paragraph we expand on the intergenerational factor by describing its modelling within the Wealth module of T-DYMM and the interactions with the rest of the processes. There are two types of intergenerational transfers, inheritances and gifts, that are modelled separately. In general, the inheritance process is driven by demography, in the sense that the total amount of yearly inherited wealth equals the wealth of the deceased in each simulated year. Hence, from the donor side the strategy is straightforward, individuals who die are the donors. The death probability is aligned to projections by Eurostat distinguishing by gender and age. On the receiver side, we have those who inherit deterministically, as offspring and/or married partner of the deceased. For these individuals the crucial condition is that there should be an in-sample link with the deceased (i.e. a daughter that exits from the original household and creates her own). In case it is not possible to select an individual with a deterministic link, we attribute a probability of receiving inheritance using the 2014 wave of SHIW, that includes a specific module dedicated to inheritance and gifts. The probability of receiving an inheritance in the survey year, according to our estimates, depends positively on age and negatively on the household size, while the amount received (in absolute terms) depends positively on the level of income and wealth. At the start of the simulation, individuals living outside of their original households can rarely be linked to their parents, therefore the inheritance receivers are simulated almost all in probability (98.3 pp in 2016), while this percentage plummets to 13.9 pp in 2070.

A different and more simple reasoning is applied to gifts, that are simulated in probability. However, in this case the probability of being donor is simulated as well, even though the number of households who donate and who receive and the related total amounts are imposed to match each other in terms of totals. There are estimations based on SHIW 2014 that guide the evolution of this process throughout the simulation period.[11]

Both inheritances and donations are reduced by a specific tax. A transfer tax (better known as inheritance tax even though it covers both inheritances and gifts) has been re-introduced in Italy in 2007, after its abolition in the early 2000s. The tax base is constituted by the estate share received by each recipient. The exemption area is set as equal to €1 million, meaning that any transfer that amounts less is not taxed at all.

[10] According to ISTAT figures, the savings rate in Italy has been more than halved between 1995 and 2019, passing from 20.8% to 9.6%.

[11] According to SHIW data, the weighted totals of inheritances received in 2014 amount to about 83 billions, while the total inheritances received in Italy according to national accounts elaborated by Acciari et al. (2021) is about 112 billions. For gifts, the SHIW totals are about 17 billions while national totals are about 21 billions.

Full exemption holds also for government bonds.[12] Then, the tax rate is flat and equal to 4% for spouses and direct relatives. The same rules apply to intergenerational *inter vivos* gifts. We simulate the tax in our model in a simplified fashion, since we consider only the transmission to spouses and children. We assume that inheritances are split among receiver family members according to Italian rules on inheritances without a will, this being the most frequent case. This implies that inheritances are equally distributed among receivers.

An interesting topic concerns the possible feedback effects of IGTs on other choices within the model. The model does not incorporate behavioural responses to inheritances. However, the consumption rule takes into account the level of household financial wealth as a control factor. Households that receive large amounts of financial wealth due to inherited amounts will adjust their saving behaviour accordingly.[13] Still, there is no specific modelling of depletion rates or consumption patterns following inheritance reception.

5 Simulation results

We start by focusing on general tendencies of Italian demography and wealth, while later in the section we move on to the interaction between these two and its influence on IGT. Finally, the last part of the section is devoted to the relationship between IGTs and wealth inequality with a focus on the inheritance tax. For all the figures presented in this section, we may observe irregularities in the first years of the simulation time span that coincide with the alignments based on historical official statistics (2016–2021). We refer to Conti et al. (2023) for in-depth validation of model outputs related to each of T-DYMM's modules.

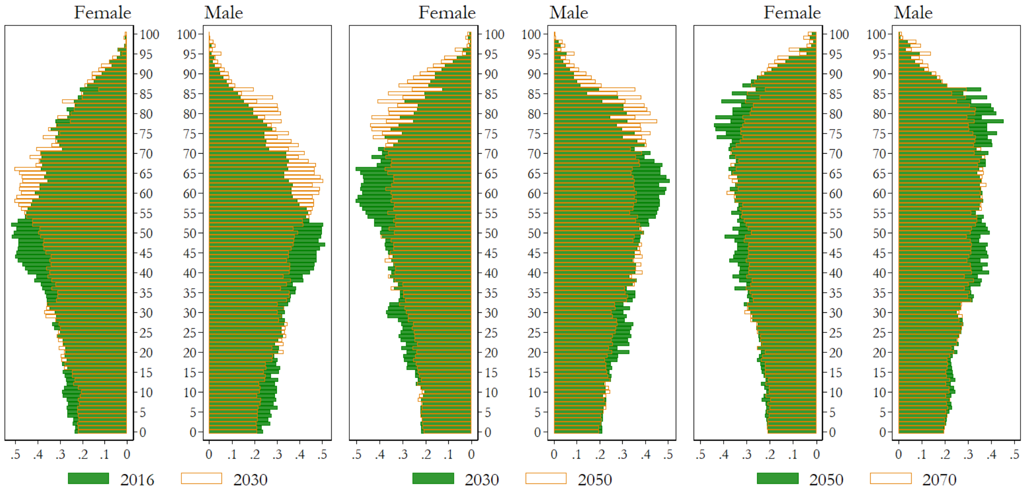
Figure 2 exemplifies the evolution in population out from the simulation in T-DYMM. As explained in the previous Section, these data are aligned to official projections by the European Commission, therefore they provide the idea of the slow but relentless population ageing. The figures that in 2016 still resemble a pyramid, in 2050 look like an inverted pyramid, in which a significant part of the population is more than 70 years old, while in 2070 they appear like a long vertical rectangle due to the rising proportions of over 90s in the population. Figure 3 shows the tendency in household size and share of successors throughout the simulation time span. Both these correlated figures display a negative trend. The average number of household components decreases over time from 2.3 in 2016 to 1.8 in 2070. This effect is due to the secular tendencies in mating and fertility, whose long-term alignments have been shown in the previous Section, as well as net migration.[14] The rise in small households implies that the number of heirs reduces over time (from 1.9% of the sample in 2016 to 0.9% in 2070).

[12] See Acciari et al. (2021) for a detailed description of the tax and its coverage.

[13] The consumption equation is estimated in levels, future versions of the model will incorporate the variation in consumption; we think this could be helpful in tackling the behavioural responses issue.

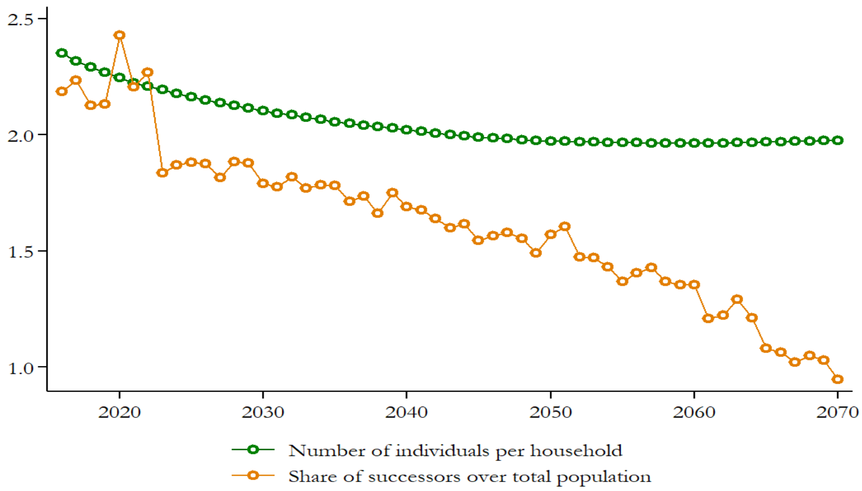
[14] The population projections adopted in the baseline version of T-DYMM are the not the more pessimistic among the available official scenarios.

Figure 2 Age pyramids



Notes: Individuals in millions on the horizontal axis. *Source*: Authors' elaborations of simulation results

Figure 3 Demographic trends



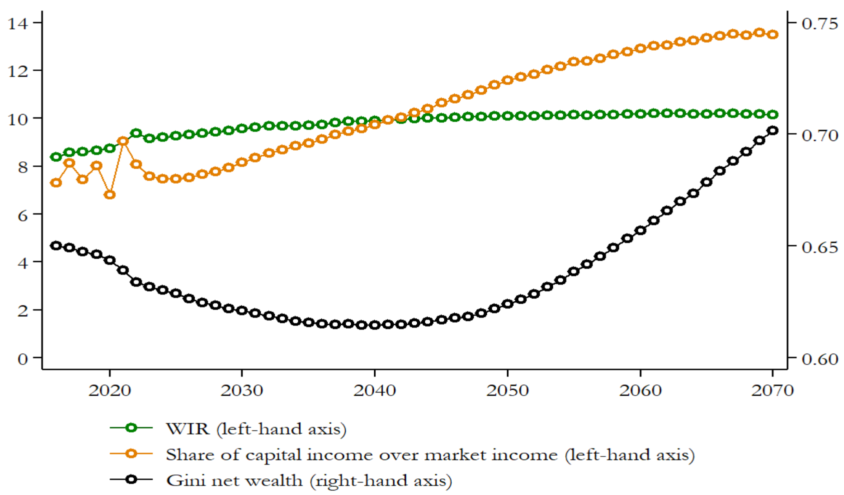
Notes: Successors are individuals (spouse or offspring of the deceased) who receive inheritance. *Source*: Authors' elaborations of simulation results

We, then, move on to illustrating the micro-simulation modeling results in terms of Italian wealth. In Figure 4 we propose the long-term trends in wealth figures according to T-DYMM. In the same graph we include what we considered as the main variables which explain wealth accumulation and inequality. On the left-hand axis we measure the wealth-to-income ratio (WIR) as well as the share of capital incomes (from house and financial wealth) over total household gross income. On the right-hand axis there is the Gini index to summarize the inequality evolution.

The WIR is a well-known measure to capture the scope of the weight of property, both real and financial, with respect to the produced incomes in the economy. Italy, as said in the Introduction, has one of the highest ratios among rich countries. The long-term simulation results depend on some key assumptions regarding the evolution of income with respect to wealth. Indeed, in our model this translates to the discrepancy between the growth of labour and pension incomes and the returns on real and financial wealth. Since, as explained in the previous Section, in the period of the simulation from 2022 onwards the assumed tendencies in wealth returns are positive and slightly above zero, we can see that there is a slow increasing tendency in WIR in the long-run, but still the ratio remains around the reasonable 10 percentage points. The share of capital income over total household gross income, on the right-hand side of the Figure, helps in summarizing a more general trend of the Italian economy, according to our model assumptions and formalization. The weight of incomes coming from housing and financial investments is going to rise with respect to the baseline year (from around 7.3 to 13.5). An overall increase in the Gini index is projected for net wealth that, after three decades of decay, is expected to start rising from about 0.57 in 2040 to 0.67 in 2070.[15] In Table B1 of Appendix B we additionally include the evolution of the detailed wealth distribution in certain years of the simulated time span; from that evidence it is easy to recognize the huge rise in the weight of households who own more than €5 million in 2070 as the main cause of the surge of net wealth inequality over the time course.

Overall, these results depict an expected rise in the weight of wealth in the Italian economy but, in the long-run, this seems to hold unequally across the population. In Appendix B (Table B2) we illustrate how the rise in inequality may be mainly attributed to financial wealth, whose weight for wealthy households is much higher in 2070 with respect to the start of the simulation.

Figure 4 Wealth and income evolution



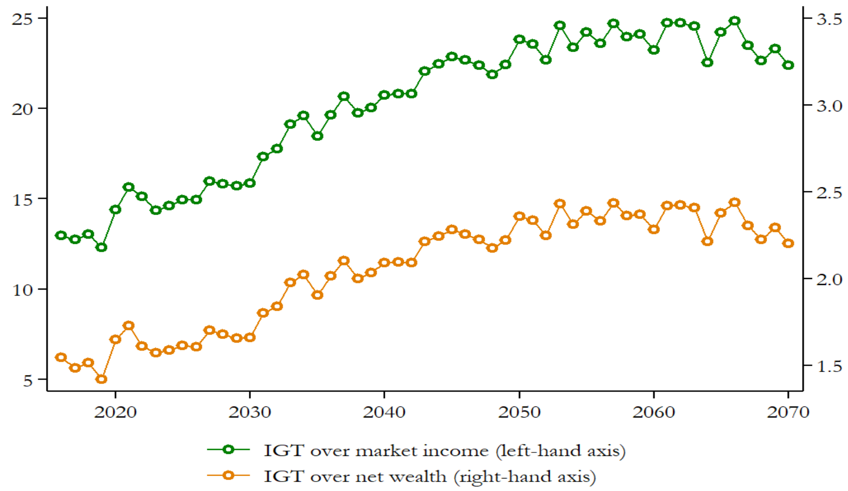
Notes: Market income is divided into two components: capital income (financial and rental income) and non-capital income (labour income, work-related pensions, private pensions and residual income sources). Negative values are excluded in the computation of the Gini index of net wealth. *Source*: Authors' elaborations of simulation results

The next part of this section is devoted to explaining why intergenerational transfers' channel may be considered as crucial for the development of Italian wealth accumulation patterns.

More generally, the weight of inheritance in the Italian economy keeps following the rising trend that has been discussed in the Introduction (Acciari et al., 2021), as shown in Figure 5. This occurs both when computing the ratio of IGTs over total market income and over net wealth.

[15]This result is in line with what was found by Morciano et al. (2013). In their work a long-term rising tendency in wealth inequality emerges when a reduced-form consumption rule is adopted.

Figure 5 Inheritance and gifts as a share of household income and wealth



Source: Authors' elaborations of simulation results

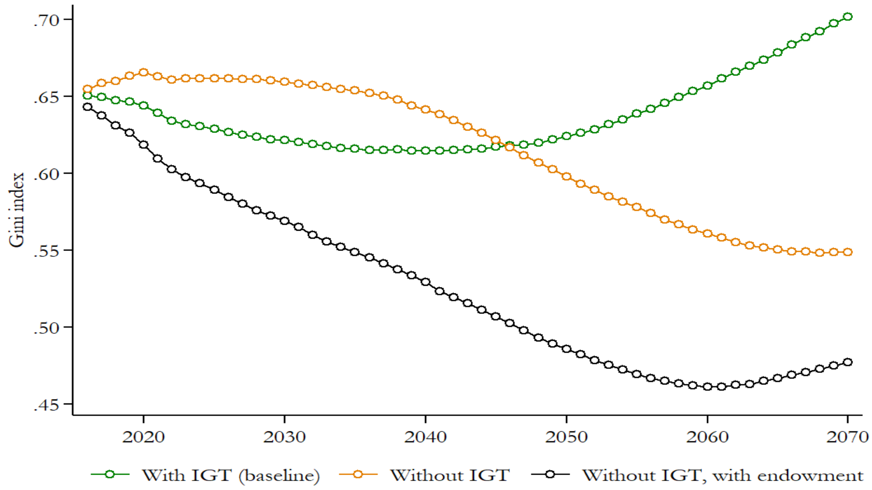
At this point we can disentangle the role of IGTs on wealth inequality. Exploiting the potentialities provided by the dynamic microsimulation model, we build different counterfactual scenarios which are later compared with the baseline scenario that is the one whose macroeconomic framework has been explained in Section 4 and that includes IGTs. The characteristics of the two alternative scenarios are listed below:

- No IGT: the IGTs are not simulated. Households cannot receive any additional wealth through this channel. Depleted wealth owned by the deceased is not redistributed.
- No IGT + endowment. Depleted wealth owned by the deceased is redistributed through an endowment of equal size to the whole population of the household.

The comparison between counterfactuals is showed in Figure 6 where we analyse the trends in wealth inequality with different scenarios using the Gini index as a synthetic distributive indicator. The green line denotes the household net wealth inequality in the baseline scenario. The first counterfactual (yellow line) provides the indication that, after the starting 25 years of simulation in which the IGTs have an equalizing effect, there is a reverse and the two lines start diverging significantly. This first finding, among others, is related to two separated but related factors: the steadily increasing inequality in the monetary value of IGTs (from a Gini index of about 0.7 at the beginning of the simulation up until 0.9) and the decay in the number of heirs. Indeed, this change is linked to the inheritance component of IGTs, since the level of inequality in gifts is instead more or less stable over the simulation period. With the second counterfactual the effect is even more pronounced, and we can see that the black line is always below the green line. Indeed, the demographic effect of a rising life expectancy is coupled with a decreasing (net) fertility, which reduces the weight of successive cohorts in the rotation from baby boomers to generation X and Y.[16] In Figure 7 we illustrate these counterfactual findings with the more comprehensive Lorenz curves that allow to verify the degree of inequality by quantiles.

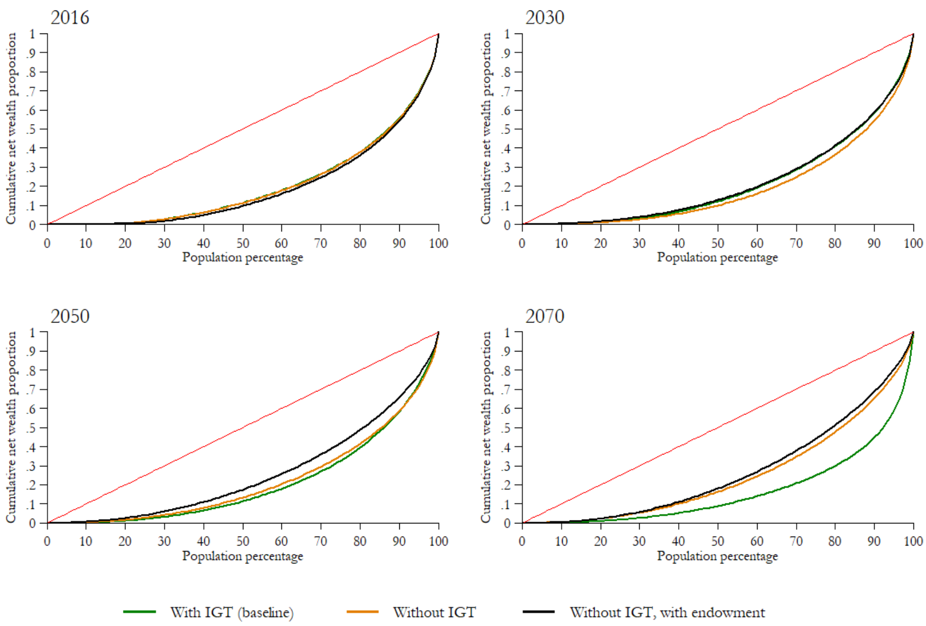
[16]The standard contemporary characterization of the cohorts borrows, in part, from the Strauss–Howe generational theory is the following: Silent Generation: Born between 1928 and 1945 (though exact years can vary); Baby Boomers: Born between 1946 and 1964; Generation X (Gen X): Born between 1965 and 1980; Millennials (or Generation Y): Born between 1981 and 1996.

Figure 6 Wealth inequality for different IGTs scenarios



Notes: Negative values are excluded when computing the Gini index. *Source*: Authors' elaborations of simulation results

Figure 7 Lorenz curves of net wealth



Notes: Zero and negative values are excluded. *Source*: Authors' elaborations of simulation results

Finally, we concentrate on inheritance and gift tax. We provide a counterfactual exercise with two alternative scenarios, with respect to the baseline that includes the Italian IGTs tax (whose details are discussed in Section 4):

- No Transfer Tax: the IGTs are simulated but they are not taxed;
- French Transfer Tax: the IGTs are taxed according to French legislation.

We opted for the simulation of the French Transfer Tax in the Italian context for a twofold reason: *i*) it is among the inheritance and gift taxes with the highest share in tax revenue as a percentage of GDP, according to OECD (2021); and *ii*) it is relatively easy to simulate compared with other taxes that exhibit a sufficient degree of progressivity and are not irrelevant in terms of revenue collected (e.g. the Belgian inheritance and gift tax). The French inheritance tax falls into the category of "double progressive tax regimes", meaning that progressivity applies both within and between population groups based on the closeness of the relationship between the receiver and the deceased. This is in contrast to Italy, where progressivity applies only between groups. No tax is paid between spouses or those in a civil partnership. Children are allowed a tax-free exemption threshold of €100,000 and are subject to progressive tax rates, with a maximum tax rate of 45% for inherited amounts above €1.8 million.[17]

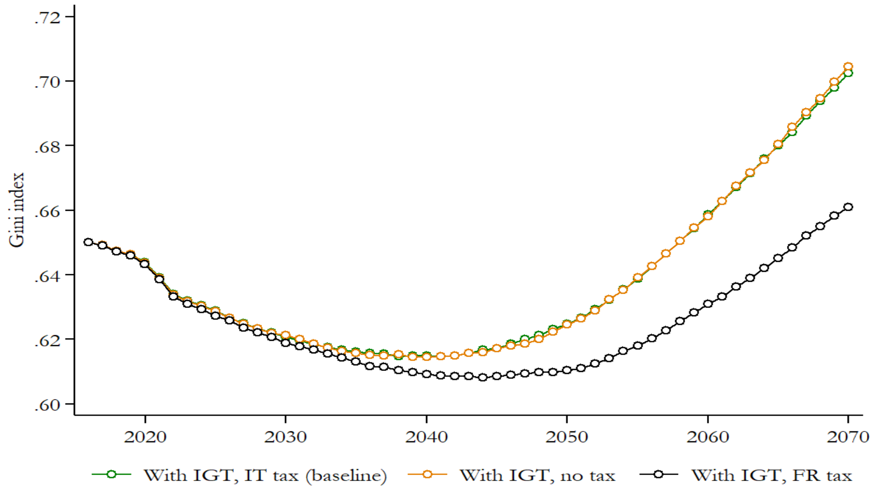
The results, in Figure 8, show that there is no significant difference in the wealth inequality trend with or without the presence of the current Italian tax. Then, the simulation provides evidence on the significant reduction in wealth inequality that would occur with the implementation of the French inheritance and gift taxation: the Gini index, in the latter case, would not overcome the value of 0.66 in 2070, four Gini points below the inequality of the baseline scenario. In Figure 9 we elaborate on this result showing on the left-hand graph the incidence of tax revenues from the inheritance tax with different scenarios over the nominal GDP, while on the right-hand axis the comparison between household equivalised income inequality. The very low incidence of the inheritance tax revenue with the Italian current design, which is around zero at the beginning of the simulation, sees a small increment in the final part of the simulation. The same increment becomes a striking upsurge when we simulate the French tax design on the Italian wealth transmission structure (from 0.3 to 3.3% of the GDP). This would give room for non-negligible switches in tax revenue composition both in a short- and long-term perspective, with the aim of financing a generalised tax wedge cut[18] or specific interventions on the expenditure side. Tax revenue projections are then strengthened by the evolution of income inequality, that we know has many different determinants and whose movements are scant, especially with a baseline scenario and stable economy. Indeed, the Gini index of equivalised market income with the French inheritance tax scenario is one-half point lower than the one with the Italian tax scenario. While bearing in mind certain limitations, such as the assumption of no behavioural adjustments throughout the life cycle in response to significant changes in tax levy[19], it is noteworthy that adopting a thorough reform in this tax policy today would likely yield significant equalizing effects on wealth distribution in the long run, with effects becoming more pronounced in 20-25 years, and even more so when considering incomes in the very long term. While this lag in impact might initially appear discouraging, it presents certain advantages. Especially when complemented with other redistributive strategies, such as capital income or wealth taxation as noted by Fize et al. (2022), it can effectively counteract other distributional tendencies. Moreover, the gradual and delayed nature of its effects might enhance its political acceptability, notwithstanding some unique Italian considerations.

[17] We report the tax rate schedule that applies to children: 5% up to €8,072; 10% on €8,072–€12,109; 15% on €12,109–€15,932; 20% on €15,932–€552,324; 30% on €552,324-€902,838; 40% on €902,838–€1,805,677; 45% over €1,805,677. See Drometer et al. (2018) for an overview of inheritance taxation from a cross-country perspective.

[18] According to the latest statistics (OECD, 2022), Italy exhibits one of the highest implicit tax rates on labour among developed economies, with a rate of 45.9% in 2022, well above the OECD average rate of 34.6%; while taxes on property and taxes on goods and services in terms of GDP percentage are slightly above OECD averages.

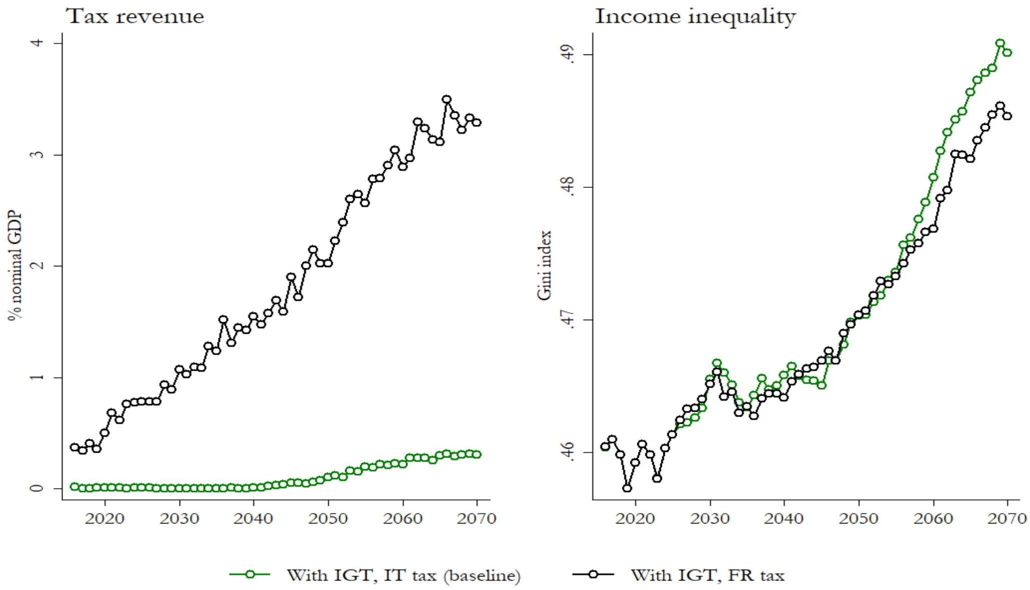
[19] An increase in the transfer tax, also known as inheritance or estate tax, can trigger several adjustments in economic behaviour, the most important are the reduced incentive to accumulate wealth and the tax evasion and avoidance that generate economic inefficiencies.

Figure 8 Wealth inequality for different inheritance tax scenarios



Notes: Negative values are excluded. *Source*: Authors' elaborations of simulation results.

Figure 9 Tax revenue and market income inequality for different inheritance tax scenarios



Source: Authors' elaborations of simulation results

6 Conclusions

The paper aims to contribute to the literature on the role of intergenerational transfers in shaping household wealth inequality assuming a long-run perspective. In particular, by using the dynamic microsimulation model T-DYMM, it is possible to study the evolution of wealth and its distribution in an ageing society. After a complex process of data cleaning and correction, we obtain a distribution of household wealth that is at maximum coherent (given the available data sources) with the data provided by the national accounts. Then, we project the choices of the Italian households over their wealth in the long-run, inserted in a more complex model that encompasses demographic, labour, pension and tax and benefit modules. Finally, we focus on the dynamics of wealth accumulation with a specific attention on the intergenerational transfers (IGT), in the form of gifts and bequests, as a source of inequality transmission.

Our primary findings indicate the expected surge in the weight of wealth in the Italian economy but, in the long-run, this seems to hold unequally across the population. The net wealth inequality is projected to remain relatively stable until 2040, after which it is expected to rise progressively. Since in the baseline version of the model we do not include uncertainty and neither do we correct for survey non-response at the top of the wealth distribution, our result constitutes a lower bound.

Moreover, to better disentangle the impact of IGTs on wealth inequality, given the increasing life expectancy combined with declining net fertility, we exploit the capabilities of the dynamic microsimulation model to construct various counterfactual scenarios. The first scenario contrasts the simulation with IGTs against one without while the second juxtaposes the Italian IGT tax system with two alternatives: one without taxation and another where people are taxed according to the more substantial French legislation. Our analysis reveals negligible disparity in wealth inequality trends under the current Italian tax system. However, the simulation underscores the potential for a marked reduction in wealth inequality with the adoption of a French-style inheritance and gift tax system.

Our findings and the employed model may offer insights for policymakers who needs to select tools to navigate long-term income and wealth inequality. While our study is rooted in Italian data, we posit that the observed evolution in inequality and IGTs can be extrapolated to other industrialized countries facing an ageing population and other similar demographic and economic challenges.

References

Acciari, P., Alvaredo, F., and Morelli, S. (2021). The concentration of personal wealth in italy 1995-2016. *Italian Department of Finance (DF) WP* No. 13.

Alvaredo, F., Chancel, L., Piketty, T., Saez, E., and Zucman, G. (2017). Global Inequality Dynamics: New Findings from WID.world. *American Economic Review*, 107(5): 404–409.

Atkinson, A. B. (2018). Wealth and inheritance in britain from 1896 to the present. *The Journal of Economic Inequality*, 16:137–169.

Bonci, R., Marchese, G., and Neri, A. (2005). La ricchezza finanziaria nei conti finanziari e nell'indagine sui bilanci delle famiglie italiane. *Bank of Italy Temi di Discussione (TD)* No. 565.

Boscolo, S. (2019). Quantifying the Redistributive Effect of the Erosion of the Italian Personal Income Tax Base: A Microsimulation Exercise. *Economia Pubblica*, 2: 39–80.

Boserup, S., Kopczuk, W., and Kreiner, C. (2016). The Role of Bequests in Shaping Wealth Inequality: Evidence from Danish Wealth Records. *American Economic Review: Papers Proceedings*, 106(5): 656–661.

Brandolini, M., Giarda, E., Moriconi, M., and Loi, M. (2009). Possibili effetti dell'under-reporting sull'analisi della ricchezza finanziaria basata sull'indagine dei bilanci delle famiglie di Banca d'Italia. *Prometeia Rapporto di Previsione* Ch. 8, 123-131.

Bronka, P. and Richiardi, M. (2022). LABSim: A dynamic life course model of individual life course trajectories for Italy. *CeMPA Working Paper Series* No. 5.

Bönke, T., von Werder, M., and Westermeier, C. (2017). How inheritances shape wealth distributions: An international comparison. *Economics Letters*, 159: 217–220.

Cannari, L. and D'Alessio, G. (2018). Wealth Inequality in Italy: A Reconstruction of 1968-1975 Data and a Comparison with Recent Estimates. *Rivista di storia economica*, 34(3): 357–396.

Caprara, D., De Bonis, R., and Infante, L. (2018). La ricchezza delle famiglie in sintesi: l'Italia e il confronto internazionale. *Bank of Italy Occasional Paper* No. 470.

Ceriani, L., Fiorio, C. V., and Gigliarano, C. (2013). The importance of choosing the data set for tax-benefit analysis. *International Journal of Microsimulation*, 1(6):86–121.

Conti, R., Bavaro, M., Boscolo, S., Fabrizi, E., Puccioni, C., and Tedeschi, S. (2023). The Italian Treasury Dynamic Microsimulation Model (T-DYMM): Data, structure and validation. *International Journal of Microsimulation*: forthcoming.

D'Aurizio, L., Faiella, I., Iezzi, S., and Neri, A. (2006). L'under-reporting della ricchezza finanziaria nell'indagine sui bilanci delle famiglie. *Bank of Italy Temi di Discussione (TD)* No. 610.

Deville, J.-C. and Särndal, C.-E. (1992). Calibration Estimators in Survey Sampling. *Journal of the American Statistical Association*, 87(418): 376–382.

Drometer, M., Frank, M., Pérez, M. H., Rhode, C., Schworm, S., and Stitteneder, T. (2018). Wealth and inheritance taxation: An overview and country comparison. *ifo DICE Report* No. 2.

Elinder, M., Erixson, O., and Waldenstrm, D. (2018). Inheritance and wealth inequality: Evidence from population registers. *Journal of Public Economics*, 165: 17–30.

EU Commission (2021). The 2021 Ageing Report Economic & Budgetary Projections for the EU Member States (2019-2070). *Institutional Paper*, 148.

Feiveson, L. and Sabelhaus, J. (2018). How does intergenerational wealth transmission affect wealth concentration? *FED Notes.* www.federalreserve.gov/econres/notes/feds-notes/how-does-intergenerational-wealth-transmissionaffect-wealth-concentration-20180601.htm.

Fessler, P. and Schrz, M. (2018). Private Wealth Across European Countries: The Role of Income, Inheritance and the Welfare State. *Journal of Human Development and Capabilities*, 19: 521–549.

Fize, E., Grimprel, N., and Landais, C. (2022). Can inheritance taxation promote equality of opportunities? *LSE Public Policy Review*, 2(4).

ISTAT (2022). Report Previsioni Demografiche 2021. Italian National Institute of Statistics, Rome. https://www.istat.it/it/files/2022/09/report-previsioni-demografiche-2021.pdf.

Jappelli, T., Padula, M., and Pica, G. (2014). Do Transfer Taxes Reduce Intergenerational Transfers? *Journal of the European Economic Association*, 12(1): 248–275.

Krenek, A., Schratzenstaller, M., Grünberger, K., and Thiemann, A. (2022). Intaxmod: Inheritance and gift taxation in the context of ageing. Technical report, WIFO Working Papers.

Leuven, E. and Sianesi, B. (2003). Psmatch2: Stata module to perform full mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing.

Maitino, M. L., Ravagli, L., and Sciclone, N. (2020). IrpetDin. A Dynamic Microsimulation Model for Italy and the Region of Tuscany. *International Journal of Microsimulation*, 13(3): 27–53.

Morciano, M., Mazzaferro, C., Tedeschi, S., and Pisano, E. (2013). Modelling private wealth accumulation and spend-down in the Italian microsimulation model CAPP_DYN: A life-cycle approach. *International Journal of Microsimulation*, 6(2): 76–122.

Morelli, S., Nolan, B., Palomino, J., and Van Kerm, P. (2021). Inheritance, gifts and the accumulation of wealth for low-income households. *Journal of European Social Policy*, 31(5): 533–548.

Nekoei, A. and Seim, D. (2022). How Do Inheritances Shape Wealth Inequality? Theory and Evidence from Sweden. *The Review of Economic Studies*, 0: 1–36.

Nolan, B., Palomino, J., Van Kerm, P., and Morelli, S. (2021). Intergenerational wealth transfers and wealth inequality in rich countries: What do we learn from Gini decomposition? *Economics Letters*, 199: 1–3.

OECD (2021). *Inheritance Taxation in OECD Countries*. Paris: OECD Publishing.

OECD (2022). *Revenue Statistics 2022: The Impact of COVID-19 on OECD Tax Revenues*. Paris: OECD Publishing.

Palomino, J. C., Marrero, G. A., Nolan, B., and Rodríguez, J. G. (2021). Wealth inequality, intergenerational transfers, and family background. *Oxford Economic Papers*.

Piketty, T. (2011). On the Long-Run Evolution of Inheritance: France 1820–2050. *The Quarterly Journal of Economics*, 126(3): 1071–1131.

Piketty, T. and Zucman, G. (2014). Capital is Back: Wealth-Income Ratios in Rich Countries 1700–2010. *The Quarterly Journal of Economics*, 129(3): 1255–1310.

Pisano, E. and Tedeschi, S. (2014). Micro Data Fusion of Italian Expenditures and Incomes Surveys. *Sapienza University of Rome - Department of Public Economics Working Paper* No. 164.

Rosenbaum, P. R. and Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1): 41–55.

Wolff, E. N. and Gittleman, M. (2014). Inheritances and the distribution of wealth or whatever happened to the great inheritance boom? *The Journal of Economic Inequality*, 12(4): 439–468.

Appendix A Wealth data additional information

Table A1 Correction of financial instruments ownership

	Original (%)	After correction (%)
A: Single financial instrument		
Liquidity	93.3	93.3
Govt. bonds	6.6	19.0
Corp. bonds	5.8	16.7
Stocks	10.3	18.3
Liabilities	15.6	22.3
Total	100.00	100.00
B: Number of financial instruments (liquidity excluded)		
0	82.3	74.6
1	13.3	7.9
2	3.6	6.3
3	0.7	11.1
Total	100.00	100.00
C: Ownership of one financial instrument by:		
Gender		
Men	20.5	29.9
Women	14.6	20.4
Age		
<30	4.0	4.6
30-65	17.2	24.3
>65	19.0	27.6
Geographical area		
North	28.4	39.2
Centre	19.5	32.2
South	3.5	4.3
Degree		
Less than degree	15.6	22.5
Degree	33.5	47.7
HH income quartiles		
First	3.1	3.7
Second	8.6	12.7
Third	20.3	29.9
Fourth	38.8	55.1

Source: authors' elaborations on SHIW 2016

Table A2 Comparison between SHIW (2016) and SILC (2015) main variables adopted for statistical matching

	SHIW (%)	SILC (%)
Female	50.5	57.0
<30	3.7	4.5
30-40	13.8	14.3
40-50	20.7	20.4
50-65	28.1	27.0
65+	33.7	33.7
Foreigner	6.4	8.0
North	47.5	47.7
Centre	20.5	20.5
South	32.1	31.8
Primary	22.13	23.38
Lower Secondary	28.39	28.36
Upper secondary	35.89	33.94
Tertiary	13.58	14.32
Employed	50.19	51.24
Unemployed	5.1	5.32
Inactive	44.71	43.44
HH income (avg)	30,715	34,743
Individual income (avg)	22,118	20,805
no. hh components: 1	33.66	32.39
2	26.70	27.49
3	17.59	19.56
4	16.03	15.81
5	6.02	4.74

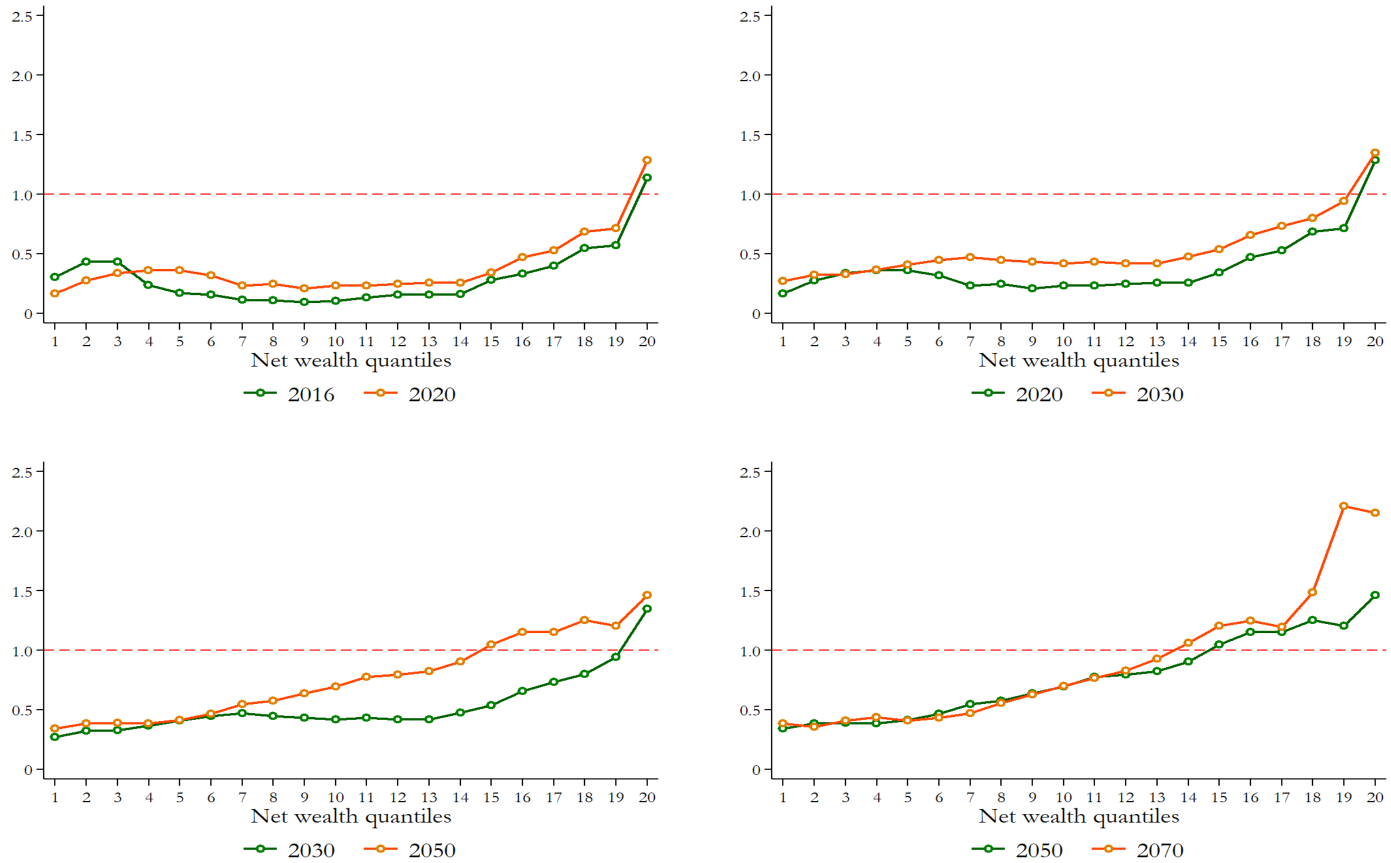
Notes: All results are population-weighted. The individual demographics characteristics refer to the head of household. *Source*: authors' elaborations on SILC 2015 and SHIW 2016

Appendix B Wealth simulation results

Figure B1 Frequency density function for net wealth

Notes: Values are expressed in 2023 prices. Values in thousands of euros on the x-axis. Zero and negative values are excluded. The share of households with zero (negative) net wealth gradually varies from 13.0% (0.6%) in 2016 to 9.9% (1.7%) in 2070. *Source*: Authors' elaborations of simulation results

Figure B2 Ratio between financial wealth and house wealth by quantile of net wealth



Notes: Zero and negative net wealth values are not used in the calculation of quantiles. *Source*: Authors' elaborations of simulation results