

Simulating Long Run Wealth Distribution and Transmission: the role of inter-generational transfers in Italy

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Outline - first part about TDYMM

- T-DYMM: development, general features, data and modular structure
- Wealth module
- Validation
- Future improvements and expansion

Development

- T-DYMM has been developed in three phases:
 - 1° European project (2010-2012): based on MIDAS-IT (derived from MIDAS-BE) and EconLav; developed in Liam 1.0
 - 2° European project (IESS, 2014-2016): new and improved data, move to Liam 2.0, addition of a private pension sub-module, unemployment benefits
 - 3° European project (MOSPI, 2019-2021): new and improved data, improvement of sample representativeness, inclusion of working pensioners, expansion of the disability sub-module, development of a tax-benefit module, a wealth module and a migration sub-module

General features (1)

Dynamic models in Italy

Name	Reference	Survey Data	Administrative data	Cohort/ Population	Open/ Closed	Discrete/ Continuous	Use of alignments	Main uses
CAPP_DYN	Morciano et al. (2013)	IT-SILC	No	P	C	D	Yes	Analysis of the evolution of private wealth and distributional effects
DYNAMITE	Ando and Nicoletti-Altimari (2004)	SHIW	No	P	C	D	Yes	Relationship between demographic structure and saving rate
IrpetDin	Maitino et al. (2020)	IT-SILC	Yes (INPS)	P	C	D	Yes	Focus on future socio-demographic structure of the population and effects of social security programmes in Italy and in Tuscany
Italian Cohort Model	Baldini (2001)	SHIW	No	C	C	D	No	Redistributive effect of welfare state intervention
LABORsim	Leombruni and Richiardi (2006)	RTFL	No	C	C	C	Yes	Analysis of the evolution of the labour force
Michelangeli and Pietrunti's model	Michelangeli and Pietrunti (2014)	SHIW	No	P	C	D	Yes	Focus on households' indebtedness and debt-service ratio to monitor financial vulnerability
MIND	Bianchi et al. (2005)	SHIW	No	P	O	D	Yes	Emphasis on model alignment and validation issues
T-DYMM	Conti et al. (2023)	IT-SILC	Yes (INPS, DF)	P	C	D	Yes	Focus on pensions and social protection adequacy and their related distributional effects

General features (2)

- We draw from previous experiences in the microsimulation field:
 - Demographic module: MIDAS-BE (Dekkers and Belloni, 2009)
 - Migration sub-module: we follow Dekkers (2015) in implementing a cloning procedure for households using Chénard's Pageant algorithm (Chénard, 2000)
 - Option-value model for the retirement choice (Van Sonsbeek, 2010)
 - Wealth module: CAPP_DYN (Morciano et al., 2013)
 - Estimate of tax expenditure beneficiaries: Albarea et al. (2015)
 - Calibration of the starting sample for simulations: raking techniques described in Pacifico (2014)
- T-DYMM's main strenghts:
 - model comprehensiveness, both in terms of simulated events and policies
 - extensive use of highly detailed administrative data
- Limited behavioural responses to changing incentives and policies, no business/growth cycles and recessions

Data (1) - The AD-SILC dataset

- The core of T-DYMM's micro dataset is obtained by linking:
 - Survey data (IT-SILC 2004-2017)
 - Administrative data from INPS (working careers and pensions)
- The record linkage procedure is conducted through individual tax codes
- We call the merged dataset AD-SILC, used both to estimate transition probabilities and to derive T-DYMM's starting sample for simulations
- Exact matching from tax returns and the Cadastre for the 2010, 2012, 2014 and 2016 IT-SILC waves to derive real estate wealth, tax expenditure information and residual income components subject to PIT
- Statistical matching to include information on financial wealth and liabilities from the 2016 SHIW wave (correction for under-reporting)

Data (2) - Wealth data: detailed description

- Information on real wealth is taken from the administrative archives of the Italian Department of Finance (MEF)
 - AD-SILC reduces discrepancy with the National Accounts totals with respect to SHIW
 - Major differences arise when looking at the second houses
- The other component of total wealth is constituted by financial wealth and liabilities, for which we use the information coming from the SHIW
 - We apply an under-reporting correction procedure, the result is that SHIW financial wealth weighted totals accounts for 78.2% of the NA totals
- The connection between the SHIW dataset (after the correction) and AD-SILC is achieved through a matching technique performed at the household level. In this procedure, we conceive AD-SILC as the *recipient* sample and SHIW as the *donor* of some missing information

Data (3) - T-DYMM's starting sample for simulations

- The starting sample is set in 2015 and derived from a single extract of AD-SILC, relative to the 2016 IT-SILC wave linked to administrative data and SHIW data
- Sample weight calibration to improve the representativeness of a series of dimensions we are interested in (e.g. gross income subject to PIT, employees by type of contract, individuals with retirement income by sex and type of pension)
- Expansion of the calibrated starting sample and extraction of the 100,000 best-fitting household sample to administrative totals in order to deal with alignment procedures in dynamic microsimulation (Dekkers and Cumpston, 2012)
- As a result, the starting sample contains 238,431 individuals

Data (4) - Macro data and alignments (1)

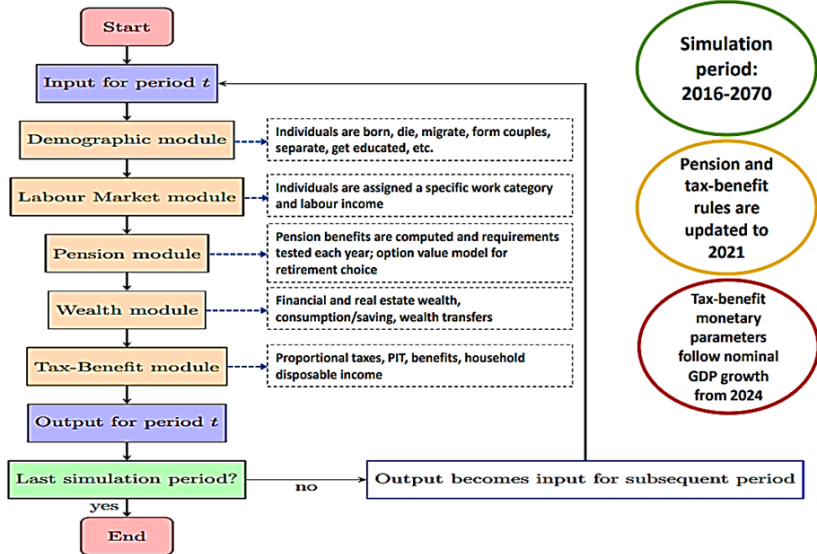
- Exogenous data are used to align a number of patterns within the simulation:
 - **Europop projections**: mortality rate, fertility rate, immigration and emigration by gender
 - **Ageing Report assumptions**: employment rate, inflation, GDP, productivity, disability rate, returns on risk-free assets
 - **Department of Finance**: number of households paying rents, beneficiaries of specific tax expenditures and substitute tax regimes
 - **ISTAT**: probability to leave household of origin, age and country of birth of migrants, education, acquisitions of houses, average propensity to consume
 - **INPS**: occurrence of disability allowances
 - **COVIP**: enrolment in private pension plans

Data (5) - Macro data and alignments (2)

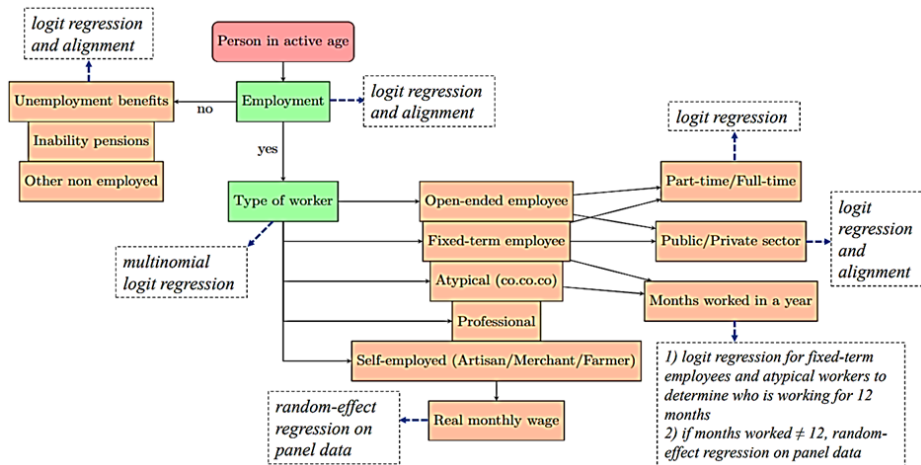
		2020	2030	2040	2050	2060	2070
Demographic	Life expectancy at 65	21.3	22.2	23.1	24.0	24.8	25.6
	Total Fertility Rate	1.3	1.4	1.4	1.4	1.5	1.5
	Net migration flow	160,697	223,984	217,230	214,328	210,477	206,564
Macroeconomic (%)	Real GDP	-9.0	0.4	1.1	1.5	1.4	1.3
	Labour productivity	0.4	1.3	1.7	1.7	1.6	1.5
	GDP deflator	1.4	2.1	2.0	2.0	2.0	2.0
	Consumer Price Index	-0.1	2.0	2.0	2.0	2.0	2.0
Financial (%)	Total return on government bonds	2.4	2.5	3.2	3.5	3.7	3.7
	Total return on corporate bonds	7.9	2.9	3.6	3.9	4.1	4.1
	Total return on equity	11.9	3.4	4.1	4.4	4.5	4.6
	Return on house wealth	4.2	4.3	5.0	5.3	5.4	5.5

Source: Eurostat, European Commission, OMI, S&P 500

Modular structure (1)



Modular structure (2) - How does the model work? An example looking at the Labour Market module



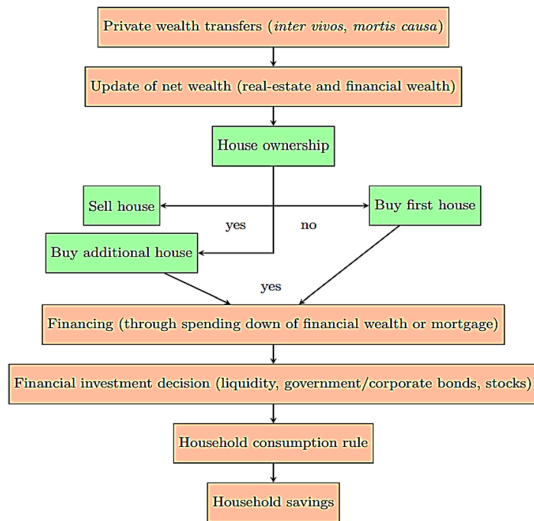
Modular structure (3) - Pensions and benefits simulated in T-DYMM

- Pensions:
 - Old-age/seniority pensions and supplementation to a minimum for pensions (*Integrazione al minimo*)
 - Incapacity pensions: severe incapacity (*Assegno ordinario di invalidità*) and total incapacity (*Pensione di inabilità*)
 - Survivor pensions (*Pensione di reversibilità*, *Pensione indiretta*)
- Social assistance and other benefits:
 - Unemployment benefits (*NASpl*, *Dis-COLL*)
 - Disability allowances: civil disability pensions (*Pensione di invalidità civile*, *Assegno sociale sostitutivo*) and attendance allowances (*Indennità di accompagnamento*, *Indennità di frequenza*)
 - Bonus 80/100 euro
 - 14th month pension (*Quattordicesima*)
 - Old-age support measures: social allowance (*Assegno sociale*), integrations and augmentations to social allowance and *integrazione al minimo*
 - Family allowances (*Assegni al nucleo familiare*), newborn bonus (*Bonus bebè*), mother bonus (*Bonus mamma domani*, from 2017 onwards)
 - Minimum income schemes: SIA; REI; RdC, from 2019 onwards

Wealth module (1) - Motive and main assumptions

- A Wealth module is available only in rare cases in DMMs due to lack of reliable wealth data and modelling complications
- Modelling private wealth is crucial to obtain a more complete picture of disposable income and households' well-being distribution as well as inter-generational redistribution
- Main assumptions:
 - Net wealth = real wealth + financial wealth – liabilities
 - House ownership is the only form of real wealth
 - Financial wealth is divided into four activities: liquidity, government bonds, corporate bonds and stocks
 - Mortgages are the only form of liabilities
- Transition probabilities derived from SHIW waves (2002-2016)

Wealth module (2) - Structure



Wealth module (3) - Wealth updating

Wealth type		2016-20	2021-70
House wealth	Income gain	OMI	Projections based on OMI
Government bonds	Income gain	Implicit rate on debt, AWG	Implicit rate on debt, AWG
Corporate bonds	Income gain	S&P 500	Implicit rate on debt, AWG
	Capital gain	S&P 500	Projections based on S&P 500*
Stocks	Income gain	S&P 500	Implicit rate on debt, AWG
	Capital gain	S&P 500	Mark-up stocks-bonds*
Mortgages		Long-term interest rate, AWG	Long-term interest rate, AWG

Notes: * For the 2021-2023 period a linear convergence is applied.

Wealth module (4) - Wealth module regression estimates

Process	Regression dependent variable	Data source
Financial investment decision	Ownership of government bonds	SHIW 2010-16
Financial investment decision	Ownership of corporate bonds	SHIW 2010-16
Financial investment decision	Ownership of stocks	SHIW 2010-16
Financial investment decision	Ratio of liquidity over total fin. wealth	SHIW 2010-16
Financial investment decision	Ratio of gov. bonds over total fin. wealth	SHIW 2010-16
Financial investment decision	Ratio of corp. bonds over total fin. wealth	SHIW 2010-16
Financial investment decision	Ratio of stocks over total fin. wealth	SHIW 2010-16
Inter vivos transfers	Probability of making transfers	SHIW 2014
Inter vivos transfers	Amount transferred (absolute value)	SHIW 2014
Inter vivos transfers	Probability of receiving transfers	SHIW 2014
Inter vivos transfers	Amount received (absolute value)	SHIW 2014
Inheritance	Probability of receiving inheritance	SHIW 2014
Inheritance	Amount received (absolute value)	SHIW 2014
House investment decision	Probability of buying house	SHIW 2010-16
House investment decision	Log-value of purchased house	SHIW 2010-16
Rent	Probability of paying rent	SHIW 2010-16
Rent	Ratio of rent paid over household income	SHIW 2010-16
Rent	Probability of received rent	AD-SILC 2015
Rent	Ratio of rent received over household income	AD-SILC 2015
Consumption	Log-level of household consumption	SHIW 2002-16

Validation (1) - What does it mean to validate DMMs?

INTERNAL VALIDITY Is the model specified in such a way as to adequately reflect the reality it is supposed to represent?	EXTERNAL VALIDITY Does the model produce results that are credible and robust?
VALIDATION OF ANALYTICAL FRAMEWORK Are the concepts and causal relations that underpin the model clear and properly specified, and in line with the existing literature? DATASET VALIDATION Does the dataset adequately reflect the characteristics of the reality it is supposed to portrait? PARAMETER VALIDATION Are the parameters in the model well specified, and in line with the existing literature? FUNCTION/ALGORITHM VALIDATION Does the model algorithm, and its components, perform as it was designed to?	HISTORICAL CROSS-VALIDATION Is the model able to replicate relevant historical data? PROSPECTIVE CROSS-VALIDATION How do the results of the model compare with alternative prospective exercises? ROBUSTNESS ASSESSMENT How robust are the results of the model?

Source: Liégeois, P., Benjelloul, M., Boscolo, S., Calcagno, L., Conti, R., Dekkers, G. ... and Zhan, P. (2021). *Spotlight report on dynamic microsimulation*. Deliverable 6.9, Leuven, InGRID-2 project 730998 – H2020

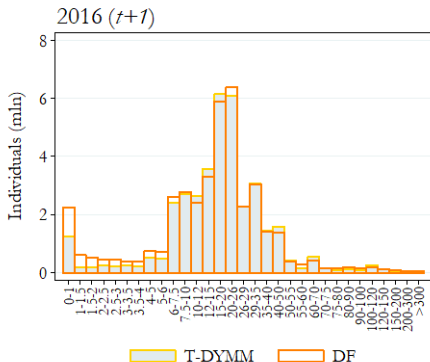
Validation (2) - Dataset validation

Wealth totals in 2015 (in billions of euros)

	T-DYMM	NA	Ratio
House wealth	5,020.3	5,333.3	0.941
Financial wealth	2,543.6	3,146.9	0.805
Liabilities	340.3	692.1	0.492
Net wealth	7,214.6	7,788.1	0.926

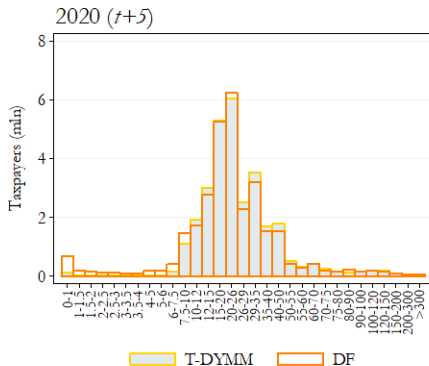
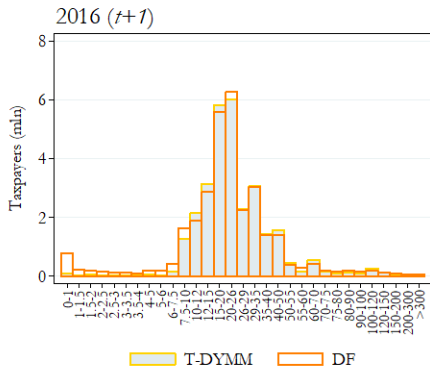
Validation (3) - Historical cross-validation (1)

Frequency density function for gross income subject to PIT
(income groups in thousands of euros)

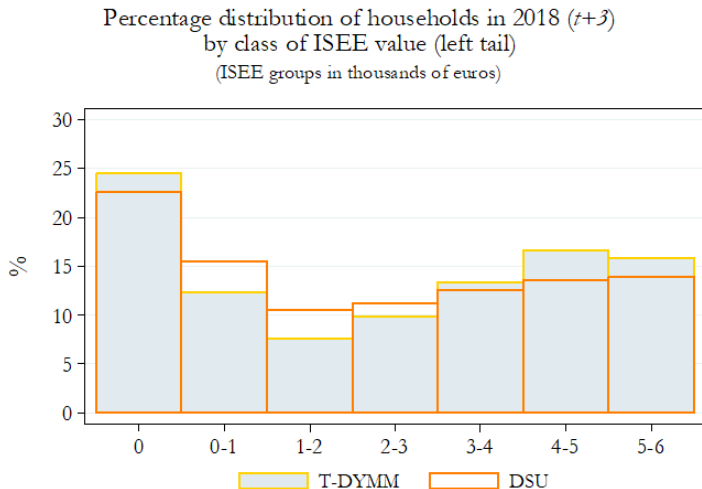


Validation (4) - Historical cross-validation (2)

Distribution of PIT taxpayers by gross income group
(income groups in thousands of euros)

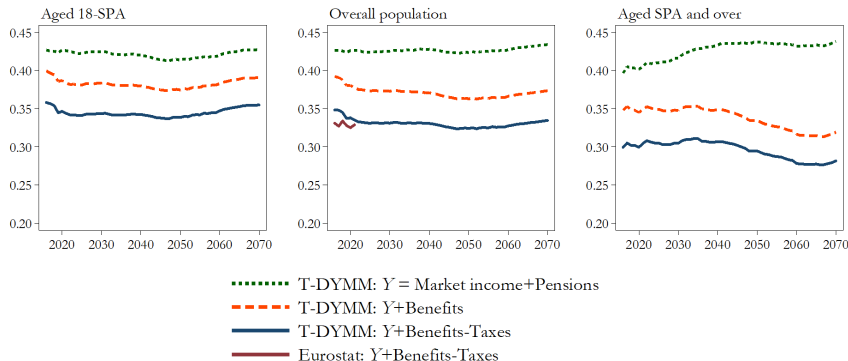


Validation (5) - Historical cross-validation (3)



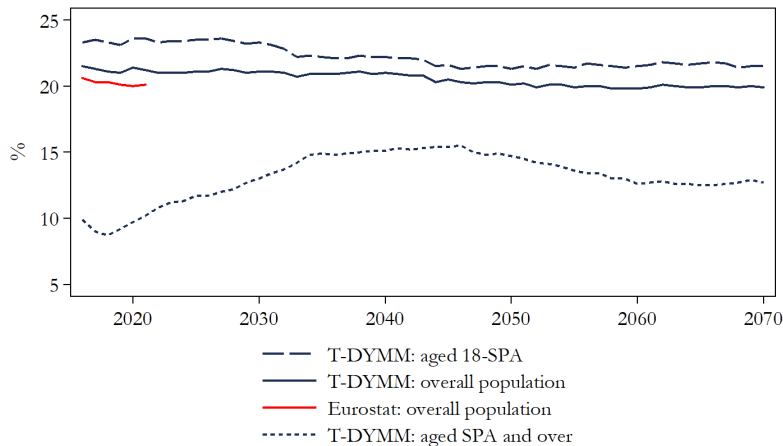
Validation (6) - Historical cross-validation (4)

Gini index for different equivalised income definitions by age group



Validation (7) - Historical cross-validation (5)

Headcount ratio of equivalised disposable income by age group



Future improvements and expansion

- Update legislation
- Heterogeneity in mortality
- Uncertainty in results (bootstrapping methods, random seed)
- Refinement of retirement choices
- Improvement of wealth transmission and accumulation processes
- Labour supply behavioural responses

Outline - second part about IGTs

- Motivation: stylized facts, research question and related literature
- Wealth Module in T-DYMM: wealth accumulation and IGTs related processes
- Simulation results: the wealth weight in T-DYMM and the IGTs long-term role on Italian wealth distribution

Some stylized facts

- Wealth-income ratios are rising all over the world (Piketty and Zucman, 2014). Italy is not an exception (from 3.1 in 1980 to 6.7 in 2020)
- Growing role of wealth has been paralleled by the increase in wealth inequality in this period in Western countries (Cannari and D'Alessio, 2018)
- Inter-generational transfers (IGTs), in the form of inheritances and *inter vivos* gifts, are increasing their weight in the last decades in Italy, both on national income and wealth, as shown by Piketty (2011) for France, Atkinson (2018) for UK and Acciari et al. (2021) for Italy
- Secular trends in population decrease and ageing in major European countries

Stylized facts (1), from Atkinson (2018)

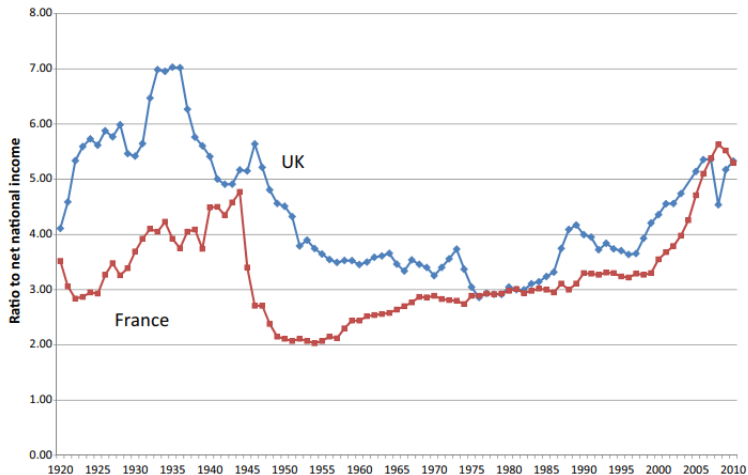
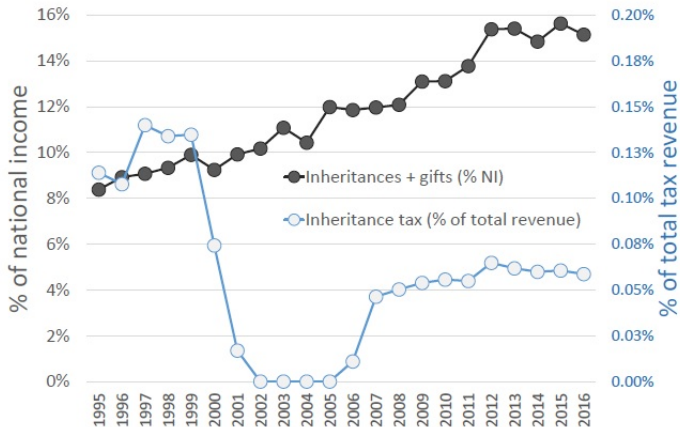


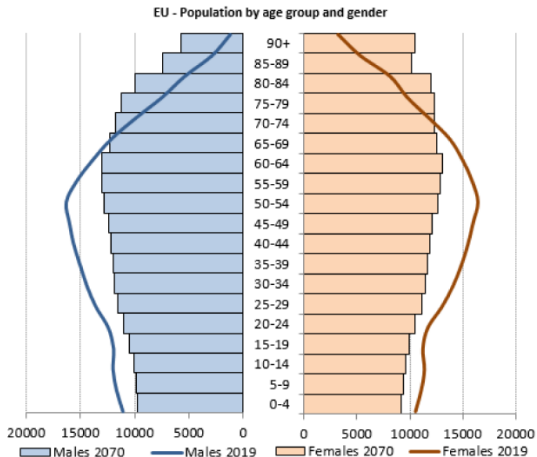
Fig. 10 Ratio of personal wealth to national income France and the UK

Stylized facts (2), from Acciari et al. (2021)



Stylized facts (3), from AWG Report (2021)

Graph I.1.9: **Population by age group and gender, 2019-2070 (thousands)**



Research question(s)

- The aim is to study the likely future evolution of the Italian wealth and income distributions and the peculiar role of IGTs using dynamic microsimulation techniques
- Identify what the pattern in long-term inequality would be if accumulation and transmission behaviours and policies not significantly change
- Microsimulation models are particularly suited for the aims of this paper, since they allow to control in a simplified way for some mechanisms that lead to the accumulation of household wealth
- Italian economy characterized by some peculiarities related with formation and transmission of wealth
 - According to ISTAT, population to fall down to 47 billions in 2070.
 - High wealth-to-income ratios
 - Long transition of the pension system (from DB to a full NDC)

Related literature (1)

- Extent and evolution of inheritances and gifts in Italy: Acciari and Morelli (2020)
- Key role of inheritances in explaining intergenerational wealth mobility, see Adermon et al. (2018)
- Role of inheritances and gifts in shaping wealth inequality: recent contributions by Black et al. (2022) and Nekoei and Seim (2022) using Scandinavian data
- Equalizing effect of inheritances: Wolff and Gittleman (2014).
Un-equalizing effect: Palomino et al. (2021)
- Effect of taxes on inter-generational transfers: Jappelli et al. (2014) on the Italian case
- Behavioural responses to IGT tax, tax planning: Kopczuk (2007), Sommer (2017), Niimi (2019)

Related literature (2)

- Paper and project by Krenek et al. (2022) held by JRC and the European Commission
- The study focuses on the cases of five European countries, namely Finland, France, Germany, Ireland and Italy
- Using HCFS data from ECB, they develop INTAXMOD, a model that allows to simulate wealth transfers and associated inheritance tax revenues in European countries until 2050
- They project that inheritance tax revenues in France and Germany will double by 2050. Finland and Italy will reach this mark in 2040 and an increase by another 40% of today's revenues until 2050
- Their study and results are perfectly complementary to ours, since we use a model that allows to analyze the distributional role of IGTs on wealth as well as the distributional effect of the taxes

Wealth module in T-DYMM

- The process of wealth accumulation in our model is summarized with the following equation.

$$\Delta W_t = S_{t-1} + (1 + r)W_{t-1} + IGT_{t-1}$$

- The simplified dynamics of wealth depends on a limited number of factors, namely the level of savings (and therefore, the saving rate), the rate of returns on financial and house wealth and finally, on the inter-generational transfers

Wealth module in T-DYMM - IGTs (1)

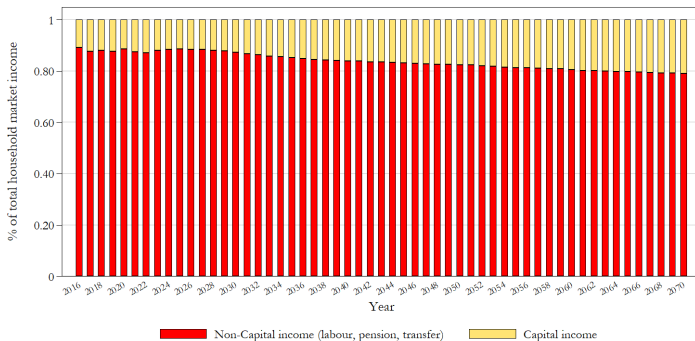
- IGTs are divided into *mortis causa* (inheritances) and *inter vivos* (gifts)
- Inheritance is driven by demography in the sense that the total amount of transferred wealth equals the wealth of the deceased
- Receivers are selected deterministically being the off-springs of deceased individuals if any in the sample, or attributing a probability of receiving inheritance through regressions based on SHIW 2014
- 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
- The *inter vivos* transfers are based on regressions on both donors and recipients sides

Wealth module in T-DYMM - IGTs (2)

- Both inheritances and donations are reduced by the inheritance tax
 - Tax base is constituted by the estate share received by each recipient. The exemption area is set equal to 1 million euros. Then, the tax rate is flat and equal to 4% for spouses and direct relatives and increases for less strict relatives. The same rules apply to intergenerational gifts
- Percentage of households that receive an inheritance once in their life-time in the whole simulation is 29.3%. The percentage of households that receive a gift once in their life-time in the whole simulation is 69.4%
- At the moment the model does not incorporate any specific behavioural response to inheritance, however, the consumption rule that set the level of consumption/saving takes into account the level of household financial wealth as a control

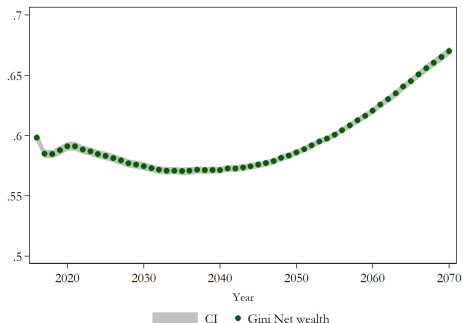
Results (1) - Recognizing the weight of wealth

- Relevance capital incomes in explaining household market income inequality after Gini decomposition (following methodology by Lerman and Yitzhaki (1985))



Results (2) - Shaping wealth inequality in the long-run

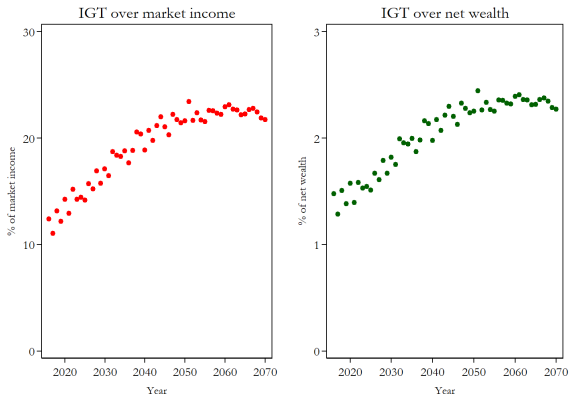
- Evolution of household net wealth inequality, Gini Index



- The average number of household components decreases over time from 2.3 in 2016 to 1.8 in 2070. The rise in small households implies logically that the number of heirs reduces over time (from 1.9% of the sample in 2016 to 0.9% in 2070)

Results (3) - The growing relevance of IGTs

- Inheritance and gifts as a share of household income and wealth

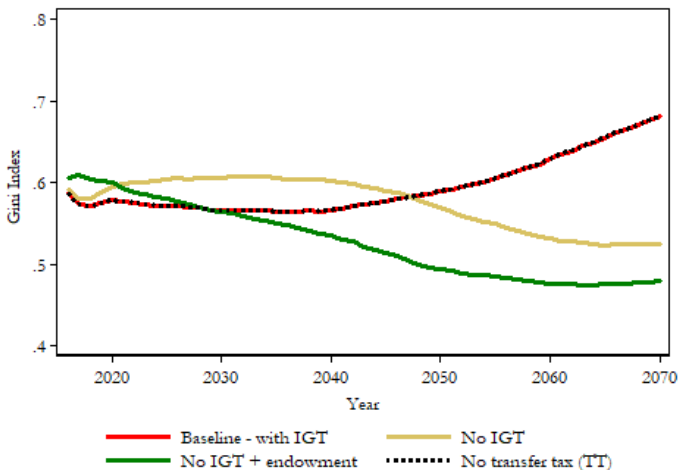


Results (2&3): Wealth inequality, role of IGTs (1)

- We exploit the potentialities provided by the dynamic microsimulation model as a tool to understand the effect of intergenerational transfers on wealth distribution
- We did so by building different counterfactual scenarios
 - ① No IGTs: the IGTs are not simulated. Households can not receive any additional wealth through this channel. Depleted wealth owned by the deceased is not redistributed
 - ② No IGTs + endowment. Depleted wealth owned by the deceased is redistributed through an endowment of equal size to the whole population of households
 - ③ No Transfer Tax: the IGTs are simulated but they are not taxed

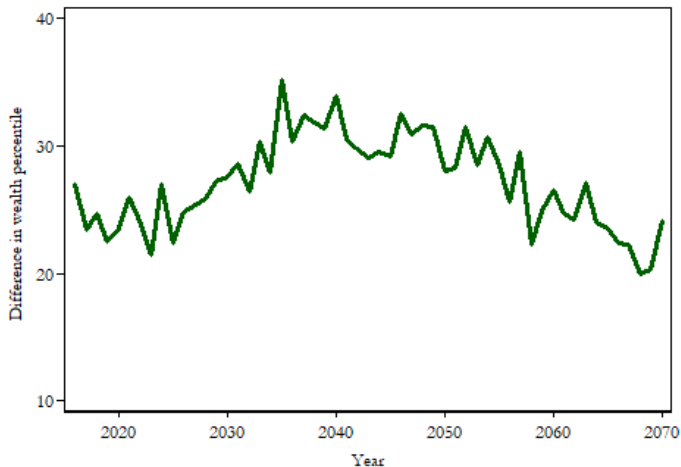
Results (2&3): Wealth inequality, role of IGTs (2)

- Evolution of household net wealth inequality with different counterfactuals



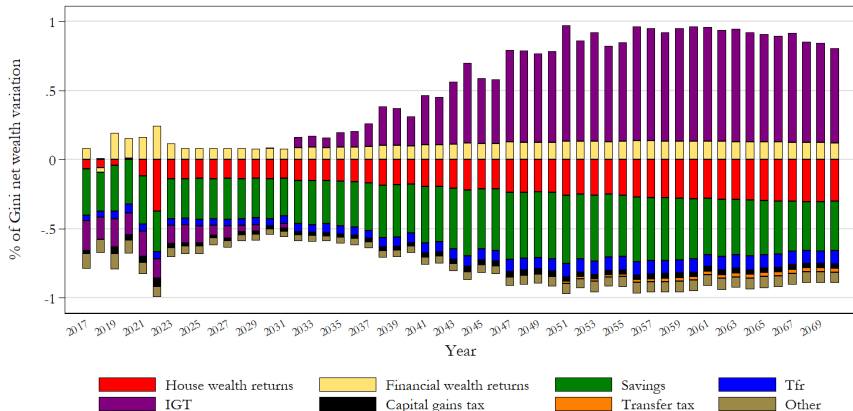
Results (2&3): Wealth inequality, role of IGTs (3)

- Micro-level: Short-run effect of inheritances and gifts by comparing the distribution of wealth with/without IGTs



Results (2&3): Wealth inequality, role of IGTs (4)

- Decomposition of Gini of household net wealth variation
- Disequalizing effect of IGTs emerging from 2030



Caveat and work in progress

- Simulated data are NOT real data! The microsimulation model is useful as a tool to study what-if scenarios
- Baseline dataset: specific correction of the upper tail of the distribution (Forbes rich list)
- Introduce uncertainty with confidence intervals
- Behavioural responses to inheritances (especially in the labour market)
- ...

Conclusions

- We build a reliable wealth dataset on Italy based on integrated survey-administrative data sources. We studied the long-term IGTs phenomenon within a DMM framework
- Explaining factors of the expected surging role of IGTs in shaping wealth inequality:
 - Steady and positive projections on returns that provide stable wealth accumulation and appreciation
 - Reducing fertility rates and household size lead to a reduction of the average number of successors
 - Rise in the inequality of inheritances
- The un-equalizing effect of IGTs becomes strong after 2035, coinciding with the death of individuals born in the 50s and later (baby boomers generation)
- Policy implications: it is probably worthwhile to reconsider the policy and tax framework regarding inheritances and gifts towards a more egalitarian direction, as suggested by Krennek et al. (2022)

Further developments

- T-DYMM 3.0 will make it possible to carry out long-term and inter-generational (re)distributive analyzes that jointly take into account aspects related to public pension wealth and private accumulation
- Long pension system transition and the changing inter-generational redistributive mechanisms inherent in the pension system
- Simulation of policy reforms scenarios (both on the inheritance and pension side)

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Thank you!

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