# Inheritance Expectations and Education*

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July 2024

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**Abstract**

Economic and demographic factors underpin the rising importance of inheritance flows across advanced economies. Based on Italian data about expected and realized inter-generational asset transfers, this paper shows that their influence extends before transfers and beyond assets, uncovering a strong, positive conditional association between inheritance expectations and the pursuit of higher education. This association is driven by expected housing wealth, pointing at long-run determinants. The intention to leave a bequest, in fact, is strongly associated with having received one, or the expectation to receive one in the future, consistently with heterogeneity and persistence in dynastic altruism. I rationalize the empirical findings through a simple analytical model where dynastic altruism, connecting anticipated inheritances with bequest motives, shifts the inter-temporal trade-off associated with education, thus perpetuating inter-generational disparities in education and income. Through a richer quantitative lifecycle model, I show that heterogeneity in bequest motives can account for around 40% of the observed gap in student rates. Finally, through a set of counterfactual exercises, I illustrate how the strength of the positive link between inheritance expectations and education critically rests on high short-term costs and low expected long-term benefits from the latter within the lifecycle.

**Keywords:** inter-generational mobility, human capital, education, inequality, inheritance

**JEL Codes:** I23, I24, J24, J62

*I am indebted to my advisors Ramon Marimon and Thomas Crossley for their guidance and support. I would like to thank Marta Cota and Victor Saldarriaga for their insightful discussions, and seminar and conference participants at BSE Jamboree, Helsinki PhD Workshop on Economics of Education, EALE 2023, UPF-CREI Macroeconomics Lunch, 1st Imperial College PhD Conference in Economics and Finance, and EDP Jamboree 2024 for helpful comments and suggestions. I am also very grateful to Isaac Baley, Jordi Caballé, Andrew Caplin, Edouard Challe, Monica Costa Dias, Julián Díaz Saavedra, Mariacristina De Nardi, Matthias Doepke, Jonathan Heathcote, Christopher Flinn, Nezih Guner, Hamish Low, Joan Llull, Andrej Mijakovic, Alessandra Peter, Luigi Pistaferri, Björn Richter, and Hanna Wang for their generous feedback.

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# 1 Introduction

Inter-generational persistence in wealth, income, and education affects efficiency and fairness of our societies, along with their perception. As a consequence, a rich literature has studied the importance of family background and resources on early life decisions and their long-term repercussions over the lifecycle (Becker and Tomes, 1979, 1986; Huggett et al., 2011). Much less attention, however, has been devoted to *expectations* concerning the transmission of family resources across generations, and their potential impact on social mobility (and lack thereof).

This paper, to the best of my knowledge, is the first to focus on how the *expected* transmission of wealth matters for one of the main drivers of social mobility: higher education decisions. It is *ex ante* far from obvious why, and how, expectations of wealth transmission in the potentially very distant future might affect education decisions at the beginning of the lifecycle. First, features correlated with future inheritances that might influence enrollment in higher education should be captured by other contemporaneous factors, such as family wealth, or co-residence arrangements. Second, if an association were indeed present, its direction would be theoretically ambiguous. On the one hand, expecting an asset windfall might alleviate some of the pressure to accumulate wealth in the short-run through labour income, thereby incentivizing higher education. On the other one, the so-called Carnegie Conjecture posits a disincentivizing effect of anticipated inheritance on broadly defined effort (Holtz-Eakin et al., 1993; Doorley and Pestel, 2020; Brown et al., 2010), corresponding, in economic terms, to a magnification of contemporaneous marginal disutilities, such as those associated to education through foregone consumption.

In this paper, based on extensive Italian micro-data about both realized and expected inheritances and bequests, I uncover a strong positive association between inheritance expectations and enrollment in university, indicating that the relevance of inter-generational asset transfers extends beyond transferred assets, and before such transfers realize.

From the data, I also expose remarkable persistence along and heterogeneity across dynasties in the preference for altruism: having received or expecting to receive an inheritance is a strong predictor of intending to leave a bequest, other things equal. This heterogeneity in *dynastic altruism* is the key theoretical mechanism I rely on to rationalize the empirical link between education and inheritance expectations. Expecting an inheritance is associated with stronger bequest motives, which, akin to a patience multiplier, allows youths anticipating a wealth transfer to accumulate more human capital and thus increase their life-time earnings. Inter-generational persistence in education, income, and wealth ensues.

I integrate this insight into a rich partial equilibrium life-cycle model featuring heterogeneity in dynastic altruism, productivity, and education taste along with multiple sources of uncertainty. Under the estimated parameters, the model matches remarkably well several targeted empirical moments pertaining to education choices, consumption-savings dynamics, and the relationship between dynastic altruism and human capital. Quantitatively, while heterogeneity in bequest motive explains around 40% of the positive empirical association between inheritance expectations and higher education, and differential co-residence patterns another 20%, the actual financial transfer itself, as predicted by the Carnegie Conjecture, plays a significant disincentivizing effect on human capital accumulation. Finally, the model allows me to perform a set of counterfactual exercises, concerning estate taxation, income support for young students, and different wage profiles over the lifecycle. Despite different setups, all exercises show how the strength of the link between dynastic altruism and education critically rests on the balance between short-term costs of education and its expected benefits over *and within* the lifecycle. As a consequence, large scholarships for students, or faster and higher education wage premia, severely weaken the association between expected inheritance and human capital decisions. Conversely, higher estate taxation strengthens it. These results bear implications for both policy – as the prominence of altruistic preferences in determining education choices at the individual level reverberates at the aggregate level, affecting graduates' pool of skills and equilibrium wages – and theory – as they can help explain the dynamics and heterogeneity of wages, within and across labour markets.

The focus on Italy originates in the availability of a rather unique cross-sectional dataset on inheritance *expectations* provided by the Bank of Italy. In addition, demographic, economic, and cultural features make Italy a particularly fitting context to address the transmission of education, income and wealth across generations. First, Italy is an old, ageing country.[1] Its share of under 15 and over 65 are, respectively, the lowest and the highest amongst European countries in the OECD, and fertility rates are extremely low (Guner et al., 2020; Villari and Tabellini, 2010). These demographic trends have mechanically increased the relative importance of inter-generational wealth transfers over disposable income, reinforced by persistently stagnant growth and high private wealth, in particular in terms of housing stock (Acciari and Morelli, 2020). As a result, from 1995 to 2016, the relative weight of inheritances and gifts distributed every year over household disposable income has almost doubled, from below 10% to more than 18%. Second, Italy is characterized by strong inter-generational persistence in educational attainment, dismal tertiary education rates, and a low higher-education wage premium. According to estimates by Corak (2013), the intergenerational elasticity of earnings in

[1] Figures and tables supporting motivating facts can be found in Appendix A.

Italy is around 50%, whereas the university earnings premium for male in the age group 25-34 is only slightly above 10%. This paper thus contributes to the literature on the idiosyncracies of the Italian economy, providing (i) an empirically grounded theoretical explanation for intergenerational persistence in estate transmission (Acciari et al., 2021a; Jappelli and Pistaferri, 2005; Acciari and Morelli, 2020), and (ii) a complementary explanation for the feedback effects between low education rates and low returns to education, and their relationship with low social mobility (Checchi et al., 1999; Hoffmann et al., 2022; Acciari et al., 2021b). Furthermore, I offer new insight on the complementary role of co-residence patterns, famously long-lasting in Italy (Manacorda and Moretti, 2006; Giannelli and Monfardini, 2003).

Despite the focus on Italy, however, the empirical results and theorethical hypothesis of this paper are consistent with two among the most important findings of the recent literature on education and inequality. First, the correlation across countries between lifetime income inequality and intergenerational correlation in educational attainment – the so-called "Educational Great Gatsby Curve" (Blanden et al., 2023). Countries where lifetime income is distributed more unequally also exhibit larger inter-generational persistence in educational achievements. This relationship holds even though there is almost no correlation between the former and disparities in skills *per se*, as measured through standardized tests. Granting a role for anticipated transmission of wealth in determining education achievements, at the expenses of innate ability, can help rationalize this puzzle. Second, educational inequality is very persistent across generations, well beyond the parent-child pair (Adermon et al., 2021). Heterogeneity in dynastic preferences for altruism can help account for this fact.

The first part of this paper illustrates the empirical results. I exploit a special supplement attached to the 2002 edition of the Bank of Italy's Survey on Households' Income and Wealth (SHIW), specifically targeted at expectations concerning inheritances and bequests. Controlling for a rich vector of individual and household level variables, including parental wealth, income, and education, I document a strong positive association between inheritance expectations and enrollment in higher education. My baseline estimates suggests that, *ceteris paribus*, expecting an inheritance is associated with an increase in the likelihood of being enrolled at university of 15.5–18.3 percentage points. The predicted probability of enrollment, moreover, is increasing in the amount individuals expect to inherit. I test the robustness of this association on a longer time period. The SHIW panel data, ranging from 1989 to 2016, includes one question about how households acquired their housing, which appears to be the asset component responsible for the observed positive conditional correlation, consistently with a rich literature addressing the ties between housing wealth and education (Kaplan, 2012; Lovenheim, 2011). Despite the different source, the estimated coefficient of expected housing inheritance on education remains positive.

Focusing on real estate inherited by the household addresses two potential concerns. First, if one might suspect parents express their intention to leave a bequest as a consequence of their heirs' enrollment at university, this cannot possibly apply to inherited real estate. In other words, this rules out reverse "causality".[2] Second, it downplays the potential relevance of confounding factors such as *inter vivos* transfers, which might be partially correlated with both enrollment decisions (Keane and Wolpin, 2001) and the expressed intention to bequeath. Intergenerational asset transmission embedded in family dwellings does not arise as a result of short-term altruistic transfers.

Jointly, these empirical facts strongly suggest the presence of long-term drivers associating expected inheritance and education decisions. Focusing on the anticipated transmission of assets, I contribute to the limited literature on the role of inheritance expectations in determining individual choices early in life. Where other papers stressed their impact on physical capital transmission (De Nardi, 2004), savings (De Nardi, 2004; Weil, 1996) or the labour supply (Kindermann et al., 2020), I study their influence in the transmission of human capital across generations. Furthermore, the unique Bank of Italy's survey item allows me to study inheritance expectations directly, rather than imputing them *ex-post* from realized asset transfers, which have been studied more extensively, along with their impact on capital accumulation and/or entrepreneurial decision (Cagetti and De Nardi, 2006, 2009), or education itself (Alonso-Carrera et al., 2008).

Lending support to the intution that long-term factors underpin the association between inheritance expectations and education choices, I document that household heads who have received an inheritance, or expect to receive one in the future, are much more likely to intend to leave a bequest, other things being equal. Household heads who have received an inheritance in the past are up to 55 pp more likely to intending to leave a bequest, holding household's current wealth and income constant. This points at strong dynastic heterogeneity and persistence in the preference for inter-generational altruism. With this second empirical result, I contribute to the rich literature documenting the importance of inter-generational transmission of preferences (Falk et al., 2018; Doepke and Zilibotti, 2008) by focusing specifically on the persistence of the preference for altruism.

I propose a simple 2-period analytical model to rationalize these findings, using the uncovered dynastic altruism as core mechanism. The strength of the bequest motive, increasing

[2]Reverse "causality" would nevertheless be extremely implausible in the cross-section analysis too, as it would imply a full-commitment joint decision by all siblings to undertake higher education

in anticipated inheritance, reproduces the positive association between the latter and education. In this framework, anticipating an inheritance acts as a patience multiplier, shifting the intertemporal trade-offs associated to education. It decreases the relative importance of its upfront costs in the first period, in terms of foregone labor earnings, vis-a-vis its long-term benefits, namely the ability to leave a more generous bequest through higher labor earnings in the second period. This heterogeneity in dynastic altruism – which I label the *late-life* determinant – can therefore trump the disincentivizing effect of inheritance receipt *per se* (i.e., the *mid-life* determinant). By linking the preference for altruism with education choices, I combine insights from the literature investigating the heterogeneity of time discount factors within and across dynasties (Krusell and Smith, 1998), along with its connection with precautionary savings (Boar, 2021) and its impact on the multi-generational persistence of status (Alesina et al., 2022), and education (Toews and Vézina, 2021). In addition, the positive association between expected inheritance and education can be further stregthened by heterogeneity in *early-life* co-residence patterns: youths expecting an inheritance, being more likely to live with their parents, have a higher ability to bear the short-term costs of education in terms of private consumption.

Building on this analytical representation, I introduce a quantitative lifecycle model in partial equilibrium. Agents who are *ex ante* heterogeneous with regards to productivity, altruism, taste for education and parental human capital, can acquire university education at the beginning of their lifecycle, with positive expected returns in terms of lifetime earnings. The calibrated model matches carefully selected data moments pertaining to persistence in dynastic altruism, capital accumulation, and education achievements, fully capturing the positive relation between the latter and expected inheritance. I quantify the relative importance of different determinants across the dimension of time and the type of transfer in determining student gaps. Heterogeneity in the late-life determinant can explain around 41% (-4.7 pp) of the observed difference in student rates across dynastic altruism groups, whereas heterogeneity in early-life co-residence patterns is responsible for 16% (-1.9 pp). The mid-life channel runs in the opposite direction, implicitly vindicating the Carnegie Conjecture, since 14% (1.6 pp) more youngsters expecting an inheritance would be enrolled if nobody expected any inter-generational financial transfers. Unexplained heterogeneity is left to account for a residual implied 52.7% gap across groups.

I finally leverage the quantitative model to perform a few counterfactual exercises.

First, I simulate the effect of introducing meaningful estate taxation. This increases student gaps across groups: youths expecting an inheritance expect lower asset transfers (which incentivizes education decisions given the negative impact of the mid-life determinant) and need to accumulate more assets to feed the same bequest motives, given the introduction of a wedge between gross and net bequests. For youths expecting no inheritance, the mid-life determinant is unaffected by definition, and their already weak bequest motives are further constrained by estate taxation. As a consequence, student rates increase more, or decrease less, among the former than the latter. The gap is increasing in the estate tax rate.

Second, I complement estate taxation with unconditional income support for students. Here, enrollment rates increase quite uniformly across groups, due to the lower short-term costs of education. As a consequence, the student gap decreases, although not in percentage point terms. Both under a low intensity tax-and-transfer scenario and with higher taxes and transfers, the regression coefficients on binary expectations fall substantially, whereas the relevance of continuous expectations depends on how high estate taxes are – the higher the tax rate, the weaker the mid-life disincentivizing impact of expecting an inheritance, the stronger the estimated coefficient.

Third, I alter age-education earning dynamics. In turn, I (i) remove any uncertainty surrounding education wage premia and their evolution along the lifecycle, (ii) increase the wage premium for young adults while keeping lifetime income expectations constant, and (iii) raise the education premium by 10%. Across the three exercises, the student gap across groups narrows, especially when lifetime returns to education are inflated: student rates among youths expecting no inheritance are lifted by + 4.5 pp vs 2.0 pp for those who expect some, weakening the influence of dynastic altruism on human capital accumulation.

The counterfactual exercises show that the association between dynastic altruism and education relies on a combination of high short-term costs and sufficiently low expected long-term benefits of education. If the former decreases, via income support for students, or the latter increases, via higher, or faster, expected earnings for individuals holding a degree, this association declines, as upsides to education *within the lifecycle* become relatively more important vis-a-vis late-life motives. Understanding the marginal role of the inter-generational transmission of preferences in determining individual education choices, hence aggregate human capital distribution, can help shed light on the determinants of wage growth and wage gaps, both within and across labour markets (Adda and Dustmann, 2023; Doepke and Gaetani, 2022; Bianchi and Paradisi, 2024).

The rest of the paper is organized as follows. Section 2 outlines the original data, the various procedures to obtain appropriate estimates of inheritance expectations, and the empirical results. Section 3 illustrates the analytical model, isolating the channel at the core of my theoretical explanation. Section 4 expands on this insight with a richer quantitative lifecycle one, calibrated according to procedures outlined in Section 5. Section 6 describes the results and quantify the relative importance of various channels at play, and Section 7 evaluates counter-factual scenarios. Section 8 concludes.

# 2 Empirics

## 2.1 Data

The Bank of Italy's Survey on Households' Income and Wealth (SHIW) contains detailed information at household and individual level on, among others, income, wealth, and education. The regular bi-annual questionnaire for panel households does not include any item on bequests and related expectations.[3] However, editions 1991, 2002, 2014 and 2018 of the survey feature questions on received and/or expected bequests for a subset of households.

I focus on the 2002 edition, since it is the only one featuring questions on *expected* bequests and inheritances, including their amounts, on top of realized inheritances/gifts. Appendix B.1 outlines in detail all relevant survey questions, whereas Table 1 lists the most important summary statistics on bequests and inheritances at household level.[4] An important limitation is that these questions are only asked to household heads (defined as the household's breadwinner) and spouses. Focusing on youths' education decisions requires imputing inheritance expectations to individuals who are in most cases too young – at least according to Italian standards – to be household heads or spouses and usually co-reside with their parents. As shown by Figure 1, Italian youths tend to co-reside for a very long time with their parents: among sampled households, around 90% of individuals have not left their family house by the age of 25. The same holds true for students and graduates within the same age bracket.

Table 1: Summary statistics on bequests

| **Question** | **Answer: Yes** | **Answer: No** | **Answer: Unsure** |
|---|---|---|---|
| Ever received inheritance/gift? | 2,498 (24.08%) | 7,874 (75.92%) | – |
| Ever transferred bequest/gift? | 265 (2.55%) | 10,107 (97.45%) | – |
| Expect to receive inheritance/gift? | 1,476 (14.23%) | 8,896 (85.77%) | – |
| Expect to leave bequest/gift? | 4,768 (45.97%) | 2,881 (27.78%) | 2,723 (26.25%) |

To impute consistent inheritance expectations to young co-residents, I drop households whose heads and spouses are uncertain about whether they will leave any bequest (one fourth

[3] The only exception being the source of households' real estate property. More on this in 2.3.2.

[4] Henceforth, all summary statistics and econometric results will be obtained through the use of household-specific survey weights provided by the Bank of Italy.

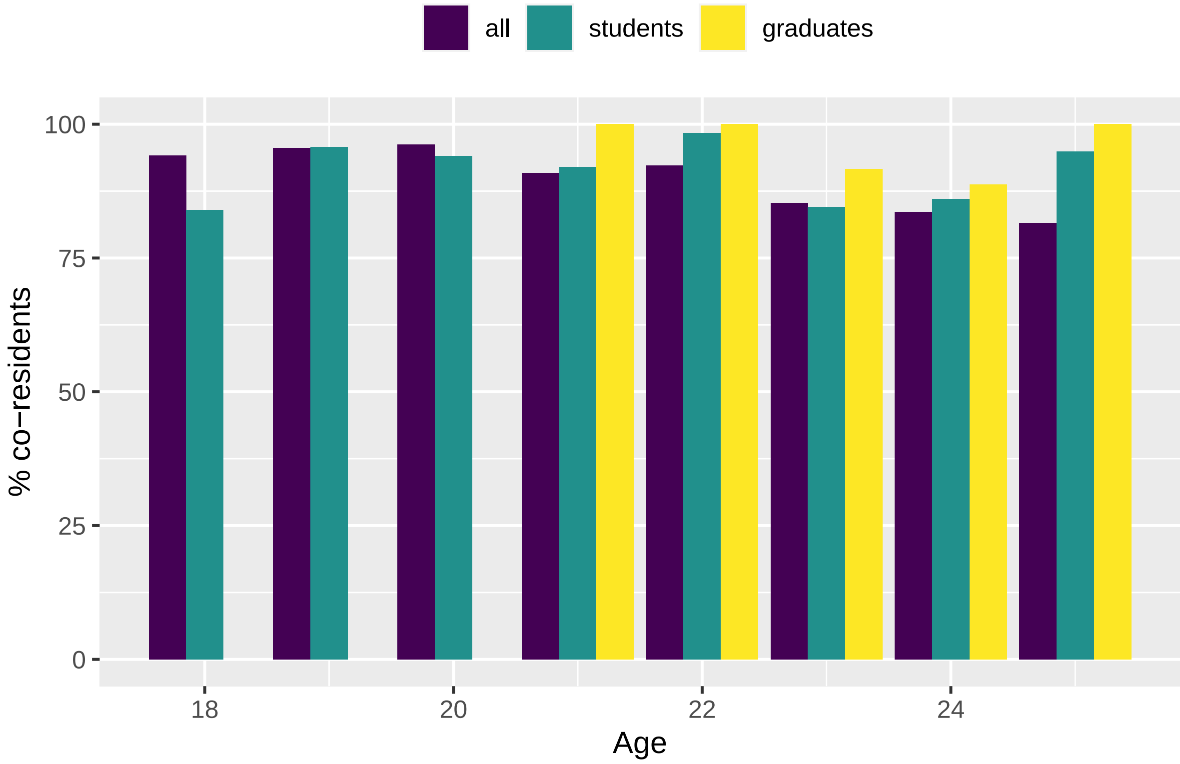


Figure 1: Share of co-residents within education, student status and age group.

of the total),[5] and consider only those destined for children and grandchildren. Imputed co-residing youths' binary expectations simply correspond to (at least one of) their parents' binary intention to leave a bequest. For imputed expected amounts, I first calculate the total number of parental children, living both within and outside the household, and then divide the planned bequest amount by the total number of heirs. Henceforth, all results and considerations on young co-residents' expected inheritance refer to the variables described above.

| **Expected inheritance:** | **No (N = 402)** | **Yes (N = 767)** |
|---|---|---|
| Age (median) | 24.0 | 24.0 |
| Age (mean) | 24.3 | 24.4 |
| Net hh wealth, per capita (median) | 0.11 | 0.54 |
| Net hh wealth, per capita (mean) | 0.35 | 0.86 |
| Net hh wealth in housing, pc (median) | 0.10 | 0.50 |
| Net hh wealth in housing, pc (mean) | 0.27 | 0.67 |
| Parental income (median) | 0.17 | 0.27 |
| Parental income (mean) | 0.22 | 0.33 |

Table 2: Summary statistics by expected inheritance (co-residents aged 18-33, monetary values in 100k euros)

Tables 2 and 3 report a list of important individual and household characteristics across

[5]Table 27 in Appendix B.1 shows that results are robust to the inclusion of an intermediate category for household where expectations are uncertain.

two groups, co-residents who expect no inheritance and those who expect some. Unsurprisingly, those expecting an inheritance tend to come from families with larger wealth holdings and higher earnings. The share of men is higher among those who do not expect an inheritance, although in both groups it is higher than 50%, as women tend to live independently relatively earlier. The average and median age are almost identical, while the proportion of individuals living in the North or in the Centre is higher amongst those who expect an inheritance, showing, perhaps unsurprisingly, that in the South it is less common to transmit wealth, given its lower starting levels.

| **Expected inheritance:** | **No (N = 402)** | **Yes (N = 767)** |
|---|---|---|
| Sex: | | |
| Man | 59% | 53% |
| Woman | 41% | 47% |
| 3-class geographic area: | | |
| North | 22% | 42% |
| Centre | 11% | 25% |
| South | 68% | 33% |
| 4-class municipality size: | | |
| 1-20,000 | 37% | 49% |
| 20-40,000 | 22% | 14% |
| 40-500,000 | 27% | 24% |
| 500,000+ | 14% | 12% |
| Graduated father | 7.5% | 7.0% |
| Graduated mother | 2.8% | 6.9% |

Table 3: Summary statistics by expected inheritance (co-residents aged 18-33)

## 2.2 Empirical setting

**Specifications.** In most of the following empirical analysis, the dependent variable is a dummy expressing university student status.[6] Denoting student status by $y_i$, I estimate:

$$Pr(y_i = 1 | \mathbb{E}(B_i), \mathbf{X_i}) = L(\alpha + \beta\,\mathbb{E}(B_i) + \gamma \mathbf{X_i}) \qquad (1)$$

where $L$ represents a standard logistic function, $\mathbb{E}(B_i)$ expected inheritance and $\mathbf{X_i}$ a vector of individual and household covariates (in the baseline scenario: parental income, household net wealth per household member, the household macro-region, a 4-category variable referring to the size of the municipality of residence, parents' education level, the number of siblings, sex and a polynomial in age). When including in the sample both co-residents and autonomous young individuals, I drop parental income and household net wealth per houshold

[6] In Appendix B.1, I also consider alternative binary regressands.

member.

The rationale for focusing mainly on student status, rather than on education level, is subtle, and easy to relax – as I do in Appendix B.3. First, expecting an inheritance could impact education choices not only through the *decision* whether to enroll, but also, conditional on such decision, through the *duration* of studies. If that channel was indeed present, focusing on student status would be the most natural choice. Second, perhaps not importantly from a practical point of view but surely from a theoretical one, the cross-sectional structure of the data only allows me to claim a possible link between *current* expectations and decisions. An individual's achieved education level might partly be the result of decisions taken under different expectations, and no association between the two can be inferred from the simple observation of one wave of survey data. Note however that, given the limited size of the sample of graduates in the survey within this age cohort, results including graduates are very similar.

**Samples.** The main sample includes co-residents aged 18-25, i.e. those for whom education decisions are most relevant at the present moment. As a robustness check, and in order to expand the sample size, I also reproduce results for co-residents aged 18-33, the age bracket where at least 1% of individuals are higher education students at any age. This also seems a balanced compromise considering the trade-off between sample size and proportion of individuals still co-residing with their parents. In most cases, I also discard from my sample young individuals living independently, since this allows me to control for potentially crucial household-level variables such as wealth and income, and net out the potential bias of the estimate associated with expected inheritance due to its correlation with other financial channels.[7]

## 2.3 Results

The first two columns of Table 4 shows the the coefficients estimated on expected inheritance in terms of monetary amounts (expressed in 100k €s), in the first row, and through a binary variable in the second one. This sample includes all individuals in the respective age bracket, independently from whether they live separately from their parents or co-reside with them. On the one hand, this allows me to have the largest possible sample. On the other, this prevents me from including in the regression important financial controls that the SHIW dataset only collects at household level.

To appropriately control for individuals' economic background, I therefore focus on the subsample of young co-residents, for whom financial variables are largely attributable to parental efforts. The last three columns of Table 4 shows that the amount of expected inheritance is posi-

[7]This is why Manacorda and Moretti (2006) only rely on father's age to estimate across parental and children samples, thereby losing information on parental wealth.

Table 4: Inheritance expectations and education (cross-section 2002)

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | student | | | | |
| Expected inheritance (€) | 0.301*** | 0.111** | 0.317*** | 0.307*** | 0.275*** |
| | (0.085) | (0.046) | (0.086) | (0.086) | (0.092) |
| Expected inheritance (0-1) | 0.747** | 0.619** | 0.746** | 0.713* | 0.685* |
| | (0.322) | (0.272) | (0.367) | (0.374) | (0.377) |
| Hh economic covariates | No | No | Yes | Yes | Yes |
| Squared parents' income | No | No | No | Yes | Yes |
| Wealth components | No | No | No | No | Yes |
| Group | All | All | Co-residents | C-R | C-R |
| Age | 18–25 | 18–33 | 18–25 | 18–25 | 18–25 |
| Observations | 683 | 1,445 | 617 | 617 | 617 |
| *Note:* | | | | | *p<0.1; **p<0.05; ***p<0.01 |

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*The two rows correspond to two different regressions (binary and continuous expectations are not simultaneously included among the controls).*
*Baseline controls include: age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, number of siblings, father's education, mother's education. Household-level economic covariates includes: parents' income, household's net wealth per household member.*

tively associated with the probability of being enrolled at university in this sample too (the level of significance varies between 1% and 5% depending on the specification). To the right of the baseline, I add first the squared of parental income, then the amount per household member of wealth held in housing and businesses.

The effect is still present, and actually increases in magnitude, if we consider binary expectations only (see the second row of Table 4). Youths expecting an inheritance, other things equal (including, it is worth emphasizing again, net household wealth per member, parental income, the amount of wealth held in housing and businesses), are significantly more likely to be studying at a higher education institute.

To have a sense of the magnitude of the effect, Figure 2 plots predicted probabilities depending on the expected amount of inheritance. A young woman expecting no inheritance in the South has some 50% probability of being a student according to the point estimate. The probability, other controls being fixed at the median value in the sample, jumps by more than 25 pp if she expects to receive half a million euros. The same holds true for men, and in other macro-regions, as shown by Figure 29 in Appendix B.1.

The point estimates for the impact of binary expectations are even clearer: a young woman in the North's likelihood to be a student increases from 41.7% to 60.2% if she expects any inheritance, whereas a man's moves from 27.6% to 44.5% – see Figure 3. The relative magnitude

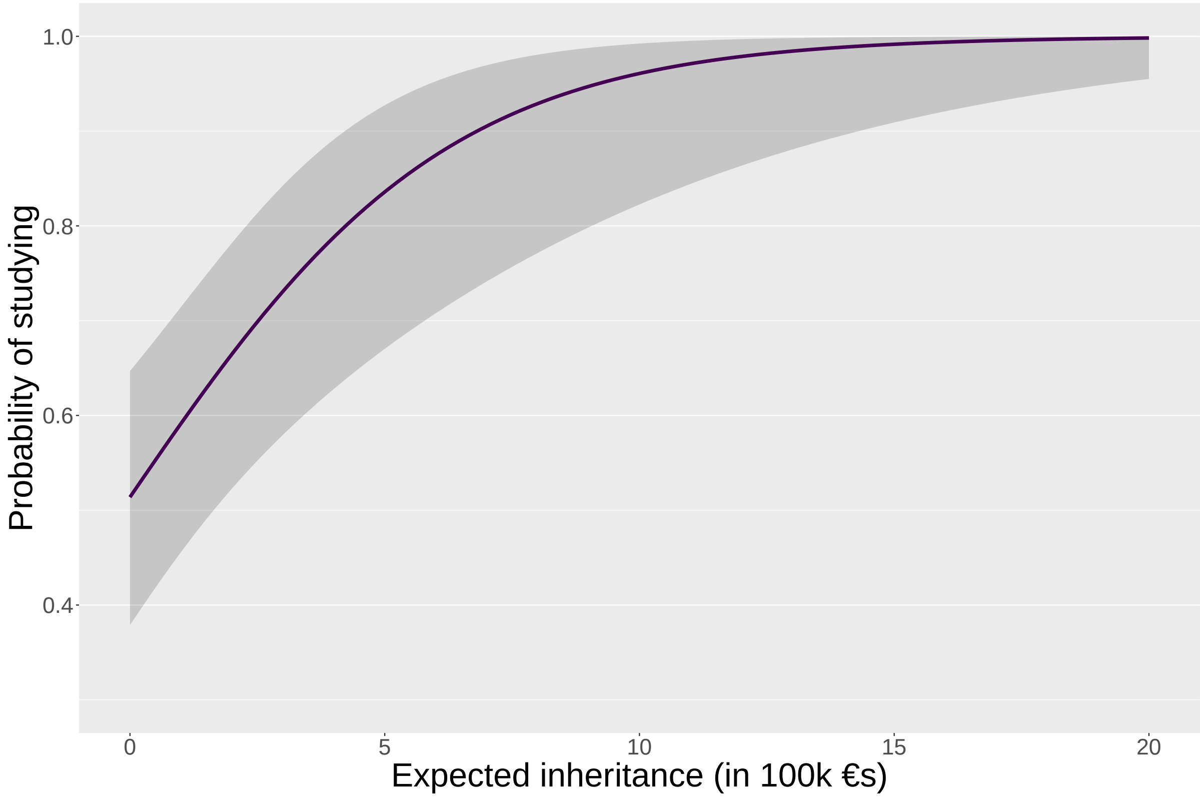


Figure 2: Predicted probability (with 95% confidence intervals) of being a student according to the baseline model for a young woman in the South at median value of continuous countrols.

of the effect is comparable across macro-regions and sexes, as shown in Figure 28 in Appendix B: in the Centre, women's (men's) probability of attending university increases from 35.7% (22.8%) to 53.9% (38.4%); in the South, from 45.3% (30.6%) to 63.6% (48.1%). Obviously, these point estimates come with considerable uncertainty, and over-estimate the share of students, since the predicted probabilities are taken at mean values of all other numerical values – including household wealth and income. However, the percentage point wedge in the predicted probabilities of studying is essentially unchanged when using median values instead.

In Appendix B.2, I perform a more granular analysis, differentiating between asset type, and show that, under plausible assumptions, it is inheritance expected in the form of housing that drives the positive association with education choices.

### 2.3.1 Panel data

The 2002 SHIW wave provides unique value added due to its specific questions on inheritances and bequests, expected and realized. However, its cross-sectional dimension and modest sample size represent a limitation for studying the long-term determinants of the uncovered positive association between inheritance expectations and education choices. In order to circumvent this limitation, I proceed in two ways when moving to the SHIW panel archive.

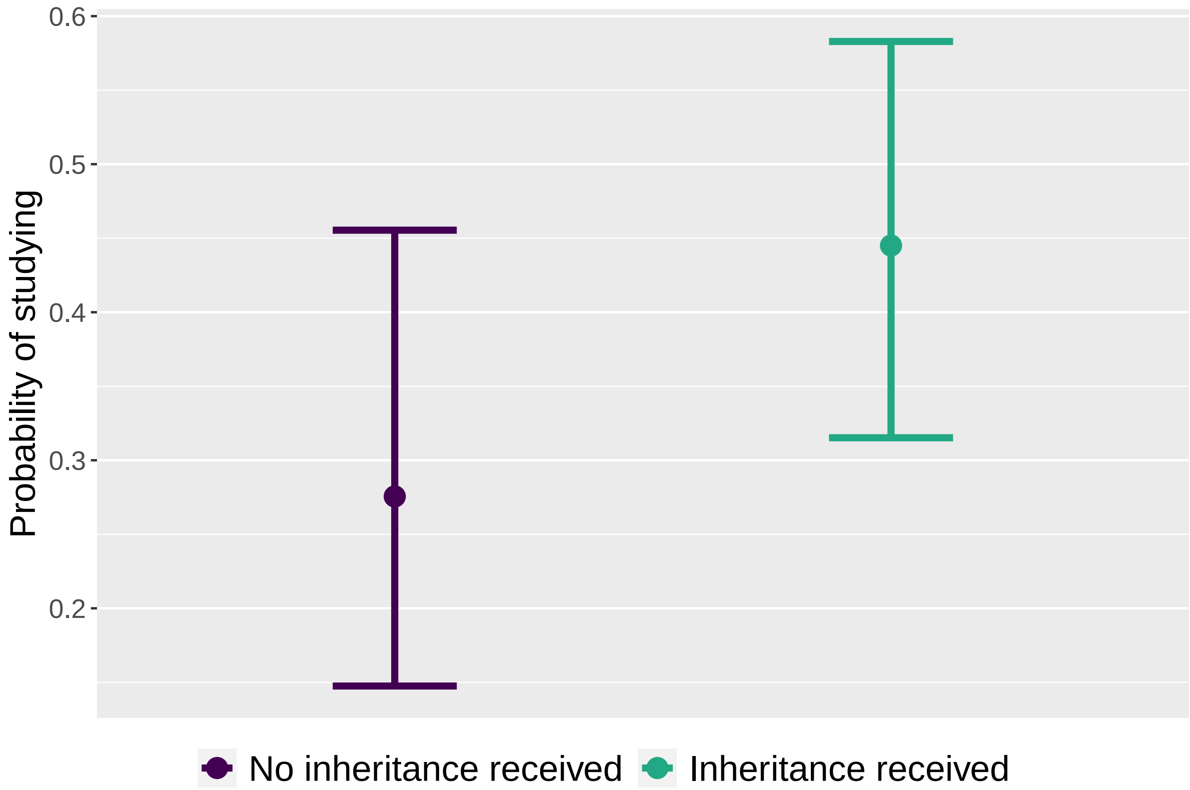


Figure 3: Predicted probabilities of being a student. Estimates are taken for young men from the North at mean values of all other controls. Bars represent the estimated 95% confidence interval around predicted probabilities.

First, I manually match individuals over survey waves (the dataset does not contain individual identifiers), and focus on the relatively few ones which participated in the supplementary survey on inheritance and bequest expectations in 2002. I then use their 2002 inheritance expectations dummy variable as a control in three regressions, whose results are listed in Table 5. The first two are logistic regressions with student status on the left hand side, for co-residents in the age groups 18-25 and 18-33 respectively. The estimated coefficients on expected inheritance are very large in size and statistically significant at 5% and 1% level. In the last column, the dependent variable is the individual's education level (measured on a scale from 1 to 5), and the sample is composed by all individuals independently from the co-residence arrangements in the age group 25-45. For these individuals, I only consider the last available observation. This OLS regression also attributes a positive and significant coefficient to expected inheritance in 2002.

The second way to address the time limitation of my cross-sectional analysis lies in the SHIW panel archive itself. In fact, the regular dataset includes a question on the source of households' dwellings' ownership, with "inheritance/gift" among the possible answers. Given that, as I show in Appendix B.2, inheritance expected in the form of housing seems to be the

Table 5: Inheritance expectations and education (panel 1989-2016)

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Student | | Student/Graduate | | Education level |
| | *Logit* | | *Logit* | | *Pooled OLS* |
| Expected inheritance (0-1) | 1.574** | 2.351*** | 1.630** | 1.293*** | 0.110** |
| | (0.718) | (0.870) | (0.741) | (0.457) | (0.047) |
| Group | C-R | C-R | C-R | C-R | All |
| Age | 18–25 | 18–33 | 18–25 | 18–33 | 25–45 |
| Observations | 247 | 563 | 247 | 563 | 1,664 |
| *Note:* | | | | | *p<0.1; **p<0.05; ***p<0.01 |

*The whole analysis is run including survey weights provided by the Bank of Italy. C-R stands for co-residents. Controls for the regressions in columns 1–4 include: age (and its square), sex, a categorical variable for municipality size, a year dummy, a categorical variable for macro-regions, household's net wealth per household member, father's education, mother's education. Controls for the regression in column 5 include all of the above with the exception of household's net wealth per household member.*

real driver of the positive association, I use the SHIW panel item on housing property source to study whether this holds in the longer-term too. In particular, I create a dummy taking value 1 if the youth's household, in a given year, owns any inherited real estate property.[8]

Unconditional mean comparisons between the two groups split depending on whether their households will receive, or have received, real estate from their ancestors, lend support to a positive association of inheritance with higher education. Figure 4 shows the net difference between the shares of individuals who either have a university degree or are enrolled at a higher education institution, the shares of individuals who are enrolled at a higher education institution, and the average education level across the two groups.

Of course, households belonging to these two groups will differ across many further dimensions. The positive association between expecting housing inheritance and attending university, however, survives if we compare means within both (i) quintiles based on net household wealth per child and, even more significantly, (ii) quintiles based on net *real estate* wealth per child (see Figures 30 and 31 in Appendix B.2). This means that, for the same level of wealth per child within the household, young dependents whose households have received, or will receive, at least some of it through intergenerational transmission, are consistently more likely to pursue higher education. The difference between groups within wealth quintile is quite stable across years and non negligible in magnitude.

On the panel dataset, I run an estimation as close as possible to the 2002 one, while adding controls for time trends. Results are shown in Table 6. Notwithstanding the chosen independent

[8] Appendix B.1 includes further results with slightly different variables.

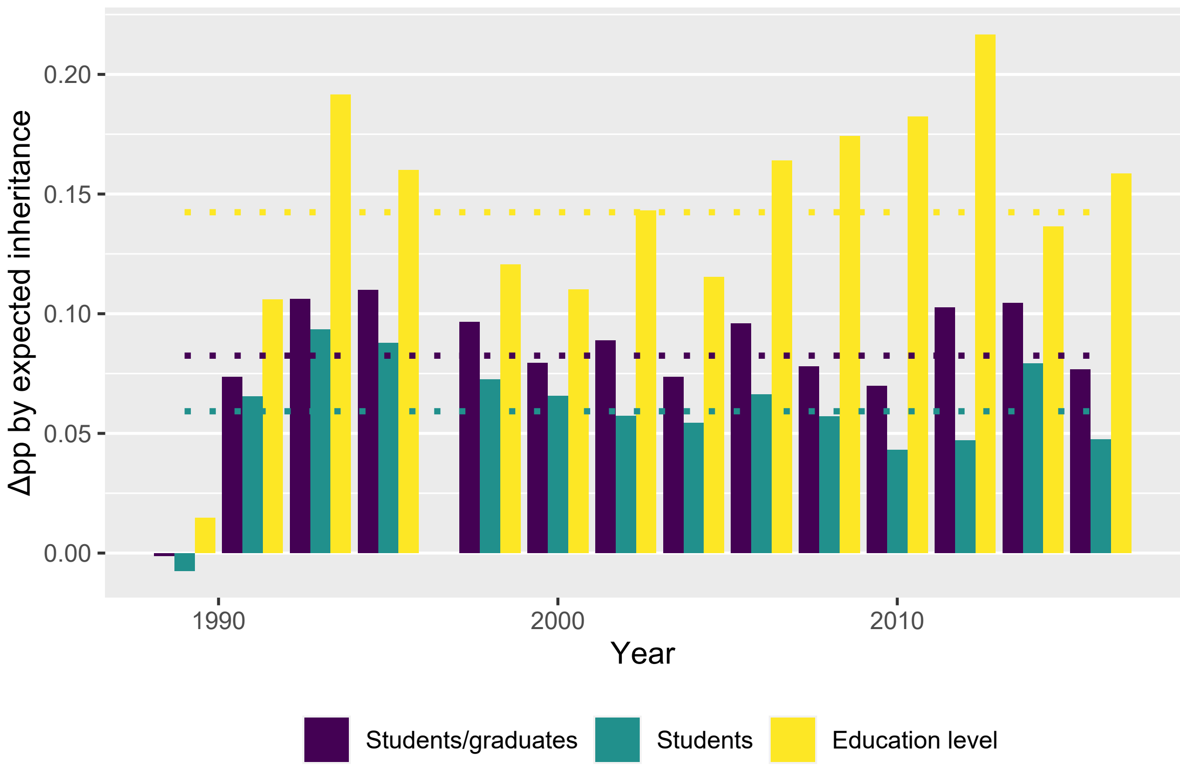


Figure 4: Net percentage point differences in (i) share of students and graduates, (ii) share of students and (iii) average education title across groups. Dotted lines indicate the average of each variable over the whole period. Sample: co-residents aged 18-30.

variable, the estimated association is positive across specifications, and strongly significant for the sample of young co-residents aged between 18-33 where inherited real estate is used to predict their education level or in a logit regression where the dependent binary variable takes value 1 in case individuals are either studying or have already graduated. While keeping in mind that these measures of anticipated inheritance are largely less accurate than those directly reported in the 2002 wave, this result is all the more remarkable given that controls include, among others, net household wealth and net household wealth held in real estate (both in absolute values and in per household co-resident child term).

The consistency between the results obtained in the cross-section and the panel analyses is especially reassuring given the different source of the same control variable, namely expected real estate inheritance. In the first part, focused on the 2002 SHIW wave, I rely on the answers given by households' heads and spouses about their planned bequest, and considered their current real estate wealth separately. In the second one, based on the SHIW panel spanning 1989-2016, I use their answer to the question on how their household acquired each currently owned dwelling. Expectations about intergenerational transmission of wealth and current composition of the latter in one case, and stated origins of actual real estate properties in the second

Table 6: Inherited dwellings and education (repeated cross-sections 1989-2016)

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | Student | | Student/Graduate | | Education Level | |
| | *Logit* | | *Logit* | | *Pooled OLS* | |
| Inherited dwellings | 0.087 | 0.079 | 0.141 | 0.282*** | 0.072*** | 0.092*** |
| | (0.142) | (0.133) | (0.122) | (0.085) | (0.022) | (0.019) |
| Group | C-R | C-R | C-R | C-R | C-R | C-R |
| Age | 18–25 | 18–33 | 18–25 | 18–33 | 18–25 | 18–33 |
| Observations | 8,288 | 16,855 | 8,288 | 16,855 | 8,288 | 16,855 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*Controls include: time fixed effects, age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, household income, household income per member, household wealth, household wealth per child, household real estate wealth, household real estate per child wealth, number of household components, household head's education.*

one coincide in drawing a positive relationship between anticipated receipt of housing wealth and education.

These results from the panel dataset also help address two potential concerns on the cross-sectional settings, both related to the survey origin of the variable capturing expected inheritance. First, the possible overlap between expected inheritance and *inter vivos* transfers. Even though one might hold the suspicion that parents expressing their intention to leave a bequest are also more likely to help their co-resident children financially, the variable on the origin of dwellings ownership considered in the panel analysis does not reflect parental plans, but factual, long-term features of family arrangements. As such, it is entirely orthogonal to short-term confounding factors. Second, the possibility of reverse causality: parents expressing greater likelihood to bequeath *because* their to-be-heir is currently studying. Even though this scenario cannot empirically explain my cross-sectional results, as it would require all siblings within each houshold to take, and remain committed to, a joint educational decision, the fact of living in a household owning inherited dwellings cannot be possibly explained this way. More generally, the results from the panel exercise indicate that the mechanism underpinning the association between expected asset transfers and education is likely to primarily lie in long-term family features.

### 2.3.2 Dynastic altruism

Are households expressing their intention to leave a bequest different? If yes, how so? To answer this question, I rely again on the 2002 SHIW survey. Table 7 indicates that the intention to transmit assets to one's children and grandchildren is very strongly, positively associated with having received in the past, or expecting to receive in the future, an inheritance – holding fixed a set of individual and household characteristics, current wealth and income included. The first column of Table 7 includes all household heads in the survey with at least one offspring, co-residing or not. Even though the positive coefficient on expected inheritance might just reflect higher lifetime wealth, it is far from obvious *a priori* why the coefficient on received inheritances should be different from zero. To confirm this intuition, I restrict the sample to household heads' whose parents have died (in the second column) and whose own and spouse's parents have died (in the third column). The positive coefficient estimated on received inheritance only becomes stronger.

The strength of this association is clear from Figure 5. For example, the average male household head in the North of Italy[9], is practically certain or slightly above 55% likely to intend to leave a bequest depending on whether he or his spouse have received an inheritance in the past or not. This result is all the more striking given that there is no imputed variable in this setting, as all variables directly follow from household heads' and spouses' own answers to the survey. Results for women and men households from other regions are comparable and illustrated in Figure 27 in Appendix B.

Table 7: Dynastic altruism (cross-section 2002)

| | *Dependent variable:* | | |
|---|---|---|---|
| | Intention to leave a bequest (0–1) | | |
| Inheritance received by head and spouse (0-1) | 2.556*** | 2.966*** | 3.896*** |
| | (0.371) | (0.429) | (0.529) |
| Inheritance expected by head and spouse (0-1) | 2.309*** | | |
| | (0.580) | | |
| Group | Heads (1) | Heads (2) | Heads (3) |
| Age | All | All | All |
| Observations | 2,881 | 1,788 | 791 |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 | | |

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*Heads (1) includes all household heads. Heads (2) includes only household heads whose parents are not alive. Heads (3) includes only household heads whose own and spouse's parents are not alive. Controls include: age (and its square), a dummy for children, number of children, household head and spouse's income, a dummy for university education, sex, a categorical variable for macro-regions, net household wealth, net household real estate wealth, net household businesses wealth.*

To wrap up, in this empirical section I have documented a strong, positive conditional association between inheritance expectations and the probability of studying at a higher educa-

[9] The average refers to the control variables in the third column of Table 7: age, number of children, household income, university education, and net household wealth.


Figure 5: Predicted intention to leave a bequest. Estimates are taken from the third column of Table 7 for a male household head in the North of Italy, at mean values of all other controls.

tion institution in Italy. This holds true for the sample of co-residents aged between 18 and 25, and survives a heterogenous set of robustness checks, including an extended sample (including co-residents as old as 33), the extension to graduates, and the reduction of the role of outliers – see Appendix B.3. The association seems to be driven by housing inheritance. In the panel dataset, despite the unavailability of precise measure of inheritance expectations, youths living in households owning real estate through inheritance are more likely to be studying than their peers. The panel results are reassuring, as they originate from a different source, downplay the relevance of confounding factors such as *inter vivos* transfers, address potential concerns of reverse causality, and indicate the presence of long-term family features responsible for the observed positive conditional correlation. In support of this last intuition, I document how the intention to transmit assets across generations exhibits very significant heterogeneity across dinasties, as household head's intention to leave a bequest is largely influenced by the fact of having received an inheritance in turn. This feature represents the building block of the simple analytical model introduced in Section 3.

# 3 Analytical Model

In this section, I outline a stylized 2-period model able to reproduce the positive association between expected inheritance and human capital accumulation. The mechanism at work is the empirically uncovered persistence along generations and heterogeneity across dynasties in the preference for altruism: agents' bequest motive is stronger if they (expect to) receive an inheritance.[10] Their lifetime income is higher if they increase their human capital early in life, but this accumulation is costly in the short-term. Other things equal, inheritance to be received constitutes an incentive to increase one's lifetime earnings ability through education. Expecting to receive an inheritance, *de facto*, is equivalent to a multiplier to agent's patience. Education and expected inheritance are therefore *ex post* positively correlated. An important feature of this stylized setting is that, differently from Alonso-Carrera et al. (2020), inheritance plays a role on education *before* its receipt.

In the initial period, agent $i$ decides whether to study and how much human capital $h_i \in [0, 1]$ to accumulate. This human capital accumulation is costly and decreases contemporaneous agent's resources to finance her consumption, while increasing her second period ones. In particular, in the first and second period, agents earn wages $w_1(h_i)$, $w_2(h_i)$, with $w_1'(h_i) < 0$, $w_2'(h_i) > 0$. I further assume $w_1''(h_i) = 0$, consistently with an interpretation of human capital accumulation corresponding to time off the labor market, and $w_2''(h_i) \leq 0$, representing decreasing marginal returns to education. In the second period, agent's resources $m_{i2}$ are thus given by the sum of the wage level corresponding to their education and received inheritance $I_i$, i.e. $m_{i2} = w_2(h_i) + I_i$. Her consumption will be equal to the total of resources minus a possible bequest $b_i \geq 0$. Critically, the presence of *dynastic altruism* is embedded in the agent's utility from bequest $v(b_i, I_i)$, which depends on, and is increasing in, received inheritance, i.e. $v_I(b_i, I_i) \geq 0$. Furthermore, $v_{bI}(b_i, I_i) \geq 0$, where $v_{bI}$ represents the cross-derivative. That is, the larger the inheritance (to be) received, the stronger the weight on the bequest motive. Furthermore, as standard, the marginal utility from consumption is decaying faster than the marginal utility from bequests: $u'(c_i) > 0$, $v_b(b_i, I_i) \geq 0$, $u''(c_i) < 0$, $v_{bb}(b_i, I_i) \leq 0$, and $u''(c_i) \leq v_{bb}(b_i, I_i)$ for $b_i = c_i$. This represents the mathematical condition for bequests to be a luxury good. There is no uncertainty, such that all relevant decisions in terms of human capital and bequests are taken at the beginning of the lifecycle.

[10] As I discuss in the concluding remarks, I inevitably remain agnostic about the underlying cause: it could be because heirs anticipate their future desire to 'give back', or because of traits, or norms, transmitted within the dynasty.

The individual problem reads:

$$V_i(I_i) = u(c_{1i}(m_{1i}(w_1(h_i)))) + \beta\left[u(c_{2i}(m_{2i}(w_2(h_i), I_i), b_i)) + v(b_i, I_i)\right] \tag{2}$$

Consumptions $c_{1i}$, $c_{2i}$ must be consistent with each period's budget constraint:

$$0 \leq c_{1i} \leq m_{1i} = w_1(h_i) \tag{3}$$

$$0 \leq c_{2i} \leq m_{2i} - b_i = w_2(h_i)I_i - b_i \tag{4}$$

As anticipated, decision variables $h_i$, $b_i$ cannot take negative values.

$$h_i, b_i \geq 0$$

It is useful to distinguish the two margins of heterogeneity associated to inheritance expectations $I_i$ and their contribution to the impact on education $h_i$. The first, the *mid-life* determinant, corresponds to the positive contribution of received inheritance $I_i$ to the budget constraint in the second period (4). The second, the *late-life* determinant, is the persistence in *dynastic altruism*, captured by $v_{bI} > 0$. Define $\Lambda$ as :

$$\Lambda \equiv -\beta u'' w_2' > 0 \tag{5}$$

and $\Theta$ as:

$$\Theta \equiv (u'' + v_{bb})(u'' w_1'^2 + u' w_1'' + \beta u' w_2'') - \beta v_{bb} u'' w_2'^2 > 0 \tag{6}$$

The relationship between the optimal amount of human capital $h_i$ and anticipated inheritance $I_i$ can be decomposed as:

$$\frac{\partial h_i}{\partial I_i} = \frac{\partial h_i}{\partial I_i}_M + \frac{\partial h_i}{\partial I_i}_L = \frac{\Lambda}{\Theta} v_{bb} + \frac{\Lambda}{\Theta} v_{bI} \tag{7}$$

**Proposition 1.** *The mid-life determinant has a weakly negative effect on human capital accumulation, whereas the late-life determinant has a weakly positive one:*

$$\frac{\partial h_i}{\partial I_i}_M = \frac{\Lambda}{\Theta} v_{bb} \leq 0, \frac{\partial h_i}{\partial I_i}_L = \frac{\Lambda}{\Theta} v_{bI} \geq 0 \tag{8}$$

*Proof.* See Appendix C.1. □

Proposition 1 illustrates an important result: expected inheritance receipt *per se* – the *mid-life* channel – constitutes a *disincentive* to human capital accumulation. This, however, can be more than offset by its positive link with the bequest motive, i.e., the *late-life* determinant. In particular:

**Proposition 2.** *Education is increasing in anticipated inheritance iff the absolute value of the late-life determinant (i.e., the marginal increase in the marginal utility from bequest associated to larger inheritance) is larger than the absolute value of the mid-life determinant (i.e., the decrease in the marginal bequest motive associated to larger bequest):*

$$\frac{\partial h_i}{\partial I_i} > 0 \quad \textit{iff} \quad v_{bI} + v_{bb} > 0 \Leftrightarrow |v_{bI}| > |v_{bb}| \tag{9}$$

*Proof.* See Appendix C.1. □

According to Proposition 2, the relationship between human capital accumulation and expected inheritance is positive if the increase in utility from leaving a bequest is not offset by the diminishing marginal utility associated to transferring more assets to the next generation. The balance between these two forces critically determines the incentives to accumulate resources early in life through education.

Importantly, Propositions 1 and 2 have established the effect of expected inheritance on education without imposing any contemporaneous impact. We can however expand the analysis by adding a third, *early-life* determinant, meant to capture the empirical correlation between expecting an inheritance and co-residing with parents – see Table 8.

| | | Co-resident | Independent |
|---|---|---|---|
| **Expected inheritance** | % | 97.3 | 2.7 |
| | % students | 35.4 | 15.4 |
| **No expected inheritance** | % | 77.4 | 22.6 |
| | % students | 27.0 | 12.3 |

Table 8: Co-residence and inheritance expectations (age 18-25).

This *early-life* margin of heterogeneity can be included in the current set-up by assuming available resources in the first period are augmented by some domestic public good provided by altruistic parents, such that the updated problem reads:

$$V_i(I_i) = u(c_{1i}(m_{i1}(w_1(h_i), I_i))) + \beta \left[u(c_{2i}(m_{2i}(w_2(h_i), I_i), b_i)) + v(b_i, I_i)\right] \tag{10}$$

and

$$m_{i1_I} > 0 \tag{11}$$

Define $\Gamma$ as:

$$\Gamma \equiv -(u'' + v_{bb})u''w_1' > 0 \tag{12}$$

**Proposition 3.** *The early-life determinant has a positive effect on human capital accumulation.*

$$\frac{\partial h_i}{\partial I_i}_E = \frac{\Gamma}{\Theta} m_{i1_I} > 0 \tag{13}$$

*Proof.* See Appendix C.1. □

**Proposition 4.** *Education is increasing in anticipated inheritance iff the sum of early-life and late-life determinants is large enough to offset the negative contribution of the mid-life determinant:*

$$\frac{\partial h_i}{\partial I_i} > 0 \quad \textit{iff} \quad \Lambda(v_{bI} + v_{bb}) + \Gamma m_{i1_I} > 0 \tag{14}$$

*Proof.* See Appendix C.1. □

Proposition 4 states that the stringency of the requirement on for education to be increasing in expected inheritance weakens once we allow for realistic heterogeneity within the early phase of the life-cycle too.

The overall role of dynastic altruism can be analytically clarified by assuming a set of functional forms for the returns to education, utilities from consumption and transmitted wealth and the configuration of the *early-life* margin of heterogeneity. Assume logarithmic utility from consumption $u(c) = \log(c)$ and linear utility from bequests, multiplied by a dynastic altruism factor, such that $v(b, I) = \phi_1(\kappa + I)b$ and $\phi_1 \geq \frac{1}{\kappa} \Rightarrow v(0, b) \geq b$. Each period, agents earn an unconditional wage $w$, normalized to 1. In the initial period, agent $i$ decides whether to study and how much human capital $h_i \in [0, 1]$ to accumulate. This human capital accumulation is costly and decreases agent's resources $m_{i1}$, which are increasing in expected inheritance $I_i$, such that consumption follows $c_{i1} = w(1 - h_i) + \log(1 + I_i) = 1 + \log(1 + I_i) - h_i$. In the second period, agent's resources $m_{i2}$ are given by the sum of the baseline wage, a premium proportional through a factor $\chi$ to human capital acquired in the first period and received inheritance $I_i$, i.e. $m_{i2} = w + \chi h_i + I_i = 1 + \chi h_i + I_i$.

The individual's problem now reads:

$$V_i(I_i) = \log(c_{1i}) + \beta[\log(c_{2i}) + \phi_1(\kappa + I_i)b_i] \tag{15}$$

under the same constraints (3) and (4). The individual's optimal bequest will be:

$$b_i^*(I_i) = \begin{cases} 1 + I_i + \chi(1 + \log(1 + I_i)) - \frac{1+\beta}{\beta\phi_1(\kappa+I_i)} & \text{if} \quad \chi > \frac{\frac{1+\beta}{\beta\phi_1(\kappa+I_i)} - (1+I_i)}{1+\log(1+I_i)} \\ 0 & \text{otherwise} \end{cases} \tag{16}$$

Her human capital decision will then follow:[11]

$$h_i^*(I_i) = \begin{cases} 1 + \log(1 + I_i) - \frac{1}{\beta\chi\phi_1(\kappa+I_i)} & \text{if} \quad \chi > \frac{\frac{1+\beta}{\beta\phi_1(\kappa+I_i)} - (1+I_i)}{1+\log(1+I_i)} \\ 0 & \text{otherwise} \end{cases} \tag{17}$$

This very parsimonious analytical framework is sufficient to replicate the positive link between education and expected inheritance, independently from whether the latter is considered in continuous or binary terms. As shown by (17), a higher expected inheritance $I_i$ has the double effect of (i) raising the amount of optimal education acquired in the 1st period to finance bequests and (ii) lowering the minimum wage premium $\chi$ below which acquiring education is suboptimal. In fact,

**Proposition 5.** *The sensitivity of human capital decisions to expected inheritance is decreasing in the education wage premium, i.e.:*

$$\frac{\left(\frac{dh_i^*(I_i)}{dI_i}\right)}{d\chi} < 0 \tag{18}$$

*Proof.* See Appendix C.1. □

This final result highlights the importance of expected lifetime returns to education in drawing the precise link between anticipated wealth transmission and human capital accumulation. The role played by early-life consumption sharing and late-life wealth transmission is, unsurprisingly, relatively larger when the return to education over an individual own lifecycle is weaker. This can be seen in the left panel of Figure 6. When education entails no wage premium, expected inheritance does not matter as no agent finds optimal to undertake human capital accumulation. In the *low premium* scenario, the return to education in the 2nd period

[11] There potentially exists a further intermediate region where $h_i^*(I_i) = \frac{\beta\chi-1+I_i}{\chi(1+\beta)}$ if $\frac{1+I_i}{\beta} \leq \chi < \frac{1+\beta}{\beta\phi_1(\kappa+I_i)} - (1+I_i)$. However, the assumption $\phi_1 \geq \frac{1}{\kappa}$ implies $\frac{db^*}{dI} \geq 1$, ruling out the existence of such parameter space.

corresponds to the cost in the 1st period (i.e., $\chi = 1$), implying that the present value of education over the lifecycle is negative. It takes a weight on bequest motives strong enough, i.e. a sufficiently large inheritance, to make education optimal. When the return to education is increased, however, lower and lower levels of anticipated wealth transfers are required for agents to acquire education.

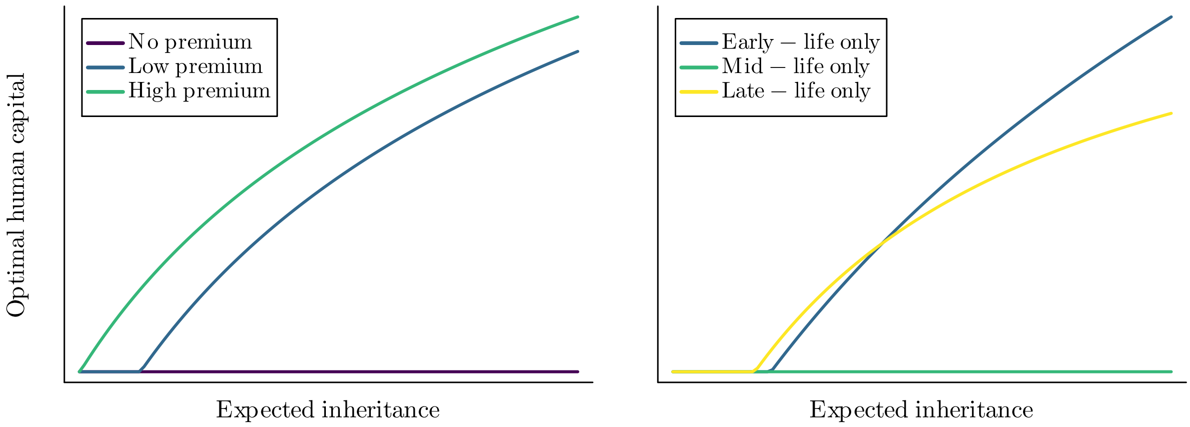


Figure 6: Left panel: relationship between expected inheritance and education, depending on the education wage premium. Right panel: relationship between expected inheritance and education, depending on the determinant at work.

The right panel of Figure 6 helps distinguish the relative contribution of three margins of heterogeneity associated with inheritances $I_i$, which I labelled the *early-*, *mid-* and *late-life* determinants. In this analytically tractable framework, education decisions are orthogonal to the anticipated wealth transfer *per se*, since bequest motives are linear and unaffected by received inheritance. As a consequence, human capital acquisition purely depends on intertemporal optimization in terms of individual consumption, whereas the positive contribution of inheritance to the relaxation of the budget constraint in the 2nd period is entirely diverted to financing bequests. On the other hand, deeper consumption-sharing when young and the larger bequest motive associated with higher expected inheritance can both reproduce the effect of the latter on education.

# 4 Quantitative Model

If the analytical model in Section 3 helps provide the intution for a possible mechanism linking expected inheritance and education, a richer quantitative model is needed to replicate empirical facts, quantify the relative importance of multiple determinants and run counterfactual policy analysis. To this end, I introduce a partial equilibrium life-cycle model with *ex-ante* heterogeneity in altruism and education taste, and uncertainty about (own and parental) lifes-

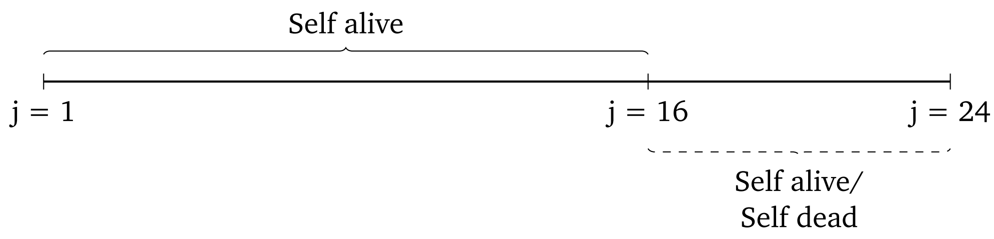


Figure 7: Timeline: Own survival. Dashed braces indicate uncertainty.

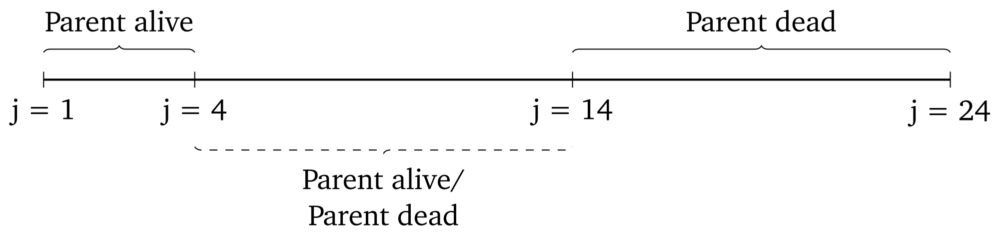


Figure 8: Timeline: Parental survival. Dashed braces indicate uncertainty.

pan, inheritance timing and size, co-residence dynamics, returns to studying and to education.

**State variables.** I consider households as composed of a parent-child pair. At any age $j$, the individual state vector $\mathbf{x_j}$ includes: (i) age $j$, (ii) co-residence state $cr \in \{0, 1\}$ where $cr = 1$ corresponds to a co-residence arrangement including either the agent's parent or her child, (iii) asset position $a$ (by assumption individuals cannot borrow, i.e. $a \geq 0$), (iv) education level $h \in \{1, 2, 3\}$, (iv) parental education level $hp \in \{0, 1, 2, 3\}$ where 0 corresponds to a dead parent, (v) a stochastic, permanent preference for education $\zeta_h$, (vi) observed current productivity on the labour market $z \in \{z_1, z_2, z_3, z_4\}$ and (vii) preference for altruism $\phi_1 \in \{\phi_{1_{low}}, \phi_{1_{mid}}, \phi_{1_{high}}\}$.

**Timing.** One model period corresponds to 3 years. Agents are born at age $j = 1$ (equivalent to age 18 in the real world) and live with certainty until age $j = 15$ (60), when they retire. After that, they have a decreasing probability of survival $s_j$ until age $j = 25$ (90), when death occurs with certainty. Given that agents, by assumption, have a child at age $j = 6$ (33), all parental events are shifted by 11 periods (see Figures 7 and 8).

From age $j = 1$ until $j = 5$, agents can decide at each period whether to work (and earn labour income) or study, and potentially increase their human capital $h$ by one unit. Such increase is stochastic, and negatively depends on the probability of dropping out $p_{dropout}$ and the probability of taking longer to complete university $p_{delay}$. From $j = 15$ until death, they are retired and receive a pension benefit equal to a share $\eta$ of their last labour income. In the meantime, they work, earning labor income $y$ jointly pinned down by a deterministic component, related to age and education, and a stochastic one, which depends on education only. Figure 9 depicts these margins of the lifecycle dynamics.

Co-residence determines the relationship between the agent's private consumption and

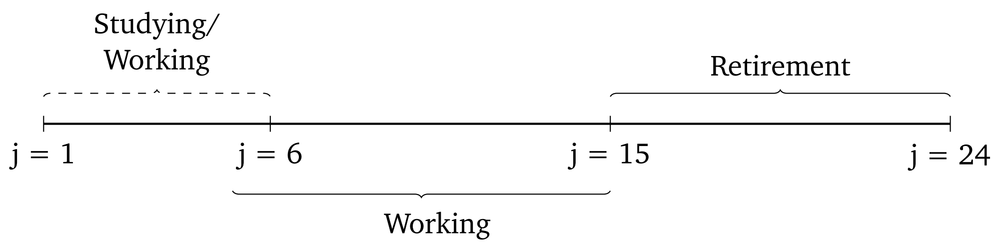


Figure 9: Timeline: Education, work and retirement. Dashed braces indicate uncertainty.

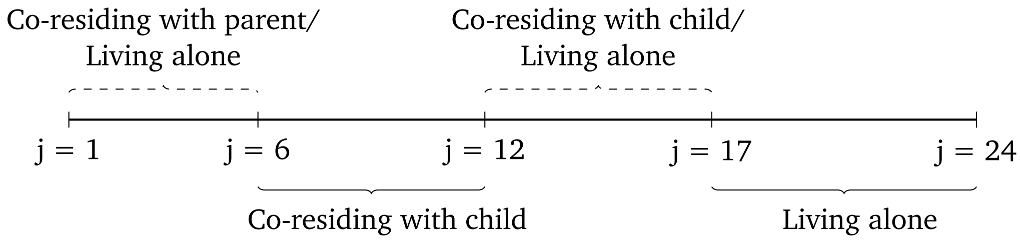


Figure 10: Timeline: Co-residence. Dashed braces indicate uncertainty.

utility, through age-coresidence-specific consumption equivalence scales (CES). Co-residence with the parent is possible in the first 5 periods of life, and impossible ever since. Co-residence with the child is certain from $j = 6$ until $j = 12$, then turns stochastic until $j = 17$ when the agent lives alone with certainty (see Figure 10). I assume that once a household splits, in any of the two periods with uncertainty, it cannot co-reside again (said otherwise, living alone is an absorbing state in $j \in \{1, ..., 5\}$ and $j \geq 12$).

Having described the main components of the model environment, we can now move to a stage-by-stage analysis of the agent's problem.

## 4.1 Education choice stage

In the first stage ($j \in \{1, ..., 5\}$), agents have both a discrete and a continuous choice margin, as they choose whether to study ($S_j$) or work ($W_j$) and how much to consume ($c_j$) and save ($a_{j+1}$):

$$V_j(\mathbf{x_j}) = \max\{V_{S_j}(\mathbf{x_j}), V_{W_j}(\mathbf{x_j})\} \tag{19}$$

where:

$$\mathbf{x_j} = \{cr_j, a_j, h_j, h_j^p, \zeta_j, z_j, \phi_1\} \tag{20}$$

The student's problem reads:

$$V_{S_j}(\mathbf{x_j}) = \max_{c_j, a_{j+1}} u_{S_j}(c_j(\mathbf{x_j})) + \beta \mathbb{E}_{cr_{j+1}, h_{j+1}, h^p_{j+1}, z_{j+1}} V_{j+1}(\mathbf{x_{j+1}}) \tag{21}$$

subject to:

$$0 < c_j \leq (1+r)a_j + w(S_j) \tag{22}$$

$$0 \leq a_{j+1} = (1+r)a_j - c_j + w(S_j) + \mathbb{1}(h^p_j > 0)\mathbb{1}(h^p_{j+1} = 0)b(j, h^p_j, \phi_1) \tag{23}$$

whereas the worker's problem is:

$$V_{W_j}(\mathbf{x_j}) = \max_{c_j, a_{j+1}} u_{W_j}(c_j(\mathbf{x_j})) + \beta \mathbb{E}_{cr_{j+1}, h^p_{j+1}, z_{j+1}} V_{j+1}(\mathbf{x_{j+1}}) \tag{24}$$

subject to:

$$0 < c_j \leq (1+r)a_j + w(h_j, z_j) \tag{25}$$

$$0 \leq a_{j+1} = (1+r)a_j - c_j + w(h_j, z_j) + \mathbb{1}(h^p_j > 0)\mathbb{1}(h^p_{j+1} = 0)b(j, h^p_j, \phi_1) \tag{26}$$

The last two equations jointly show that next period assets $a_{j+1}$ are stochastic whenever the agent's parent is still alive (i.e., $h^p_j > 0$), as expected inheritance $b(j, h^p_j, \phi_1)$ can turn into realized inheritance if the parent dies next period (i.e., $h^p_{j+1} = 0$). However, such possible asset windfall cannot be used to finance current consumption, as shown in Equation 25.

Three elements distinguish workers' and students' value function: (i) instantaneous utilitys, (ii) current earnings, and (iii) expected future human capital.

**Instantaneous utility.** Workers' utility is a classic CRRA consumption utility:

$$u_{W_j}(c_j(\mathbf{x_j})) = \frac{\left(\frac{c_j}{\Omega(j, cr_j)}\right)^{1-\gamma}}{1-\gamma} \tag{27}$$

where $\Omega(j, cr_j)$ indicates the commensurate consumption equivalence scale. Student's utility is composed of two additional elements: a common disutility from education $\mu < 0$, which follows an increasing time trend, and an idiosyncratic education taste $\zeta_j(\phi_1)$, allowed to depend on dynastic altruism $\phi_1$ so to capture unobserved heterogeneity across altruism classes in the preference for education:

$$u_{S_j}(c_j(\mathbf{x_j})) = \frac{\left(\frac{c_j}{\Omega(j,cr_j)}\right)^{1-\gamma}}{1-\gamma} + \mu(j-1) + \zeta_j(\phi_1) \tag{28}$$

**Current earnings.** Students' earnings $w(S_j)$ are assumed to be invariant to age and current education level, and are strictly lower than any possible workers' income level $w(h_j, z_j)$, which is increasing in her age $j$, her human capital $h_j$ and her stochastic productivity level $z_j$. In particular, workers' wages follow an education-age-specific lifecycle profile $w(j,h) = z_j\epsilon_{jh}$, where $\epsilon_{jh}$ takes the form $\epsilon_{jh} = \xi_{1h} + \xi_{2h}j + \xi_{3h}j^2 + \xi_{4h}j^3$ (Sousa et al., 2022).

**Expected future human capital.** The main reason why agents acquire education in this model is the expectation that their future human capital will increase, such that their lifetime earnings will follow suit. However, while workers' next period's human capital is certain (i.e., $h_{j+1} = h_j$), students face uncertainty due to the probability of dropout $p_{dropout}(j, h_j)$ and the probability of delay in obtaining a degree $p_{delay}(j, h_j)$, both of which are allowed to depend on age and current education level. So, we have:

$$h_{j+1} = \begin{cases} h_j & \text{with } p_{dropout}(j,h_j) + (1 - p_{dropout}(j,h_j))p_{delay}(j,h_j) \\ h_{j+1} & \text{with } (1 - p_{dropout}(j,h_j))(1 - p_{delay}(j,h_j)) \end{cases} \tag{29}$$

All other elements are common for students and workers. Consumption must be positive and is financed through assets carried over from the previous period earning an exogenous interest rate $r$ and income.

State variables evolve according to the following laws of motion. Assets $a_{j+1}$ move along(23) and (26), where the last term represents in both cases the possible stochastic receipt of inheritance $b(j, h_j^p, \phi_1)$. Expected inheritance $b(j, h_j^p, \phi_1)$ is captured by

$$b(j, h_j^p, \phi_1) = \begin{cases} 0 & \text{if } h_j^p = 0 \text{ or } \phi_1 = \phi_{1_{low}} \\ \beta_{i0} + \beta_{i1}j + \beta_{i2}j^2 + \beta_{i3}h_j^p & \text{if } h_j^p > 0 \text{ and } \phi_1 \in \{\phi_{1_{mid}}, \phi_{1_{high}}\} \end{cases} \tag{30}$$

Agents receive a non-negative inheritance with probability given by their parental's death hazard rate at the corresponding age and expected amounts related to (i) their parent's age, (ii) their parent's human capital (à la De Nardi (2004)), and (iii) their own altruism. Agents expect no inheritance if their own altruism is low, or, trivially, if their parent is not alive. They do expect a positive inheritance otherwise. This implies that inheritance expectations are partly exogenous and estimated directly from the data, to allow for demographic trends that differ across generations.

Co-residence follows:

$$cr_{j+1} = \begin{cases} 0 & \text{if } cr_j = 0 \quad \text{or } h_j^p = 0 \\ 0 & \text{with } p_{cr}(j, b(j, h_j^p, \phi_1)) \quad \text{if } cr_j = 1 \quad \text{and } h_j^p > 0 \\ 1 & \text{with } 1 - p_{cr}(j, b(j, h_j^p, \phi_1)) \quad \text{if } cr_j = 1 \quad \text{and } h_j^p > 0 \end{cases} \tag{31}$$

The probability of co-residing is allowed to be correlated with age and expected inheritance, as observed in the data and reported in Section 3, Table 8.

The endogenous evolution of own human capital has already been shown, whereas parental human capital next period $h_{j+1}^p$ will be equal to the current one in case the agent's parent is already dead ($h_j^p = 0$) or with probability equal to the survival rate at the corresponding age otherwise ($s_{j+J_{child}}$, where $J_{child} = 11$ is the age when agents have offspring). The education taste $\zeta_j(\phi_1)$ is distributed normally with mean $\mu_\zeta(\phi_1)$ and variance $\sigma_\zeta^2$. Its idiosyncratic realization is drawn at the beginning of life and remains constant. The productivity level $z_j(h_j)$ evolves according to a transition matrix $\Pi(z_j(h_j), h_j)$, where both state values and transition probabilities are allowed to differ by education level. Finally, the altruism parameter $\phi_1$ is assumed to be constant over the lifecycle.

### 4.2 Working stage

From $j = 6$ until $j = 14$, the problem is simplified, as labour is supplied inelastically and the only households' choice margin pertains to the consumption-savings allocation of available resources.

$$V_j(\mathbf{x_j}) = \max_{c_j, a_{j+1}} u(c_j(\mathbf{x_j})) + \beta \mathbb{E}_{cr_{j+1}, h_{j+1}^p, z_{j+1}} V_{j+1}(\mathbf{x_{j+1}}) \tag{32}$$

subject to

$$0 < c_j \leq (1+r)a_j + w(h_j, z_j) \tag{33}$$

The agent has a child, with whom she co-resides with certainty until $j = 12$ and then stochastically. The probability of co-residing next period is similar, but not identical, to the previous case, as it now depends on the agent's own altruism:

$$cr_{j+1} = \begin{cases} 0 & \text{if } cr_j = 0 \\ 0 & \text{with } p_{cr}(j, \phi_1) \quad \text{if } cr_j = 1 \\ 1 & \text{with } 1 - p_{cr}(j, \phi_1) \quad \text{if } cr_j = 1 \quad \text{or } j < 12 \end{cases} \tag{34}$$

The remaining sides of the problem are unchanged from the young worker's case, and therefore omitted for simplicity. Furthermore, in the last period of working life $j = 14$, agents anticipate that next period productivity will remain the same and determine the amount of their henceforth constant pension benefits.

### 4.3 Retirement stage

Now agents' parents are dead with certainty, and they start facing their own probability of death. Income uncertainty disappears, since individuals are retired and earn a replacement rate $\eta_2$ of their last working income. Co-residence can be uncertain until $j = 16$, but all agents live alone starting from $j = 17$. This implies that their consumption-savings allocation will depend on the relative weight, adjusted by survival probabilities, of their bequest motive, jointly governed by parameters $\phi_1$ and $\phi_2$. The former allocates agents to three quantiles of altruism, based on the multiplier attached to the bequest motive. The latter determines the degree of non-homotheticity of bequest motives – that is, to what extent bequests are a luxury good.

$$V_j(\mathbf{x_j}) = \max_{c_j, a_{j+1}} u(c_j(\mathbf{x_j})) + \beta \left\{ s_j \mathbb{E}_{cr_{j+1}} V_{j+1}(\mathbf{x_{j+1}}) + (1 - s_j) v(a_{j+1}) \right\} \tag{35}$$

The bequest motive is represented by $v(a_{j+1})$ and takes the CRRA form:

$$v(a_{j+1}) = \phi_1 \frac{(\phi_2 + a_{j+1})^{1-\gamma}}{1 - \gamma} \tag{36}$$

The budget constraint is:

$$0 < c_j \leq (1 + r)a_j + p(h_j, z_j) - a_{j+1} \tag{37}$$

where $p(h_j, z_j) = \eta w(h_j, z_{14})$.

## 5 Calibration

As standard, I combine parameters estimated internally through the method of simulated moments with parameters taken from external sources or estimated outside the model. Education classes $h \in \{1, 2, 3\}$ are assumed to correspond (at a first approximation[12]) to no higher education degree ($h = 1$), bachelor's degree or equivalent ($h = 2$), master's degree or higher ($h = 3$).

**Prices.** For students, I assume a single earning point, equivalent to the sum of the average student's income and grant in 2002 SHIW data (1,492€ per year). From the SHIW panel dataset, I estimate the deterministic component of lifecycle profiles. In particular, I restrict the sample to employed individuals 18 to 60 years old with strictly positive income and regress separately for each education class the log of the sum of employment and self-employment income on a polynomial in age, a sex dummy, year dummies and a categorical variable related to macro-regions:

$$\log(y_{ih}) = \epsilon_{0h} + \epsilon_{1h}j + \epsilon_{2h}j^2 + \epsilon_{3h}j^3 + \beta_{Year,h}Year_i + \beta_{Woman,h}Woman_i + \beta_{Region,h}Region_i \tag{38}$$

In this way, I obtain three vectors of education-specific $\epsilon_{kh} = [\epsilon_{0h}, \epsilon_{1h}, \epsilon_{2h}, \epsilon_{3h}]$. Figure 11 shows the resulting estimates for lifecycle wages of each education group.

For the stochastic component, I consider the mean residual, by 3 quantile groups, from each education-specific regression, resulting in a 3x3 matrix, composed of 3 vectors $z(h) = [z_{1h}, z_{2h}, z_{3h}]$. I also estimate stochastic components for unemployed individuals (corresponding to $z_{0h}$), divided across individuals with and without a university degree. Ultimately, I thus end up with a 4x3 matrix. Appendix D contains a detailed description of the estimation procedure, while Figure 12 shows the very substantial overlap over possible income realizations across education groups over the lifecycle.

The Italian replacement rate is notoriously generous, such that 80% of last working period's labour income is earned when retired, according to OECD data (i.e., $\eta = 0.8$). I assume that, if individuals are unemployed at the end of their working phase (i.e., $z_{14} = 1$), they will earn a pension calibrated on the lowest earning point for working individuals with the same education level. I set an implied annual interest rate of 2%, i.e. $r = (1.02^3 - 1)$.

**Inheritance expectations.** Inheritance expectations are exogenous and estimated in the

[12] A major education reform deeply changed the Italian university system and the duration of degrees in correspondence to the 2002 survey I obtain my data from. As a consequence, I often restrict the distinction to graduates ($h > 1$) versus non-graduates ($h = 1$), and focus on student status instead of education level.

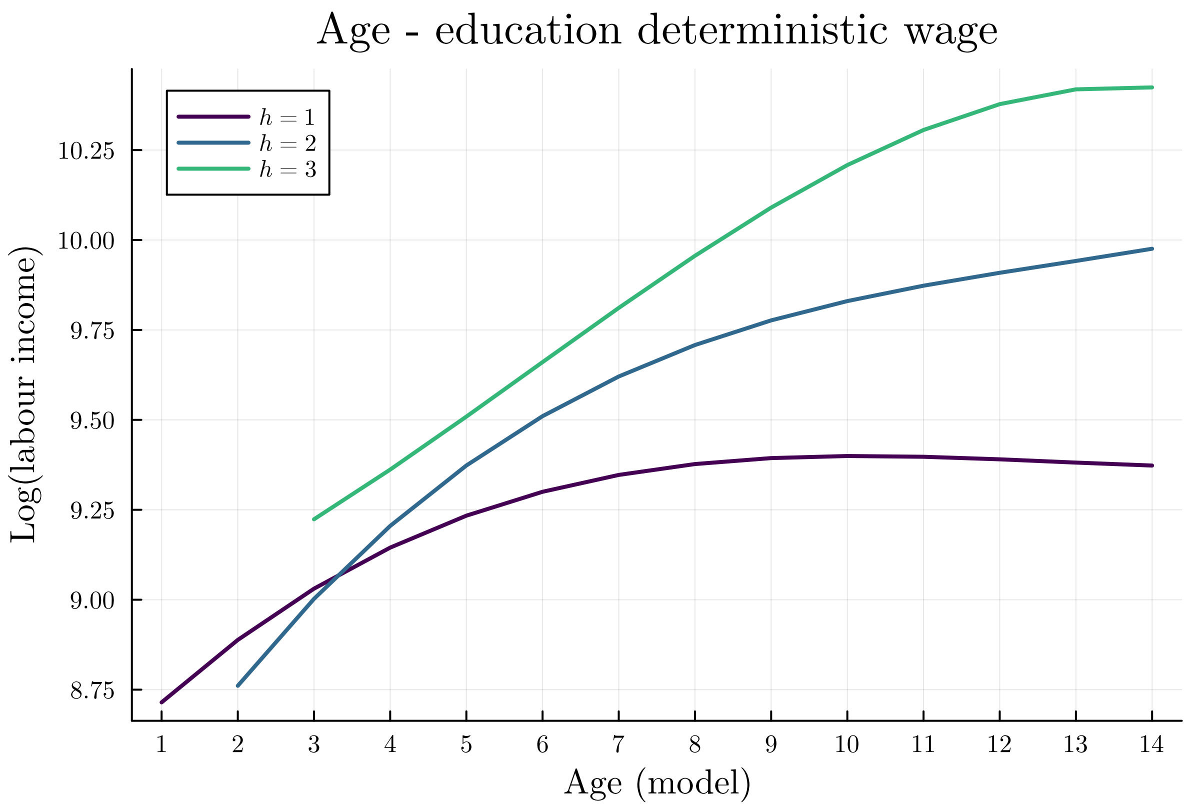


Figure 11: The estimated deterministic wage component over the lifecycle, by education group.

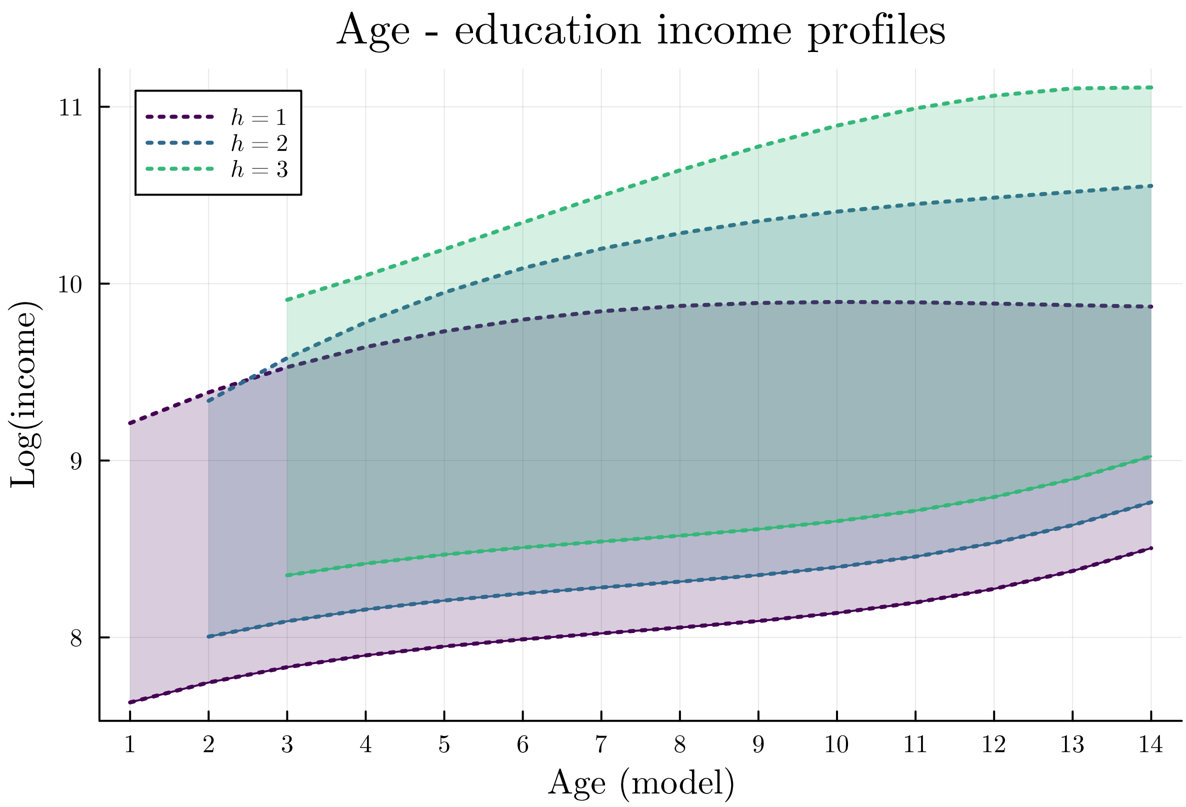


Figure 12: The estimated range of income realizations over the lifecycle, by education group.

following way: I first divide young individuals in the 2002 SHIW database in 3 increasing dynastic altruism classes. Such classes are formed based on the residuals from a regression estimated on the subsample of household heads of total intended bequest on a polynomial in age, net household (total and housing) wealth per capita, education level, a macro-region variable, sex, own and spouse's income and number of children. After dividing such residuals in three altruism quantiles, corresponding to $\phi 1_{low}$, $\phi 1_{mid}$ and $\phi 1_{high}$, I assign heads' values to their co-residing heirs. Then, separately for each altruism quantile, I regress expected inheritance on an individual's polynomial in age and her parental human capital level (in model terms):

$$\mathbb{E}b_i = \beta_{0\phi} + \beta_{1\phi} j + \beta_{2\phi} j^2 + \beta_{3\phi} h^p \tag{39}$$

This provides all $\beta_i$s for equation (30), whose resulting predicted values are shown in Figure 13. Unsurprisingly, expected inheritance is increasing in parental human capital, hence parental wealth and income, and is larger for the most altruistic group. Expectations for the first group $\phi 1_{low}$ are not shown, since its members expect no inheritance at all.[13]

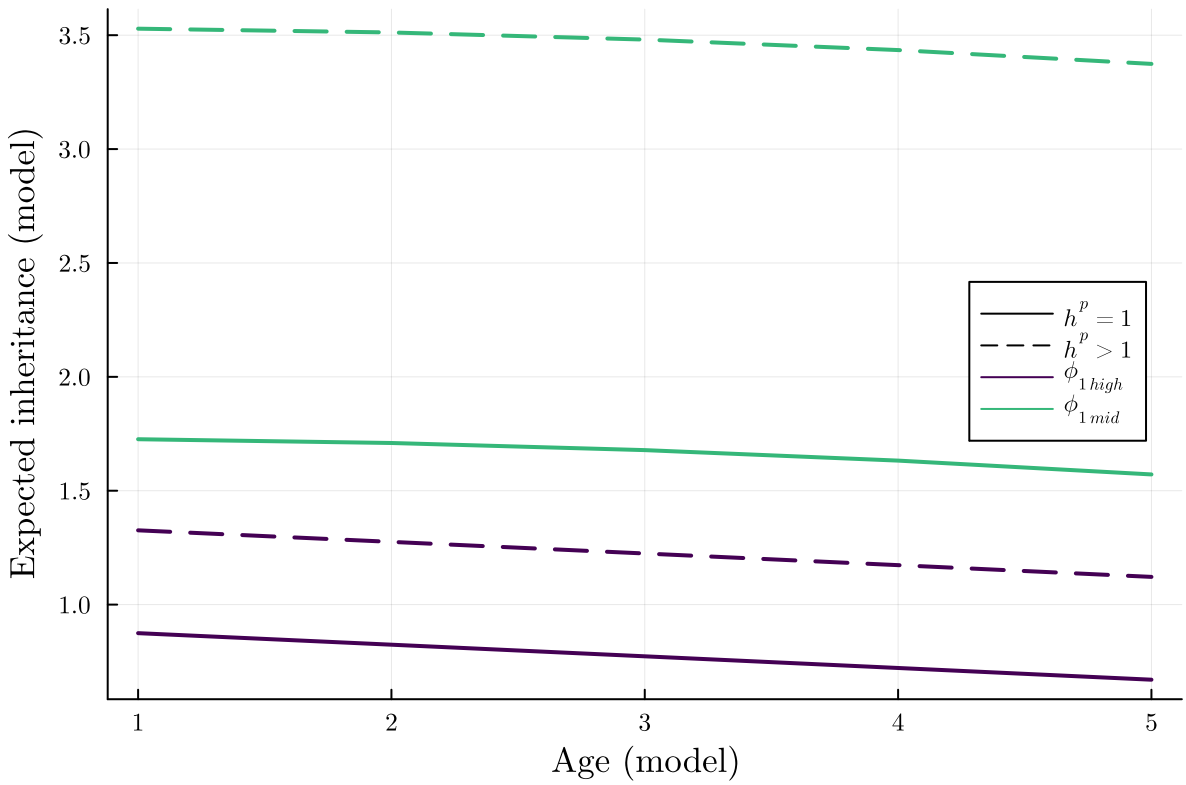


Figure 13: Estimated inheritance expectations by age, parental human capital, and altruism group. The 1st altruism group is not shown as its members expect no inheritance. Values are expressed in 100,000 euros.

[13]A "naive" alternative would be to allocate individuals across classes depending on the intended bequest-to-wealth ratio. However, since bequests are a luxury good, this would mechanically overstate the utility weight put on bequests by wealthy families – and viceversa.

**Transitions.** Survival probabilities by age are calculated from ISTAT data on mortality. The probability of dropout $p_{dropout}(j, h_j)$ is taken from the Bank of Italy (2016), and is divided by half for master's students (AlmaLaurea). I calculate the probability of delay in acquiring a degree $p_{delay}(j, h_j)$ starting from the rough figure provided by AlmaLaurea (0.376 and 0.336 for bachelor's and master's students respectively). Taking this at face value, however, would lead me to overestimate the average completion time, as in my model individuals who start a degree and those who might have started one in the previous period(s) are observationally equivalent. I therefore assume that this probability of delay is uniformly decreasing in time.

For transition matrices across productivity states, I focus on employed and unemployed individuals' data separately. First, I pool all education groups together and attribute to each individual for whom the panel archive includes multiple observations a residual class, based on her regression residuals from (38), with the addition of an education variable:

$$\begin{aligned} \log(y_{ih}) = \epsilon_{0h} + \epsilon_{1h} j + \epsilon_{2h} j^2 + \epsilon_{3h} j^3 + \beta_{Year,h} Year_i + \\ \beta_{Woman,h} Woman_i + \beta_{Region,h} Region_i + \beta_{Educ,h} Educ_i \end{aligned} \tag{40}$$

Based on the residuals from (40), I allocate each observation to three productivity state classes, based on their magnitude relative to the three education-specific residual quantiles cutoffs obtained from (38). Given that the SHIW panel archive includes individuals for which variables are observed at long, varying intervals, I construct transition matrices between stochastic states for the same individual at any available distance (from 1 to a maximum of 7 survey wave intervals). For each time interval, I consolidate all available observations across survey waves, obtaining seven 3x3 transition matrices. Finally, I estimate a set of 6 probability parameters minimizing the distance between observed transition probabilities by interval, and the resulting constructed one, each weighted by the number of observations. For transitions between unemployment and employment, I follow the same procedure, this time differentiating between individuals holding a university degree or not. The final 4x4 transition matrix is obtained by the appropriate multiplication between transition across employment and productivity states. Finally, I ensure that 2-year transitions obtained from the survey are appropriately transformed into 3-year ones for the purpose of the model.

For young adults, the probability of co-residence $p_{cr}$ differs by age and inheritance expectations. Within each age class, I calculate the share of those co-residing with parents, conditional on expecting an inheritance and on not expecting one. Then, I calculate the probability of co-residing next period as simply the share of co-residents in the following age class for the same inheritance group divided by the current one. For parents, I merely shift the same probabilities by 11 periods, with the only, minor modification that own altruism, instead of inheritance expectations, determines the corresponding probability group.

**Others.** Utility derived from consumption is scaled by $\Omega$, based on OECD equivalence scales depending on age, coresidence and household composition. For individuals living alone, the CES is, trivially, equal to one. For parents, I consider the OECD square root scale. For children, I start from Kaplan (2012), which considers American youths' utility from private consumption when co-residing as deriving from a composite consumption bundle:

$$C = c^{\phi} G^{1-\phi} \tag{41}$$

where $c$ represents private consumption, $G$ the public good available in the household, and $\phi$ the degree of complementarity between the two. For this representation to be translated into a CES framework, all it takes is:

$$\Omega = \left(\frac{c}{G}\right)^{\phi} \tag{42}$$

For the US, Kaplan (2012) defines $\phi = 0.4$. According to ISTAT (2022), less than 25% of Italian youths aged 18-34 co-residing with parents contribute to the household budget at all, and as little as 8.5% do it regularly. As the main motivation provided is financial, it is reasonable to assume a very low $c/G$ ratio, in the 0.1–0.3 interval. This implies values for $\Omega$ between 0.4 and 0.6. I set $\Omega$ = 0.5.[14]

I finally normalize to zero the average education taste for individuals who expect no inheritance (i.e., $\mu_{\zeta}(\phi 1_{low}) = 0$) and assume that for agents belonging to the second and third altruism quantiles the unobserved taste shifter (i) is the same and (ii) takes an additive form (i.e., $\mu_{\zeta}(\phi 1_{mid}) = \mu_{\zeta}(\phi 1_{high}) = \mu_{\zeta}(\phi 1_{low}) + \upsilon = \upsilon$).

**Internal parameters.** There are 9 parameters left to determine. The discount factor $\beta$, the inter-temporal elasticity of substitution $\gamma$, the weight on the bequest motive multipliers for each altruism class ($\phi 1_{low}$, $\phi 1_{mid}$ and $\phi 1_{high}$), the degree of non-homotheticity of the bequest motive $\phi_2$, the time-linear utility cost of studying $\mu$ and the two parameters governing the distribution of the idiosyncratic education taste shock (the taste shifter for individuals belonging to the mid or high altruism quantiles $\upsilon$ and the variance of the overall taste shock $\sigma^2_{\zeta}$). Their values are jointly pinned down by minimizing the distance between some informative data moments and the equivalent ones I obtain by simulating the model: the share of students (i) in the age group 18–23, (ii) in the age group 24–32, (iii) in the age-group 21–32 among those expecting

[14] This is in all likelihood an upper bound, as two thirds of young co-residing adults receive financial transfers from their parents (although "only" 13.2% receive them regularly).

| Parameter | | Value | Source |
|---|---|---|---|
| $\epsilon(j,h)$ | Deterministic wage | [...] | Est. (SHIW) |
| $z$ | Stochastic wage | [...] | Est. (SHIW) |
| $\Pi(z_j(h_j),h_j)$ | Wage transition | [...] | Est. (SHIW) |
| $\eta$ | Replacement rate | 0.8 | OECD |
| $\beta_i$ | Exp. inheritance coeff. | [...] | Est. (SHIW) |
| $p_{dropout}$ | Prob. of dropout | [...] | Est. (Nicolò et al., 2016) |
| $p_{delay}$ | Prob. of delayed degree | [...] | Est. (AlmaLaurea, 2023) |
| $s_j$ | Prob. of survival | [...] | Est. (ISTAT) |
| $p_{cr}(j,b(\cdot))$ | Prob. of co-residence | [...] | Est. (SHIW) |
| $\Omega$ | Equivalence scale | [0.5, 1.0, 1.4] | Est. (ISTAT, 2022; Kaplan, 2012) |
| $r$ | Interest rate (annual) | 0.02 | Standard |

Table 9: External Parameters. The full list of values can be found in Appendix D.

an inheritance having already obtained a degree, (iv) the mean consumption over income for working age individuals, (v) the share of individuals intending to leave a bequest among those not expecting to receive one, (vi) the mean wealth-to-income ratio for working age individuals, the coefficients from a logit regression with student status as dependent variable on (vii) the binary expected inheritance variable in the subsample of co-residents within the age group 18–26, and (viii) the continuous expected inheritance variable in the subsample of co-residents within the age group 18–26, and (ix) the coefficient from a logit regression of the intention to leave a bequest on a binary variable indicating whether the agent has received one, or expects to do so in the future.

## 6 Results

The estimated parameters and targeted moments are listed in Tables 10 and 11, 12 and 13. Considering how the targeted moments link outcomes very distant in time such as youth's education decision and bequest motives, the model fit is remarkable.

| Parameter | | Value | Source |
|---|---|---|---|
| $\beta$ | Patience (annual) | 0.97 | Internally estimated |
| $\gamma$ | CRRA curvature | 1.61 | Internally estimated |
| $\phi 1_{low}$ | Bequest motive (1st quantile) | 9.78 | Internally estimated |
| $\phi 1_{mid}$ | Bequest motive (2nd quantile) | 73.62 | Internally estimated |
| $\phi 1_{high}$ | Bequest motive (3rd quantile) | 339.58 | Internally estimated |
| $\phi_2$ | Bequest motive (shifter) | 2.93 | Internally estimated |
| $\mu$ | Utility cost of education (time trend) | -1.59 | Internally estimated |
| $\sigma_\zeta$ | Taste for education (s.d.) | 4.00 | Internally estimated |
| $\upsilon$ | Taste for education (shifter) | 0.83 | Internally estimated |

Table 10: Internal Parameters.

The model reproduces the lifecycle evolution of education decision overall, and across targeted sub-samples, captures the persistence in dynastic altruism, and pinpoints the estimated regression coefficients on both binary and continuous expected inheritance. Importantly, it does so without imposing implausible wealth accumulation behaviors.

| Moment | Age | Group | Data | Model |
|---|---|---|---|---|
| % students | 18–23 | All | 33.42 | 33.08 |
| % students | 24–32 | All | 11.94 | 12.00 |
| % students | 21–32 | Expect & $h > 1$ | 15.60 | 15.56 |

Table 11: Targeted moments - Student shares.

In particular, Table 11 reports the shares of students across subperiods (age groups 18–23 and 24–32) and for youths expecting an inheritance who already graduated. The model captures very well the share of students at the beginning of the lifecycle (33.08 in the model vs 33.42 in the data), the extent of the decline in student shares in the following age bracket (12.00 vs 11.94), as well as the share of students among youths expecting an inheritance and holding a degree (15.56 vs 15.60).

| Moment | Age | Group | Data | Model |
|---|---|---|---|---|
| Mean consumption-to-income | 33–60 | All | 0.90 | 0.88 |
| Mean wealth-to-income | 33–60 | All | 7.03 | 6.77 |
| % Intending to bequeath | 33+ | $\phi 1_{low}$ | 47.51 | 47.90 |

Table 12: Targeted moments - Consumption-savings allocation and bequests. 95% confidence intervals in parentheses (model ones are calculated by bootstrapping).

Table 12 focuses on moments pertaining to consumption and capital accumulation, during and at the end of the lifecycle. Specifically, the share of agents intending to leave a bequest[15] and the mean wealth-to-income are close (47.90 in the model vs 47.51 in the data, and 6.77 vs 7.03 respectively), as well as mean consumption over income (0.88 vs 0.90).

Finally, Table 13 lists coefficients from three different logit regressions. In the first two, the dependent variable is student status and the independent ones are binary expected inheritance and continuous expected inheritance, respectively.[16] Coefficients in the model are nearly

[15]Clearly, the intention to leave a bequest is not an explicit choice variable in the model, so to calculate a proxy for intended bequests, both in binary and continuous amounts, I proceed as follows. I calculate policy functions for all possible states with dynastic altruism taking an extra, "phantom" selfish state $\phi 1_{selfish} = 0$, where individuals put no weight at all on bequests. I then consider individuals as intending to leave a bequest in binary terms if their asset choices for next period are above the level chosen by an agent in the same exact states, with the exception of dynastic altruism corresponding to the selfish state. For the amounts of intended bequests, I consider the end-of-life asset position beyond the counter-factual "selfish" level, and divide it by the wealth position over the adult age, conditional on the binary intended bequest variable taking value one.

[16]In the model, control variables include age and age squared in the first two regressions, and age, age squared, income, wealth and a dummy for holding a degree in the third regression.

| Moment | Age | Group | Data | Model |
|---|---|---|---|---|
| $\beta$ Expected inheritance (0–1)<br>$y$ Student status (0–1) | 18–26 | Co-residents | 0.78<br>(0.21–1.34) | 0.77<br>(0.70–0.83) |
| $\beta$ Expected inheritance (€s)<br>$y$ Student status (0–1) | 18–26 | Co-residents | 0.31<br>(0.11–0.51) | 0.32<br>(0.29–0.35) |
| $\beta$ Expected/received inheritance (0–1)<br>$y$ Intention to bequeath (0–1) | 33–60 | All | 2.84<br>(1.90–3.78) | 2.86<br>(2.79–2.93) |

Table 13: Targeted moments - Regression coefficients. 95% confidence intervals in parentheses (model ones are calculated by bootstrapping).

identical to their data counterparts (0.77 vs 0.78 and 0.32 vs 0.31 both in the model and in the data, respectively). In the last one, the dependent variable is the intention to leave a bequest, whereas the control is a binary variable taking value one if the agent has received, or expects to receive, an inheritance. Here too, the strength of the persistence in dynastic altruism is correctly captured (2.86 in the model vs 2.84 in the data).

**Untargeted moments.** Table 14 shows some untargeted moments.

In the first category, the share of students across co-residents and independent young adults in the age group 18–29. Even though the model underestimates the gap in student shares across the two sub-groups, it correctly reproduces the existence of a gap with a higher share of students in the former, and precisely reproduces the share in the first group (27.50 in the model vs 0.28 in the data).

In the second category, a different set of regression coefficients are reported. First, both binary and continuous regression coefficients are positive in the age sub-groups 18–23 and 18–32, close to the data counterparts, and all well within the estimated 95% confidence intervals from the data with the exception of a higher estimated coefficient on continuous expected inheritance for co-residents in the age bracket 18–32. Second, and critically, when both binary and continuous expectations are included as controls in the same regression, the model correctly ranks the relative importance of the two, in favor of binary expectations, and with reasonably close point estimates.

In the last category, I present values pertaining to wealth accumulation behaviours over the life-cycle. First, the median wealth-to-income ratio for working age individuals, which is essentially the same as in the data (around 1% larger in the model), well below its mean value. Such relatively minor overshoot can be reconciled with the notion that the model doesn't allow for population (de)growth, and is therefore not suited to accomodate for secular trends allowing individuals to leave the same bequest with lower levels of capital accumulation over the lifecycle. This caveat motivates the inclusion of another untargeted moment that, comparing

| Moment | Age | Group | Data | Model |
|---|---|---|---|---|
| % students | 18-29 | Co-residents | 27.61 | 27.50 |
| % students | 18-29 | Independents | 9.33 | 14.02 |
| $\beta$ (0–1) | 18-23 | Co-residents | 0.84 | 0.69 |
| | | | (0.04–1.65) | (0.62–0.75) |
| $\beta$ (€s) | 18-23 | Co-residents | 0.21 | 0.29 |
| | | | (-0.16–0.59) | (0.25–0.32) |
| $\beta$ (0–1) | 18-32 | Co-residents | 0.82 | 0.77 |
| | | | (0.24–1.41) | (0.70–0.84) |
| $\beta$ (€s) | 18-32 | Co-residents | 0.12 | 0.34 |
| | | | (-0.01–0.25) | (0.31–0.37) |
| $\beta$ (0–1) (c.c.) | 18-23 | Co-residents | 0.76 | 0.60 |
| | | | (-0.05–1.58) | (0.48–0.72) |
| $\beta$ (€s) (c.c.) | 18-23 | Co-residents | 0.09 | 0.06 |
| | | | (-0.19–0.36) | (0.00–0.13) |
| Median $a/y$ | 33-60 | All | 5.21 | 5.26 |
| Mean $b/a$ | 33+ | All | [0.00, 0.44, 1.24] | [0.11, 0.68, 1.61] |

Table 14: Untargeted moments. The $\beta$s refer to regression coefficients on expected inheritance – in the data column, taken from the same regression as in Section 2, in the model from a regression with age and squared age as additional controls. Complete case (c.c.) refers to a regression where both continuous and binary expected inheritance are included as controls. 95% confidence intervals in parentheses (model ones are calculated by bootstrapping). $a/y$ indicates wealth over income whereas $b/a$ stands for intended bequest over wealth. The latter in the model is calculated as the share of assets at death divided by wealth over the period of uncertain survival, conditionally on the agent's asset position being larger than for otherwise equal agents (i.e., in the same states), except for belonging to a "phantom" selfish class that puts no weight at all on bequest motives (i.e., $\phi_{1_{selfish}} = 0$). This is meant to disentangle purely altruistic motives from capital held for consumption smoothing and precautionary purposes.

wealth and inteded bequests directly, is less likely to be affected by demographic bias. Finally, intended bequests over wealth by tercile are overshoot their empirical counterparts, but are reasonably close (0.11, 0.68, and 1.61 vs 0.00, 0.44, and 1.24).[17] Importantly, these two last untargeted moments jointly confirm that the link between bequest motives and education decisions is not obtained at the expense of plausible savings behaviors.

This feature of the model is further corroborated by Figure 14, which illustrates the agents' consumption-bequest policy functions in the last period of life, by altruism tercile. Reassuringly, the estimated share of cash-on-hand devoted to bequests is in the bullpark of estimates in the literature (compare, for instance, with Figure 5 in Fella et al. 2024). Figure 14 also implicitly vindicates the importance of integrating heterogeneity in altruism in the analysis of capital accumulation over the lifecycle.[18]

[17]It is also worth emphasising that, in the model, individuals expect and transmit perfectly liquid assets. While this assumption allows to keep the model computationally tractable, it also ignores the role played by important features of real estate, such as transaction costs and illiquidity, that would likely help reconcile asset accumulation and decumulation dynamics.

[18]Interestingly, these estimates show the presence of a relatively lower degree of non-homotheticity in the Italian

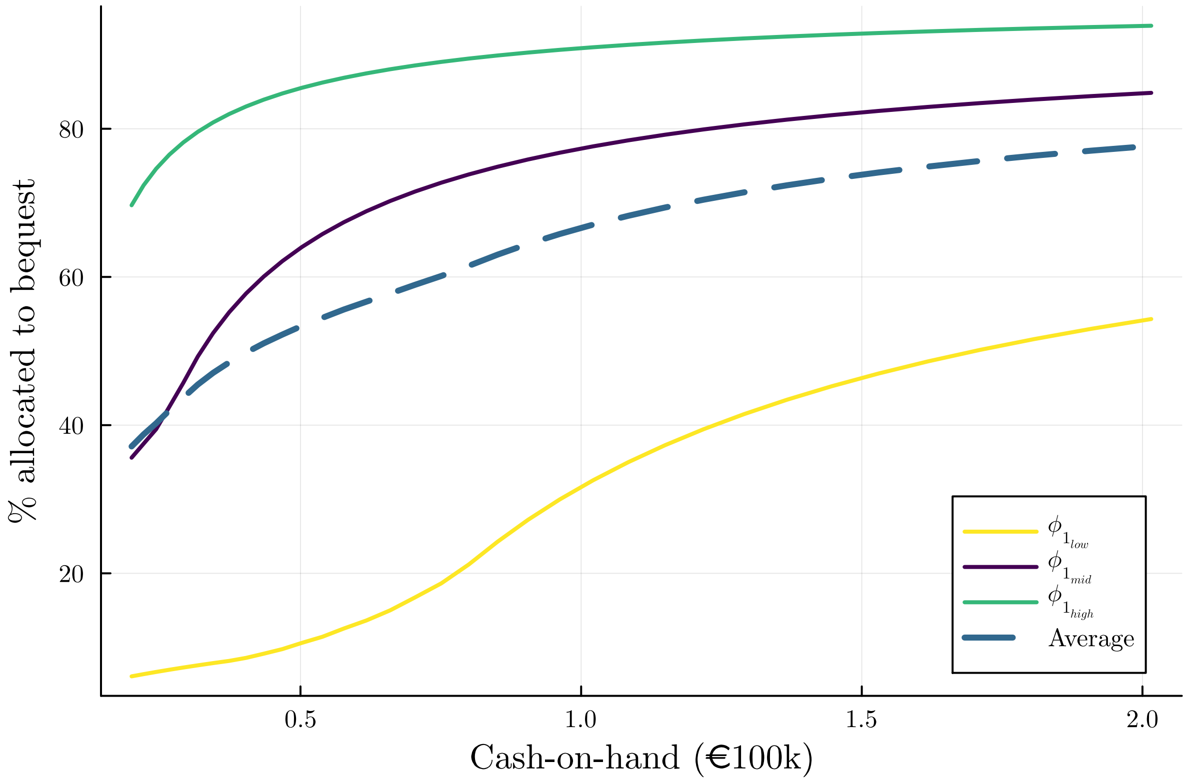


Figure 14: Estimated bequest motive by altruism tercile. The share of bequest over cash-on-hand is calculated in the last period, for comparability with Fella et al. (2024), Figure 5.

### 6.1 Determinants

Having preliminarily validated the calibrated model, I now disentangle the relative importance of various margins of heterogeneity across inheritance expectations groups in determining the positive association between inheritance expectations and education. I separate the analysis of such determinants along two different axes: by time, and by transfer type. First, I consider separately heterogeneity in the (i) *early-life*, (ii) *mid-life*, and (iii) *late-life* determinants. Second, I disentangle to which extent, across the entire life-cycle, transfers in the form of *co-residence* and *assets* matter for the observed outcome.

#### 6.1.1 Time: early, mid, and late-life

I isolate the role of *early-life*, *mid-life* and *late-life* heterogeneity by removing one at a time, and estimating the model moments again keeping all other parameters fixed.[19]

The *early-life* determinant, i.e., the association between co-residence and inheritance ex-

case – possibly because of different social norms or asset composition.

[19] I report student shares among those from the 2nd and 3rd dynastic altruism terciles (i.e., $\phi_1 \in \{\phi_{1_{mid}}, \phi_{1_{high}}\}$), rather than those expecting an inheritance, since (i) agents from the first tercile see no change in their policy functions, and (ii) comparing across expectations would not be possible, by definition, when muting the monetary transfer channel.

pectations, plays a non-negligible role, as shown in Table 15. Here, when shutting down this channel, I assume that those expecting and not expecting inheritance have the same expectations in terms of future co-residence probabilities (specifically, the same as those not expecting any inheritance). The share of students in the age group 18–32 from the upper two terciles of dynastic altruism decreases by -1.9 pp, corresponding to 16% of the entire gap across groups. The overall effect on student enrollment is therefore unambigously negative. Unsurprisingly, the coefficients on binary and continuous expected inheritance slightly decrease.

| **Moment** | **Age** | **Group** | **Baseline** | **$\Delta$E-L ht off** |
|---|---|---|---|---|
| % students | 18–32 | $\phi 1_{mid}, \phi 1_{high}$ | 24.21 | -1.85 |
| $\beta$ Exp. inheritance (0–1) | 18–32 | Co-residents | 0.77 | -0.09 |
| $\beta$ Exp. inheritance (€s) | 18–32 | Co-residents | 0.34 | -0.03 |

Table 15: Selected moments – Determinants by time: early-life heterogeneity.

Heterogeneity in the actual receipt of inheritances constitutes the *mid-life* channel. By muting it, I assume that co-residence and bequest motive remain as in the baseline case, but nobody receives, hence expects, an asset transfer over the lifecycle. The results shown in Table 16 somehow lends support to the existence of a sizeable Carnegie Conjecture effect: the share of students among 18–32 youths holding bequest motives *increases* by 1.6 pp (14% of the gap among those expecting an inheritance and the rest) when the *mid-life* channel is muted. The same late-life desire to leave a bequest is now deprived of an expected source of financing, that is therefore replaced with additional human capital accumulation in the initial phase of the lifecycle.

| **Moment** | **Age** | **Group** | **Baseline** | **$\Delta$M-L ht off** |
|---|---|---|---|---|
| % students | 18–32 | $\phi 1_{mid}, \phi 1_{high}$ | 24.21 | +1.59 |
| $\beta$ Exp. inheritance (0–1) | 18–32 | Co-residents | 0.77 | – |
| $\beta$ Exp. inheritance (€s) | 18–32 | Co-residents | 0.34 | – |

Table 16: Selected moments – Determinants by time: mid-life heterogeneity.

Finally, Table 17 shows the scenarios in which everything is unchanged except for heterogeneity in bequest motives, which now are set at $\phi 1_{low}$ for all individuals – although their co-residence patterns and inheritance receipts still differ. In this case, the student share among youths with medium and high dynastic altruism decreases substantially (-4.7 pp). Heterogeneity in bequest motives can thus account for as much as 41% of the student gap across groups. As a consequence, coefficients on both continuous and binary expectations significantly decrease in magnitude.

Figure 15 illustrates, age group by age group, the share of students in each of the different

| Moment | Age | Group | Baseline | ΔL-L ht off |
|---|---|---|---|---|
| % students | 18–23 | $\phi 1_{mid}, \phi 1_{high}$ | 24.21 | -4.66 |
| $\beta$ Exp. inheritance (0–1) | 18–32 | Co-residents | 0.77 | -0.27 |
| $\beta$ Exp. inheritance (€s) | 18–32 | Co-residents | 0.34 | -0.18 |

Table 17: Selected moments – Determinants by time: late-life heterogeneity.

time scenarios for youths with mid and high dynastic altruism.

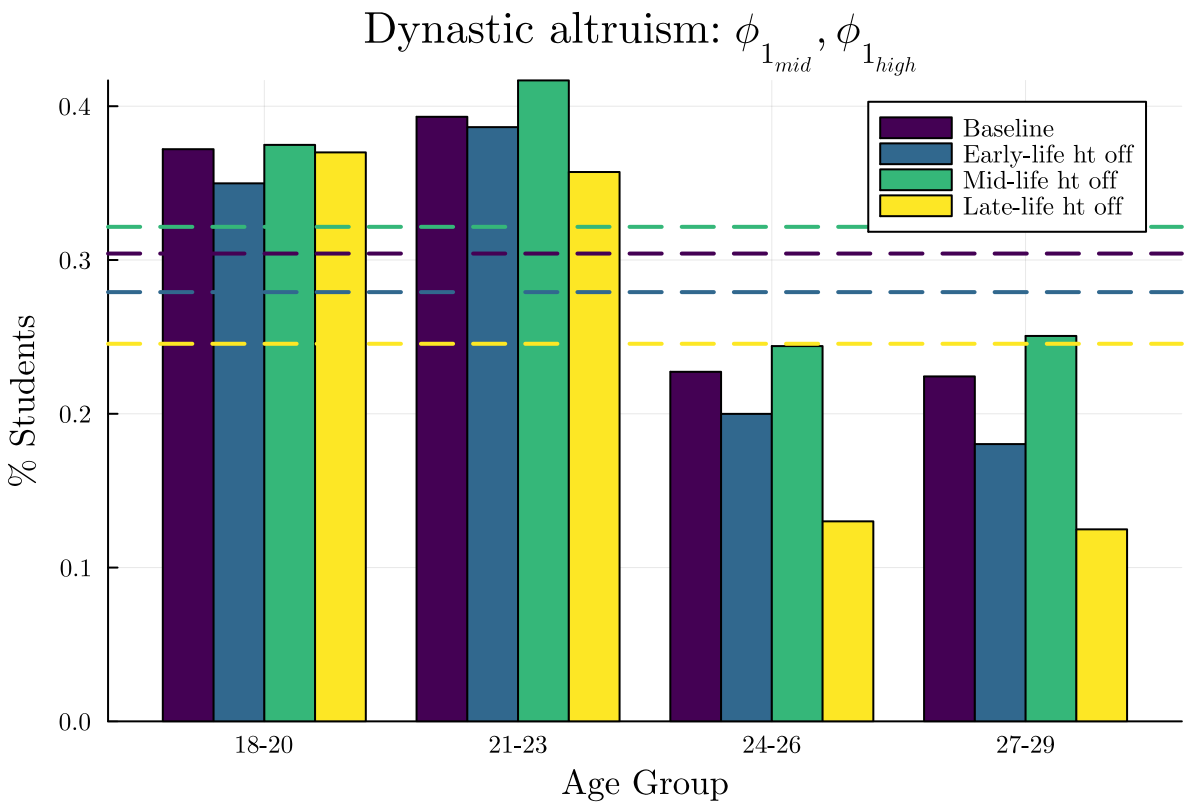


Figure 15: Student shares by age group and time determinant, for youths with mid or high dynastic altruism factor. The dashed lines represent average shares over the entire 18-29 age group.

#### 6.1.2 Transfer type: assets vs co-residence

I now separate different determinants of the association between inheritance expectations and education according to heterogeneity in the underlying type of transfer. Specifically, I differentiate between the role of *asset transfers* (essentially conflating mid- and late-life factors of the previous analysis) and of *co-residence* patterns (now not only at the beginning of the life-cycle, but also during the later stage when the agent's child's expected co-residence pattern depends on dynastic altruism).

Table 18 reports the results of these experiments. When *co-residence* expectations are orthogonal to inheritance expectations, the share of students in the age group 18–32 with mid or high dynastic altruism decreases by -2.3 pp, 20% of the overall gap.

| Moment | Age | Group | Baseline | $\Delta$C-R off | $\Delta$Assets off |
|---|---|---|---|---|---|
| % students | 18–32 | $\phi 1_{mid}, \phi 1_{high}$ | 24.21 | -2.27 | -3.77 |
| $\beta$ Exp. inheritance (0–1) | 18–32 | Co-residents | 0.77 | -0.08 | – |
| $\beta$ Exp. inheritance (€s) | 18–32 | Co-residents | 0.34 | -0.03 | – |

Table 18: Selected moments – Determinants by transfer type.

In the last column, I assume inter-generational *asset transfers* do not take place, implying no heterogeneity in bequest motives, nor in expectations or actual financial receipt. The only heterogeneity associated to altruism groups is thus due to co-residence trajectories, when both young and adults. Here the decrease in student shares is more pronounced (-3.8 pp in the age group 18–32, 33% of the gap across groups). Regression coefficients barely change when asset transfers are muted (and trivially nonexistent when co-residence is the only transfer at play). Figure 16 shows the relative importance of the two types of transfers in determining education choices.

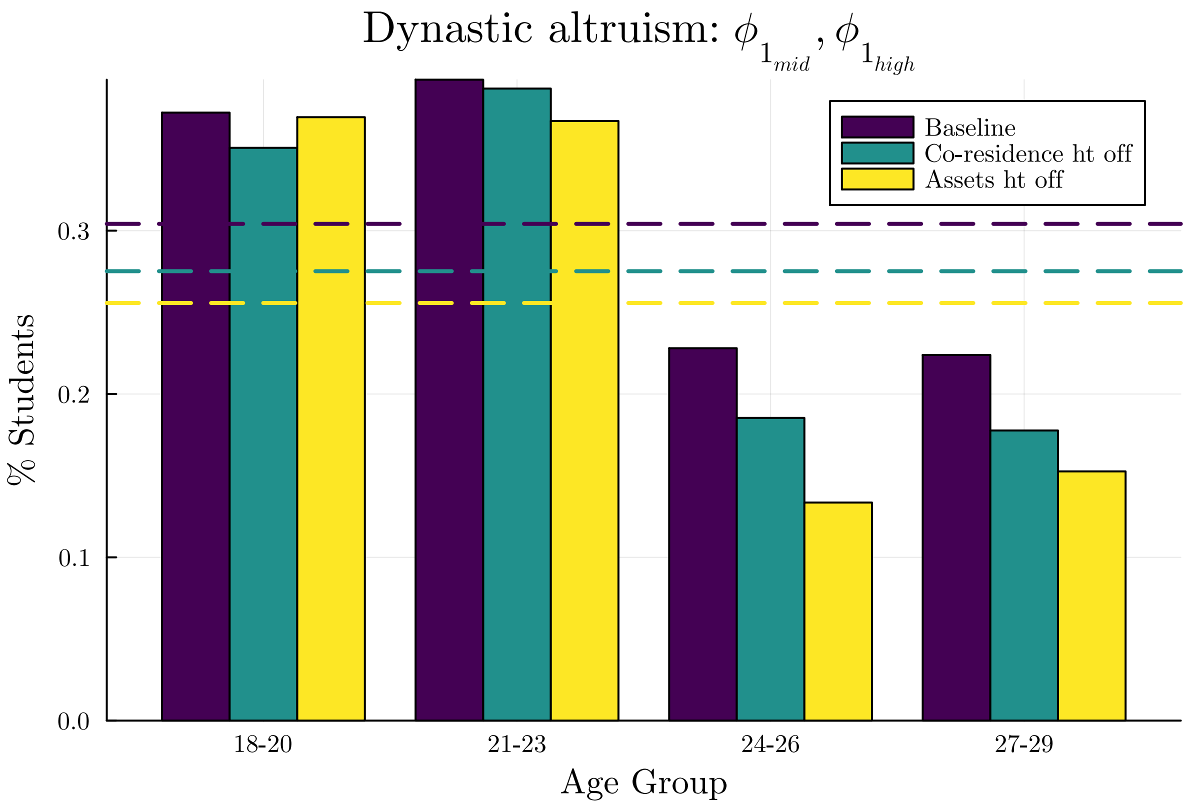


Figure 16: Student shares by age group and transfer type, for youths with mid or high dynastic altruism factor. The dashed lines represent average shares over the entire 18-29 age group.

# 7 Policy Counterfactuals

## 7.1 Estate taxation

So far, I have considered both the expected amount of inheritance and the ability to leave a bequest as unaffected by estate taxes. What happens to education decisions, however, if a policy intervention modifies the predicted returns to asset transmission, introducing a wedge between gross and net bequests?

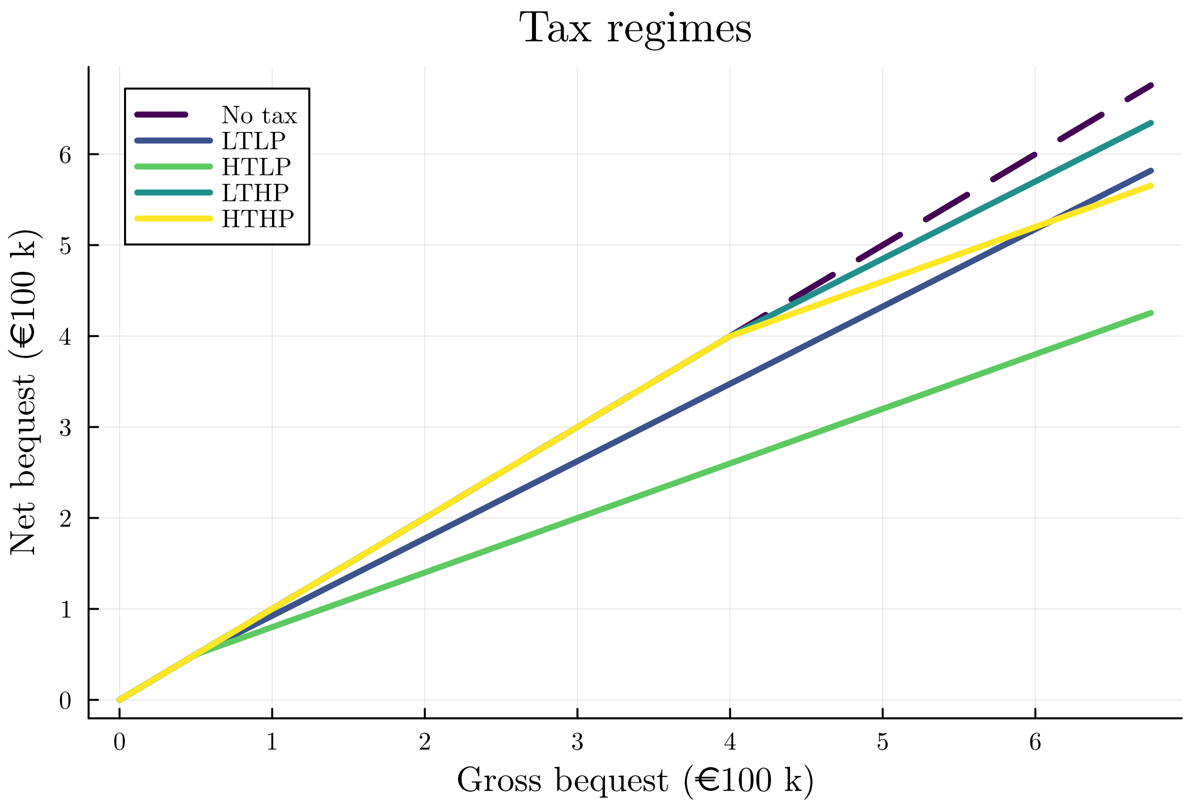


Figure 17: Gross and net bequest, by tax regime. LTLP: Low Tax, Low Progressivity; LTHP: Low Tax, High Progressivity; HTLP: High Tax, Low Progressivity; HTHP: High Tax, High Progressivity.

I consider two margins along which estate taxation can bite. First, an estate threshold, below which estates are exempted. Second, a linear estate rate, corresponding to the share of assets the government taxes away before transferring to the heir the resulting *net* bequest. Through these two levers, the government can manage both the expected tax receipts and the degree of progressivity of the tax. In the following experiments, the estate threshold can be either €25,000 or €150,000, separating the *low progressivity, LP* from the *high progressivity, HP* regimes, whereas the tax rate is taken to be either 15% (*low tax, LT*) or 40% (*high tax, HT*). Figure 17 illustrates how the policy mix affects the gross-net bequest ratio.

Assuming that the tax affects both inheritance to be received and the end-of-life net bequest from which agents derive utility, it is *a priori* not obvious how agents' decisions would change upon the introduction of alternative tax regimes. On the one hand, the *mid-life* determinant weakened, incentives for youths with medium-to-high dynastic altruism to enroll should further increase. On the other one, the returns to human capital would be unchanged over the lifecycle, but their ability to feed bequest motives would decrease, shifting the time composition of costs and benefits of education.

Overall, as shown by Table 19, under all scenarios, differences in enrollment rates across inheritance expectation groups *increase* after the introduction of an estate tax. On the one hand, youths belonging to the first altruism tercile have no mid-life impact, whereas taxation of end-of-life wealth provides a small disincentive to human capital accumulation in the initial phase of the lifecycle. On the other hand, individuals with mid-to-high altruism now (i) possibly expect a lower inheritance amount, which weakens the disincentivizing mid-life determinant, and (ii) need to accumulate more capital to feed the same net bequest. This produces two results. First, under *LTLP*, *HTLP*, and *HTHP*, individuals expecting an inheritance study more relative to the baseline case. The only exception is consistuted by *LTHP*, where the estate exempted is above the inheritance expected by $\phi 1_{mid}$ youths (see Figure 13) such that they experience no change through the mid-life determinant, and student rates among them slightly decrease as a consequence. Second, the relevance of the continuous margin of expected inheritances tends to increase, as shown by the changes in regression coefficients and consistently with the stronger effect of taxation on large estates (see, in particular, high-tax scenarios *HTLP* and *HTHP*).

| Moment | Age | Group | Baseline | ΔLTLP | ΔLTHP | ΔHTLP | ΔHTHP |
|---|---|---|---|---|---|---|---|
| % students | 18–32 | $\phi 1_{mid}, \phi 1_{high}$ | 24.21 | +0.48 | -0.04 | +1.69 | +1.54 |
| % students | 18–32 | $\phi 1_{low}$ | 12.91 | +0.07 | -0.35 | +0.42 | +0.25 |
| $\beta$ (0–1) | 18–32 | Co-residents | 0.77 | +0.01 | +0.03 | +0.05 | +0.06 |
| $\beta$ (€s) | 18–32 | Co-residents | 0.34 | +0.08 | +0.05 | +0.31 | +0.31 |

Table 19: Selected moments – Alternative tax regimes. LTLP: Low Tax, Low Progressivity; LTHP: Low Tax, High Progressivity; HTLP: High Tax, Low Progressivity; HTHP: High Tax, High Progressivity. Low (High) Tax corresponds to 15.0% (40.0%). Low (High) Progressivity corresponds to an exemption threshold of €25000.0 (€150000.0).

## 7.2 Income support

The previous exercise implicitly assumed wasteful government expenditure. Now, I complement an estate tax with unconditional income support for students, with two alternative scenarios. In the first, which I label *low transfers*, the low rate (15%) – high threshold (€150,000) tax regime (LTHP) is coupled with a small scholarship (€500 extra per year on top of the baseline students' income). In the second, the *high transfers* one, the policy package includes a higher scholarship (€ 4,000), whereas the estate tax system is jointly pinned down by the high estate tax (40%) + low taxable threshold (€25,000) (HTLP) from the previous exercise. Results are reported in Figure 18.

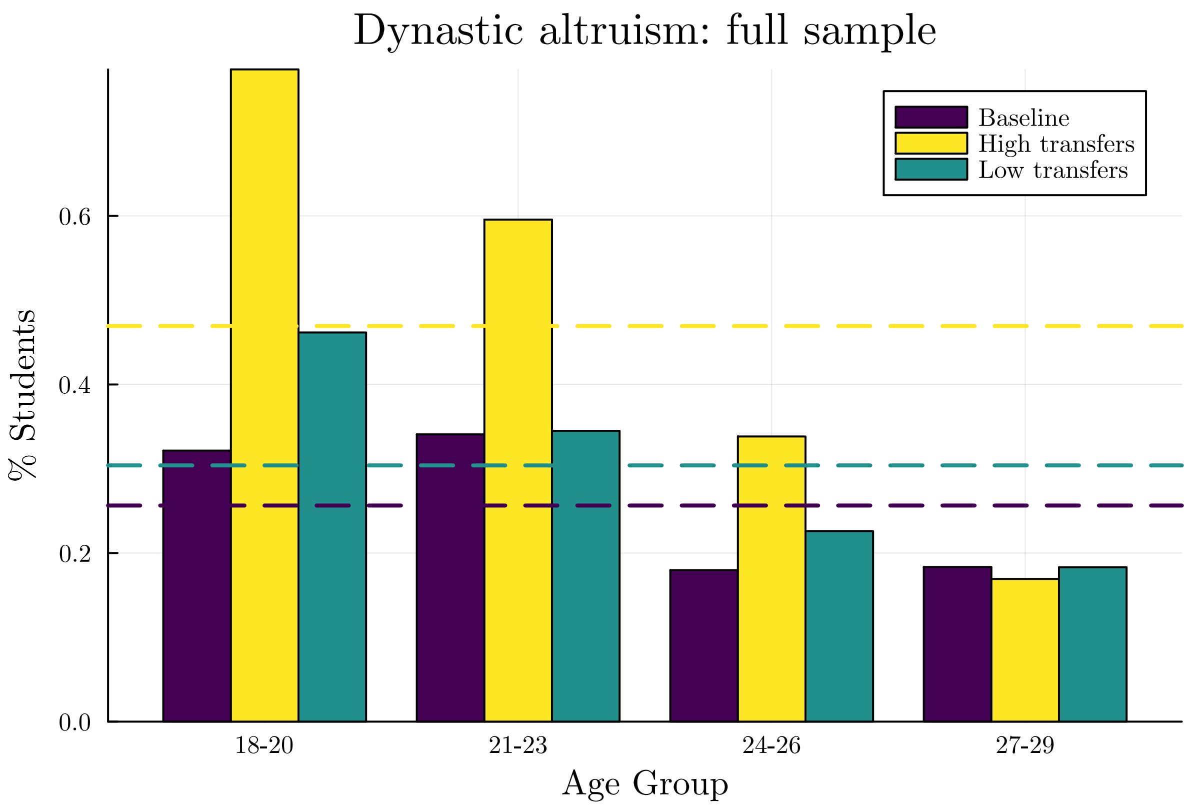


Figure 18: Student shares by age group and tax-and-transfer scenario, for all youths. The dashed lines represent average shares over the entire 18-29 age group.

Both regimes unequivocally raise university enrollment. This is not surprising given that now education is subsidised through a tax regime which had at worst a slightly negative effect on its own. The *high transfers* scenario raises average student rates by 17.5 pp over the 18–32 age group, whereas the increase associated with the *low transfers* regime is 3.4 pp. Increases take place across dynastic altruism terciles, to a very similar extent in percentage point terms – which translates into a significantly larger % increase among low-altruism youths. Unconditional income support, in fact, alleviates the short-term costs of education, while its benefits are not decreased enough by estate taxation at the end of the lifecycle. Furthermore, estate taxation weakens the disincentivizing effects of the *mid-life* channel, which is by definition muted for youths belonging to the first altruism tercile. Consistently with this insight, the coefficient on expected inheritance in continuous terms remains unchanged under the *low transfers* regime and significantly increases under the *high transfers* one.

| | | | | Transfers | |
|---|---|---|---|---|---|
| **Moment** | **Age** | **Group** | **Baseline** | **$\Delta$Low** | **$\Delta$High** |
| % students | 18–32 | $\phi 1_{mid}, \phi 1_{high}$ | 24.21 | +3.42 | +17.51 |
| % students | 18–32 | $\phi 1_{low}$ | 12.91 | +3.86 | +17.98 |
| $\beta$ (0–1) | 18–32 | Co-residents | 0.77 | -0.15 | -0.08 |
| $\beta$ (€s) | 18–32 | Co-residents | 0.34 | -0.01 | +0.30 |

Table 20: Selected moments – Low vs high transfers.

### 7.3 Returns to education

In the introduction, we saw how the returns to higher educations are particularly low in Italy, especially for young adults in the age range 25–34 (Corak, 2013). The last exercise proved that income support in the initial phase of the lifecycle would have dramatic consequences for enrollment rates, since lower short-term costs would favorably tilt the overall trade-offs in favour of education. The natural follow-up exercise is thus to study what would happen to student rates if the university wage premium for recent graduates was *certain*, *faster*, or *higher*: the current cost of accumulating human capital would be unchanged, but its benefits would be pre-determined, closer in time, or larger altogether. I thus tackle this question by performing three counterfactual exercises. In the first, I remove all uncertainty around the wage premium associated to higher education, as each education-age combination corresponds to a fix wage level (*certain* returns). In the second, I keep average lifetime earnings for each education level constant, while shifting their lifecycle evolution (*faster* returns). In the last one, *higher* returns, I increase the education-specific deterministic wage profile by 10% compared to the baseline one. Figure 19 illustrates the evolution of the mean age – education wage profiles over the lifecycle under these different scenarios.

#### 7.3.1 Certain returns

In this first exercise, I remove any uncertainty around education wage premia: individuals are assumed to earn the labour income of individuals with the central productivity realization and the corresponding educational level over the whole life-cycle. The impact of this intervention is *a priori* ambiguous. On the one hand, the need for precautionary savings dissipates, increasing the relative importance of financing bequests among the reasons for wealth accumulation. On the other, as the left panel of Figure 19 illustrates, returns to education are now significantly lower than the average ones in the baseline scenario, while the education wage premium remains comparable. Table 21 shows that the latter effect prevails. In particular, student rates significantly decrease across dynastic altruism groups, but especially among youths

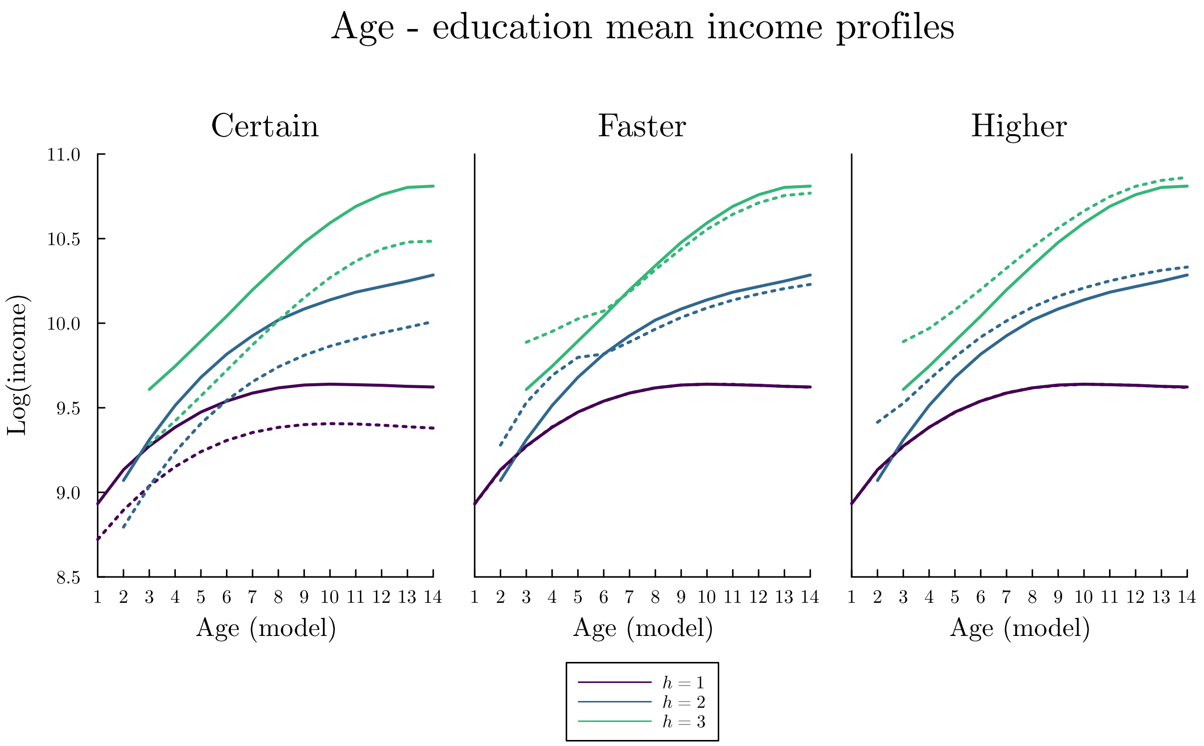


Figure 19: Mean lifecycle evolution of wages, by education. Solid lines represent the average baseline evolution of income by education level. Dotted lines illustrate the respective alternative mean path.

expecting an inheritance (-5.2 pp vs -2.2 pp). As a consequence, the link connecting education decisions and binary inheritance expectations becomes weaker, given that the estimated coefficient moves by -0.17.

| | | | | Returns | | |
|---|---|---|---|---|---|---|
| **Moment** | **Age** | **Group** | **Baseline** | **ΔCertain** | **ΔFaster** | **ΔHigher** |
| % students | 18–32 | $\phi1_{mid}, \phi1_{high}$ | 24.21 | -5.22 | -0.10 | +1.98 |
| % students | 18–32 | $\phi1_{low}$ | 12.91 | -2.15 | +0.52 | +4.46 |
| $\beta$ (0–1) | 18–32 | Co-residents | 0.77 | -0.17 | -0.07 | -0.33 |
| $\beta$ (€s) | 18–32 | Co-residents | 0.34 | +0.05 | -0.02 | -0.10 |

Table 21: Selected moments – Different education returns.

### 7.3.2 Faster returns

Here, I keep the lifetime deterministic component of wages per education level fixed, but anticipate the wage premium for higher education. Specifically, I move the 26–32 education wage premium from the current 15% level to 40%, in line with the cross-country average from Corak (2013).[20] I then shift the remaining years of the lifecycle age-education wage to minimize

[20]It is reassuring for the reliability of the underlying data and the validity of the overall estimation procedure that the wage premium I derive from the data is very close to the one reported in Corak (2013).

the distance between updated and actual profiles, while smoothing across the remaining years. The counterfactual trajectories are reported in the central panel of Figure 19.

As shown by the second column of Table 21, the impact of shifting the expected benefits of higher education towards the early stage of the lifecycle, at the expenses of later earnings, does not have an impact as sizeable as in the case of *certain returns* in absolute terms, but goes in the same direction: student rates now slightly *decrease* among mid and high dynastic altruism youths, while increasing by 0.5 pp among low dynastic altruism ones. The link between inheritance expectations and education is therefore very slightly weakened, as indicated by the small changes in estimated regression coefficients. Carrying over insights from the analytical model in Section 3, shifting the inter-temporal trade-offs associated to education has two effects. First, it increases the short-term benefits, thereby incentivizing low altruism youths to acquire some education. Second, it dampens its long-term benefit in terms of bequest financing, as earnings later in life are now lower.

#### 7.3.3 Higher returns

In this last exercise, I increase the average premium associated to each education level over the working lifecycle by 10%. The resulting evolution is depicted in the right panel of Figure 19. Here, to a higher wage premium in the early adult life, does not correspond a decrease over the following years. As a consequence, student rates increase across all altruism groups, although especially so among those belonging to the low dynastic altruism class (+4.5 pp vs +2.0 pp). The estimated coefficients on expected inheritance decrease accordingly (by -0.33 and -0.10 respectively). The rationale for the relative change in student rates across dynastic altruism groups can once again be linked with analytical results in Section 3, where the strength of the association between expected inheritance and education was showed to be decreasing in the wage premium associated to the latter. A higher expected return to education, by lifting the benefits to education within a lifecycle, weakens the prominence of heterogeneity with respect to dynastic altruism among the factors that determine education choices.

### 7.4 Discussion

The joint assessment of the three counterfactual exercises concerning returns to education suggests that the association between dynastic altruism and education critically hinges on the extent to which the former is necessary to incur the short-term costs of the latter, and is substantially weakened when such costs are lower (e.g., because of income support to students) and/or when education provides individuals larger expected utility *within the lifecycle*.

The established importance of heterogeneity in late-life bequest motives also bears policy implications, as illustrated by the simple estate tax experiments in subsection 7.1. If human capital accumulation is explained only to a minor extent by heterogeneity in education taste, and differences in bequest motives drive as much as 41% of the gap in student rates, one obvious consequence is that inheritance taxation can play a significant role in raising overall student rates. The experiments on tax regimes and income support to young students in subsection 7.2 show that both (i) the disincentivizing effect associated to actual inheritance receipts, and (ii) the relative low elasticity of bequest motives to the wedge between gross and net bequests, are likely to leave substantial leeway to policy-makers willing to increase the currently dismal student rates.

Furthermore, moving beyond the scope of this paper, it seems *a priori* plausible that at least part of the observed slow increase in the Italian higher education wage premium can be attributed to the relatively low weight played by individual skills vis-a-vis preferences – including those linked with dynastic altruism – in determining education decisions. Through its impact on the aggregate skills pool of young adults holding a degree, this can push down the prevailing wage rate expected by prospect students, further undermining the link between education and productivity. By the same token, policy interventions aimed at reducing the short-term costs of education and/or increasing its long-term benefits within the lifecycle might endogenously produce the conditions for a self-sustaining cycle between (i) the aggregate skill pools, (ii) the wage premium for higher education, and (iii) the role of dynastic altruism in undertaking higher education. More generally, taking into account the transmission of inter-generational preferences for altruism can enrich our understanding of the sources of wage growth and wage gaps across and within labour markets (Adda and Dustmann, 2023; Doepke and Gaetani, 2022; Bianchi and Paradisi, 2024).

# 8 Conclusion

In this paper, I showed that inheritance expectations are a strong predictor of education choices, and thus help shed light on inter-generational persistence in outcomes.

Empirically, I rely on Italian data to document a sizeable association between inheritance expectations and the probability of enrolling at university, holding several demographic and economic variables constant, including parental income, wealth and education among others. I also uncover strong heteorgeneity in altruism across families: some dynasties are much more likely to transmit assets across generations than others.

A simple analytical model, featuring inter-generational persistence in altruistic preferences as the key mechanism, rationalizes such findings. Given bequest motives are stronger for individuals expecting an inheritance, their incentive to improve lifetime income through education more than offsets the disincentivizing income effect of receiving an inheritance.

Finally, I present a richer quantitative lifecycle model, with *ex-ante* heterogeneity in altruism and various sources of uncertainty. Through the lenses of this framework, heterogeneity in late-life bequest motives, appears to be the most important determinant, while early-life co-residence patterns play a smaller role and the inheritance receipt itself *per se* (the mid-life determinant) has a disincentivizing effect on human capital accumulation. Throughout a set of counterfactual exercises, I show that the lifecycle configuration of the returns to education is critical to determine the link between inheritance expectations and human capital accumulation. It becomes weaker whenever the expected benefits to education *within the lifecycle* increase, or its short-term costs decrease, or both. The effect of any type of policy intervention – income support for student, a higher or faster wage premium to education, estate taxation – conforms with this fundamental insight.

Two main limitations of this study should be mentioned. First, ignoring the demographic transition allows me to realistically evaluate the dynamics surrounding the specific generational snapshot object of the empirical part at the expenses of fully endogeneizing capital transmission. I cannot therefore contribute to a clearer quantitative understanding of the relative importance of *ex-ante* and *ex-post* heterogeneity in driving inter-generational persistence in outcomes. Nevertheless, it should be noted that the established prominence of long-term persistence in dynastic altruism makes the precise estimation of inter-generational asset transfers a second-order concern compared to their extensive margin. Second, the cross-sectional nature of my data on inheritance expectations does not allow me to take any stance on the origins of the documented persistence in altruism, which obviously matter a great deal for the ensuing policy implications. Is it mainly innate, or does it rather arise as a consequence of one's own socio-economic upbringing? Alternatively assuming both – the former in the analytical model, the latter in its quantitative extension – is an implicit suggestion that further research and data collection are needed to address this critical question.

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# Appendix A Motivation

This section presents a few tables and figures in support of the macro-trends affecting Italy in terms of inter-generational asset transmission, demography, social mobility, educational achievements, and returns to education.

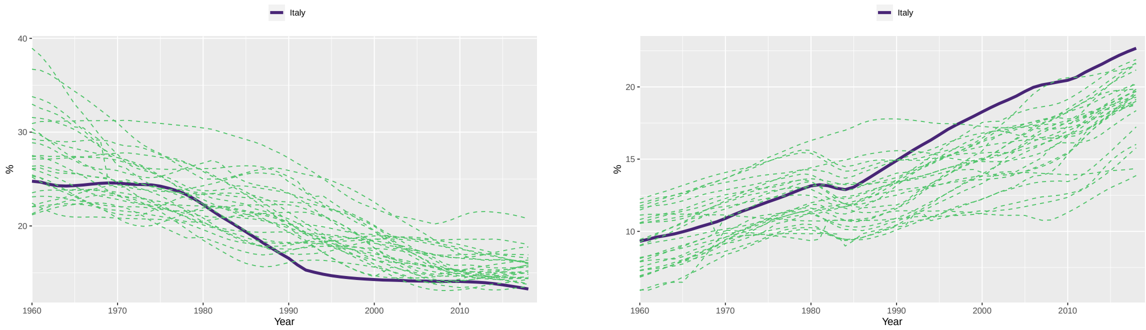



Figure 20: Left panel: share of population aged 15-. Right panel: share of population aged 65+. Background: European countries. Source: OECD.

Figure 20 shows how the share of young (under 15, left panel) and old (over 65, right panel) within the Italian population over the last six decades have decreased and increased to the lowest and highest level in Europe, respectively.

Zooming on education, the left panel of Figure 21 illustrates the very low share of the population with a university degree by European standard (age group 25–64). In addition, educational attainments are very correlated across generations: the right panel of Figure 21 shows how parental low educational levels are very strong predictors of children's education.

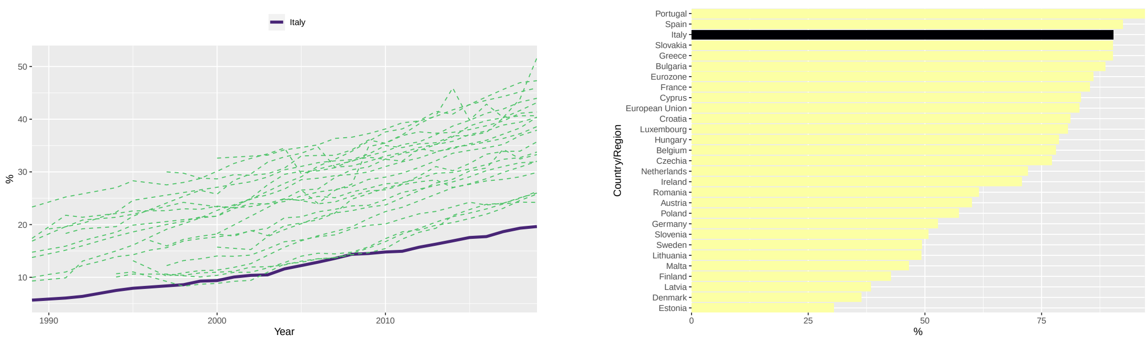
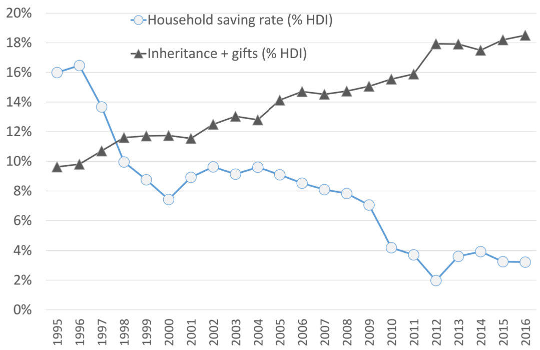



Figure 21: Left panel: share of adults with higher education (population aged 25–64). Background: European countries. Source: OECD. Right panel: transmission of educational attainment level 0-2 (less than primary, primary, and lower secondary) from parents to current adults (population aged 25–59). Source: Eurostat.

Despite the low share of graduates, the wage premium for educated workers is very low, and especially so for young adults: the right panel of Figure 22, taken from Corak (2013) illustrates how Italy simultaneously exhibits (i) one of the lowest wage premia for college-educated adults in the age group 25–34 (between 10 and 15%) and a very strong inter-generational persistence in earnings (around 0.5).



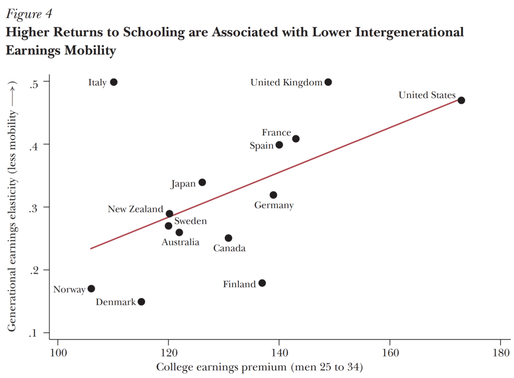




Figure 22: Left panel: Inheritance vs saving rates (% of household disposable income). Source: Acciari and Morelli (2020). Right panel: Source: Corak (2013).

Finally, the left panel of Figure 22 and Table 22 are indicative of the raising importance of inheritance flows in the Italian economy, due to both demographic and economic factors.

| **Variable** | **1995** | **2016** |
|---|---|---|
| Total annual bequests flow (tax records) | €38.2bn | €112.3bn |
| (as a share of national income) | 4.6% | 8.1% |
| Corrected gross flows of inheritance and gifts as a share of disposable income | 9.7% | 18.5% |
| Total inheritance and gifts as a share of total personal net wealth | 0.99% | 1.52% |
| Share of declared estates belonging to over 80 | 30% | 60% |
| Share of declared estates belonging to under 50 | 6% | 2% |
| Average total wealth left at death | €210,000 | €290,000 |

Table 22: Aggregate statistics on bequests in Italy. Source: Acciari and Morelli (2020)

# Appendix B Empirics

## B.1 Data and Statistics

In the 2002 special supplement to the SHIW, a subsample of households' head and spouse are asked the following questions:

- Whether they received any inheritance/gift
  - If yes: from whom (parents/grandparents or others)? To whom (head or spouse)? When? What amount?
- Whether they left any bequest/gift
  - If yes: from whom (head or spouse)? To whom (children/grandchildren or others)? When? What amount?
- Whether they expect to receive any inheritance/gift
  - If yes: to whom (head or spouse)? From whom (parents/grandparents or others)? What amount?
- Whether they expect to leave any bequest/gift
  - If yes: to whom (children/grandchildren or others)? What amount?

Figure 23 reports the unconditional shares of students and graduates in the population of this age group. The proportion of students is increasing until the age of 22 and then tend to decrease simultaneously with the appearance of the first graduates (and, one would guess, a substantial share of drop-outs). The share of graduates in the sub-sample of individuals in the age group 28-33 (when students are increasingly an exception) is in the neighbourhood of 15%.

**Inheritance expectations by asset.** I calculate for each household the share of current real and financial wealth[21] held in real estate and businesses, and multiply this by both the binary and the continuous variables of expected inheritance in order to obtain a inheritance-type-specific set of expectations. Here the assumption is that the share of wealth type will remain on average constant.[22] It should be noted that I cannot obtain a comparable figure for household heads and spouses since the wealth variables available in the dataset refer to their own household's wealth, and allocation thereof.

[21] Here I abstract from liabilities.

[22] A problem with that might arise if outstanding mortgages were artificially deflating the share of housing wealth. However, this figure does not include liabilities, such that my housing share of wealth represents an upper bound. In light of results in the following section, I maintain that, if anything, this lends further support to my hypothesis.

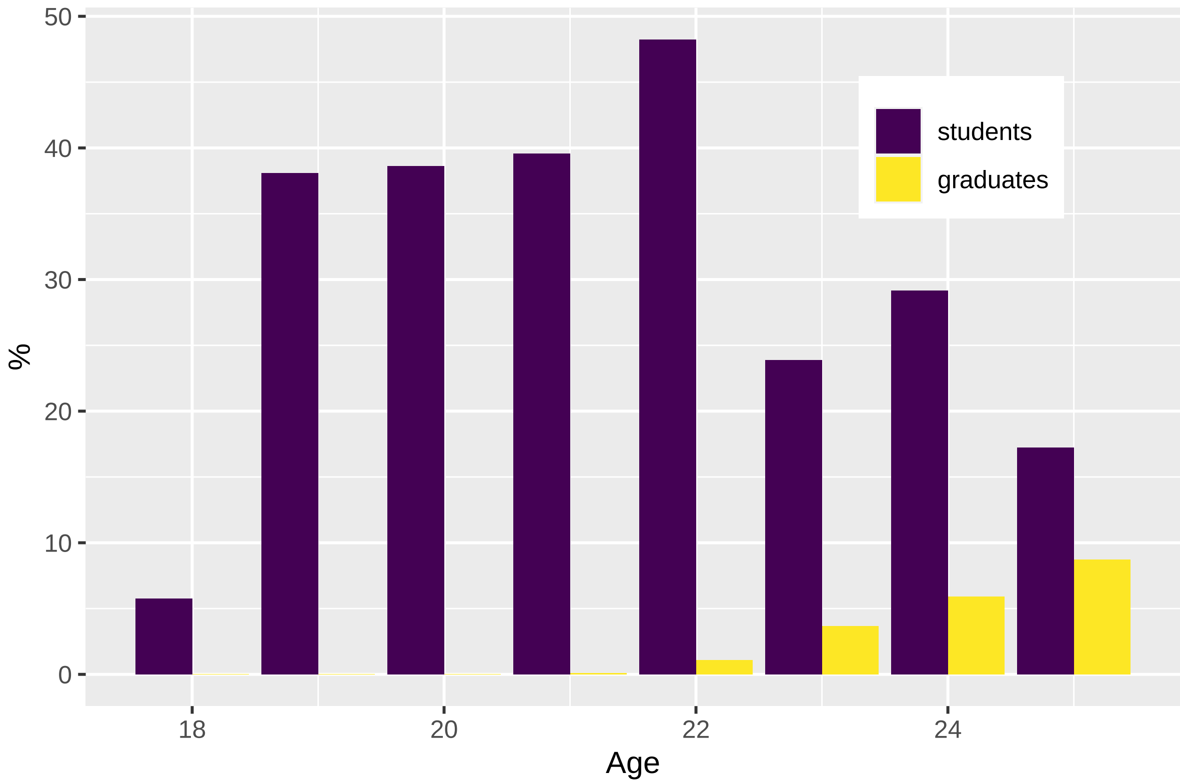



Figure 23: Share of students and graduates, by age.

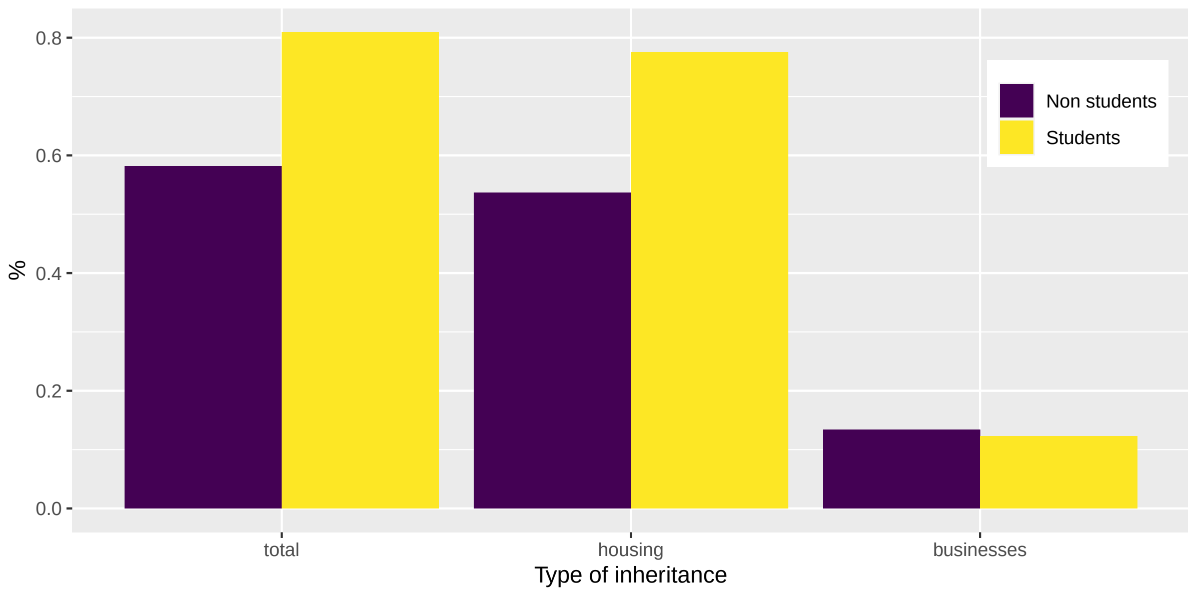



Figure 24: Share of inheritance expectation (type) by student status (children aged 18-25).

The second distinction, illustrated in Figure 24 and 25, focuses on the type of inheritance young individuals should expect to receive, given the real assets owned by the family at the point in time the survey was run. According to Figure 24, the share of young children expecting any sort of inheritance is higher for students (some 80%) than non-students (slightly above 60%). This relative difference remains unchanged when we constrain expectations to housing wealth, whereas slightly less than 15% of youngsters expect to receive business activities as inheritance, be they enrolled at university or not.

When moving to the expected amount of inheritance by type (Figure 25), the overall picture remains very similar – if anything, the average amount of expected inheritance in businesses is higher for non-students, while the opposite remains true (and by a wide margin) for housing and overall wealth.

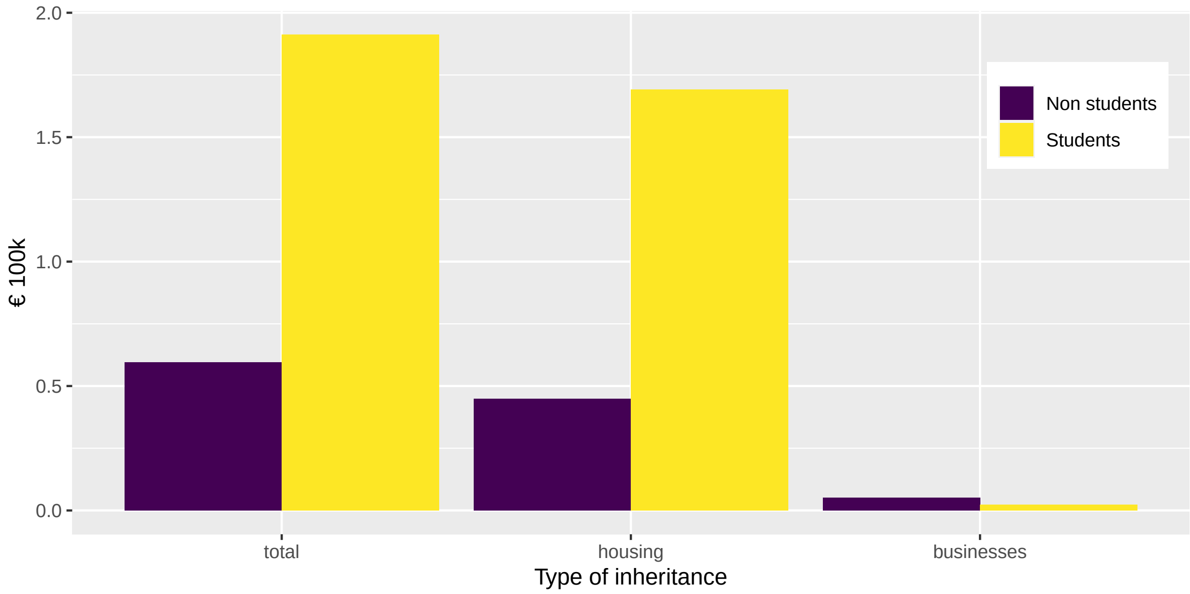



Figure 25: Amount of inheritance expectation (type) by student status (children aged 18-25).

## B.2 Housing as a driver

What happens if I differentiate inheritances depending on the type of wealth individuals expect to receive? Table 23 tentatively answers this question: housing wealth seems to be the driver of the behavioural effect under scrutiny. The conditional association is significant at 1% level in each of the four listed specifications, including the third one where current household wealth in the form of housing and businesses are among the control variables.

Figure 26 is the equivalent of the earlier graph, now restricted to inheritance expectations in terms of housing. The estimated effect is now steeper: expecting 500 thousand euros worth of housing increases the estimated probability of a woman in the North to attend university from some 16% to more than 63%, whereas she is more likely than not to attend university when expecting slightly more than 380 000 euros. Once again, the relative magnitude of the impact across sex and macro-region is stable.

The effect remains statistically significant across the three main specifications, and substantially stronger in magnitude, if I replace continuous expectations with two dummy variables.

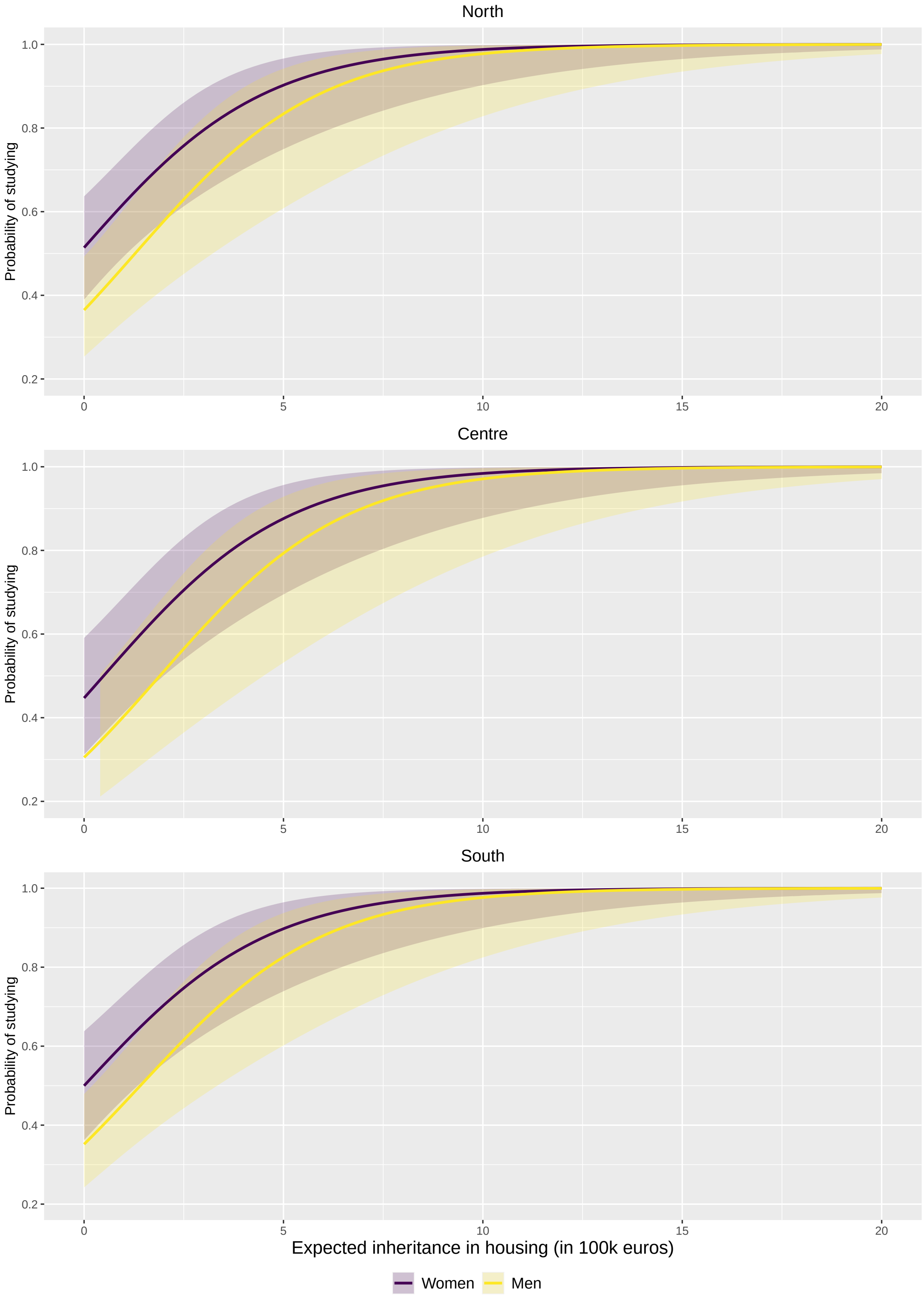



Figure 26: Predicted probabilities (with 95% confidence intervals) of being a student according to the baseline model with component-specific expectations (housing vs businesses).

Again, housing seems to be the important factor at play. To illustrate the estimated impact, the point estimate of the predicted probabilities for a young woman in the North increases from 43.3% to 64.1% if she expects to receive housing inheritance, whereas for a man the same probability moves from 28% to 47.6%. In the Centre, a woman's (man's) likelihood increases from 37% (23.1%) to 57.9% (41.2%), in the South from 45.7% (30.1%) to 66.3% (50.1%).

Table 23: Inheritance expectations by type (co-residents aged 18-25)

| | *Dependent variable:* | | |
|---|---|---|---|
| | Student | | |
| Expected inheritance (housing, €) | 0.434*** | 0.420*** | 0.476*** |
| | (0.112) | (0.110) | (0.144) |
| Expected inheritance (housing, 0-1) | 0.848** | 0.817** | 0.780** |
| | (0.330) | (0.337) | (0.346) |
| Squared parents' income | No | Yes | Yes |
| Wealth components | No | No | Yes |
| Observations | 617 | 617 | 617 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*Controls include: age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, parents' income, household's net wealth per household member, number of siblings, father's education, mother's education.*

**Repeated cross section (1989-2016).**

Table 24: Repeated cross-sections (1989-2016)

| | *Dependent variable:* | | |
|---|---|---|---|
| | Student *Logit* | Student/graduate *Logit* | Education level *Pooled OLS* |
| (To be) inherited dwellings | -0.038 | 0.236*** | 0.103*** |
| | (0.141) | (0.089) | (0.020) |
| Observations | 8,062 | 16,246 | 16,246 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*Column (1) includes co-residents aged 18-25. Column (2) and (3) include co-residents aged 18-33. Controls include: time fixed effects, age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, household income, household income per member, household wealth, household wealth per child, household real estate wealth, household real estate per child wealth, number of household components, household head's education.*

**Complete figures.**

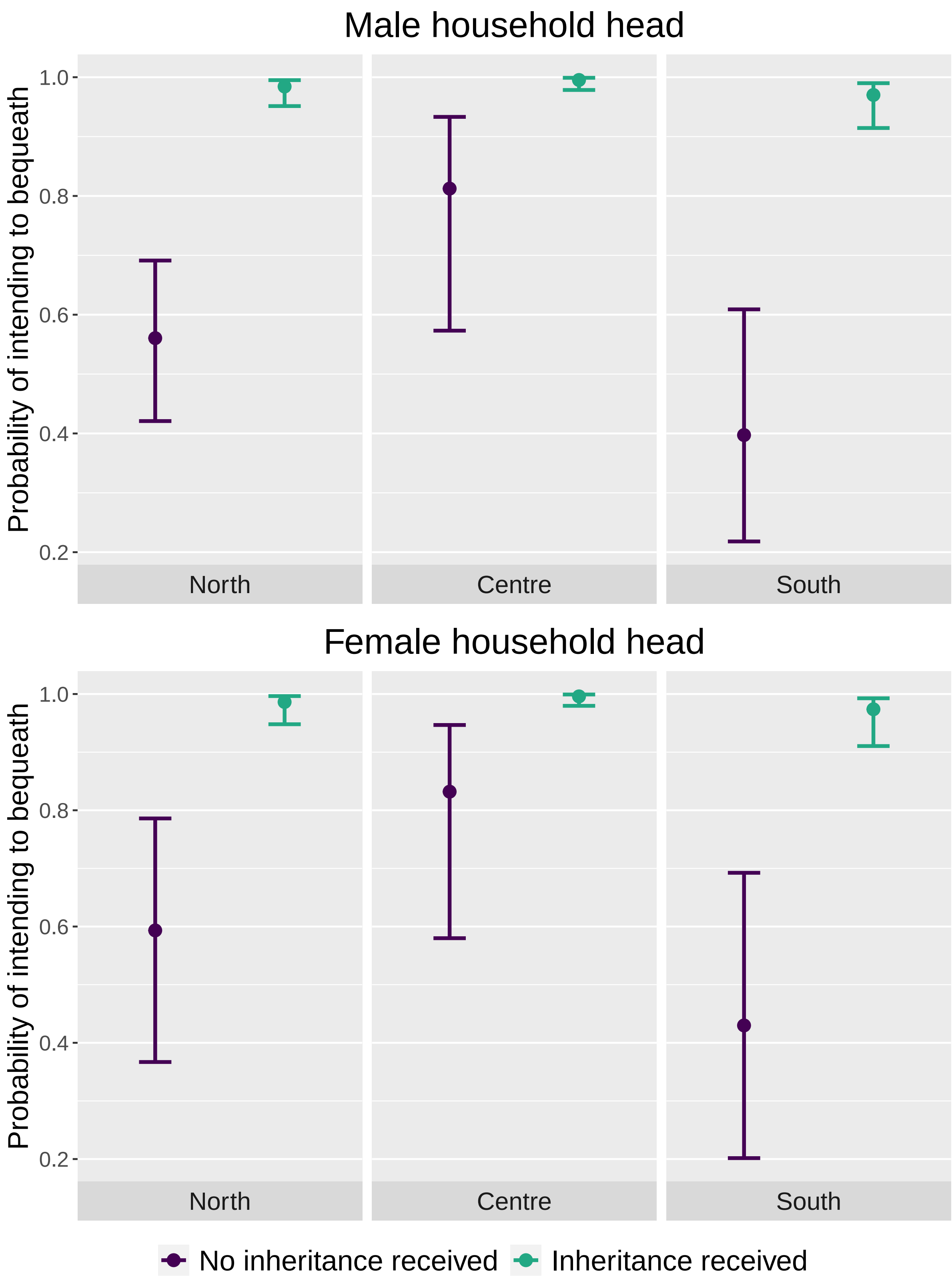



Figure 27: Predicted intention to leave a bequest. Estimates are taken from the third column of Table 7 at mean values of all other controls.

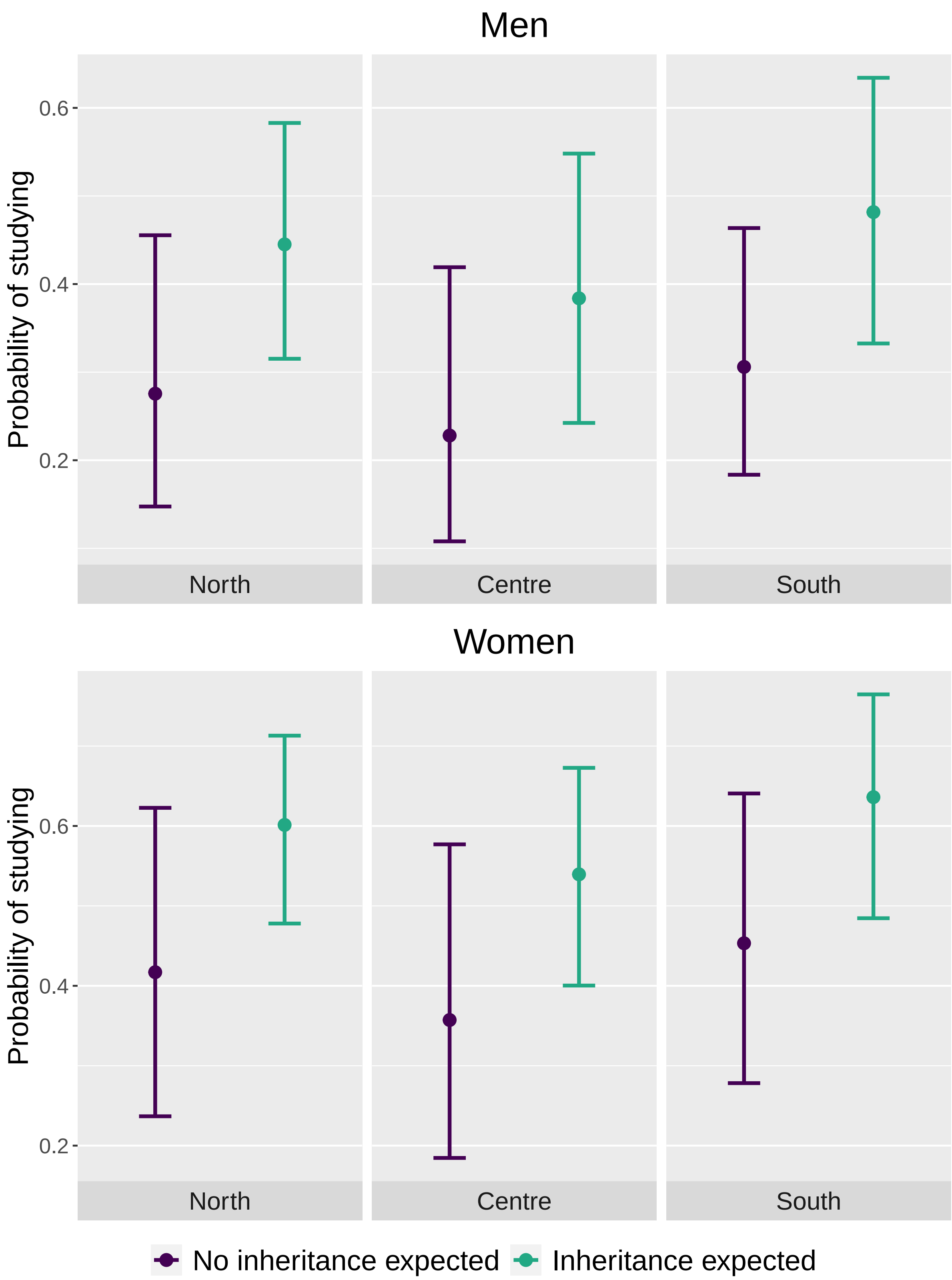



Figure 28: Predicted probabilities of being a student. Estimates are taken for young men living in the North at mean values of all other controls. Bars represent the estimated 95% confidence interval around predicted probabilities.

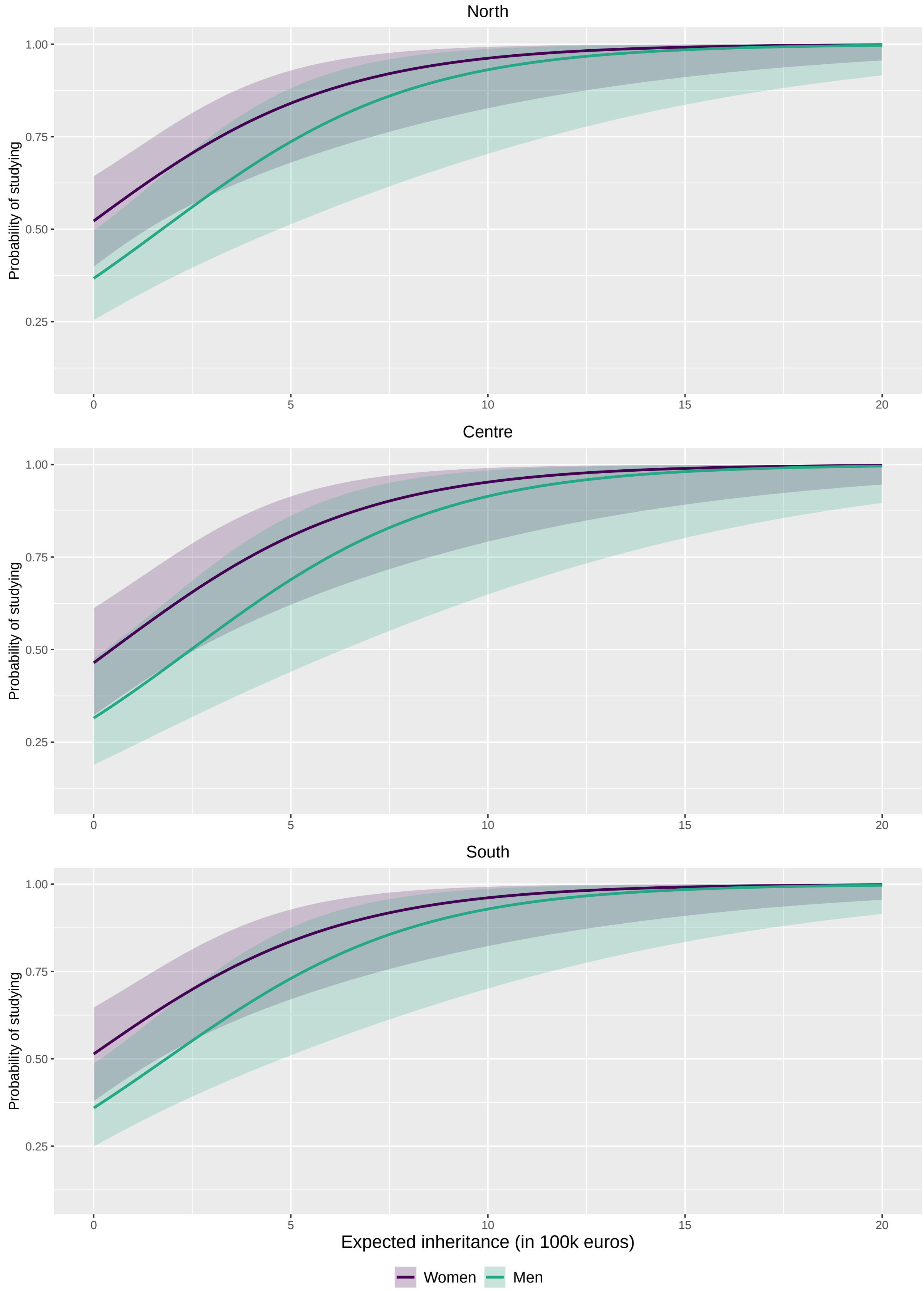



Figure 29: Predicted probabilities (with 95% confidence intervals) of being a student according to the baseline model.

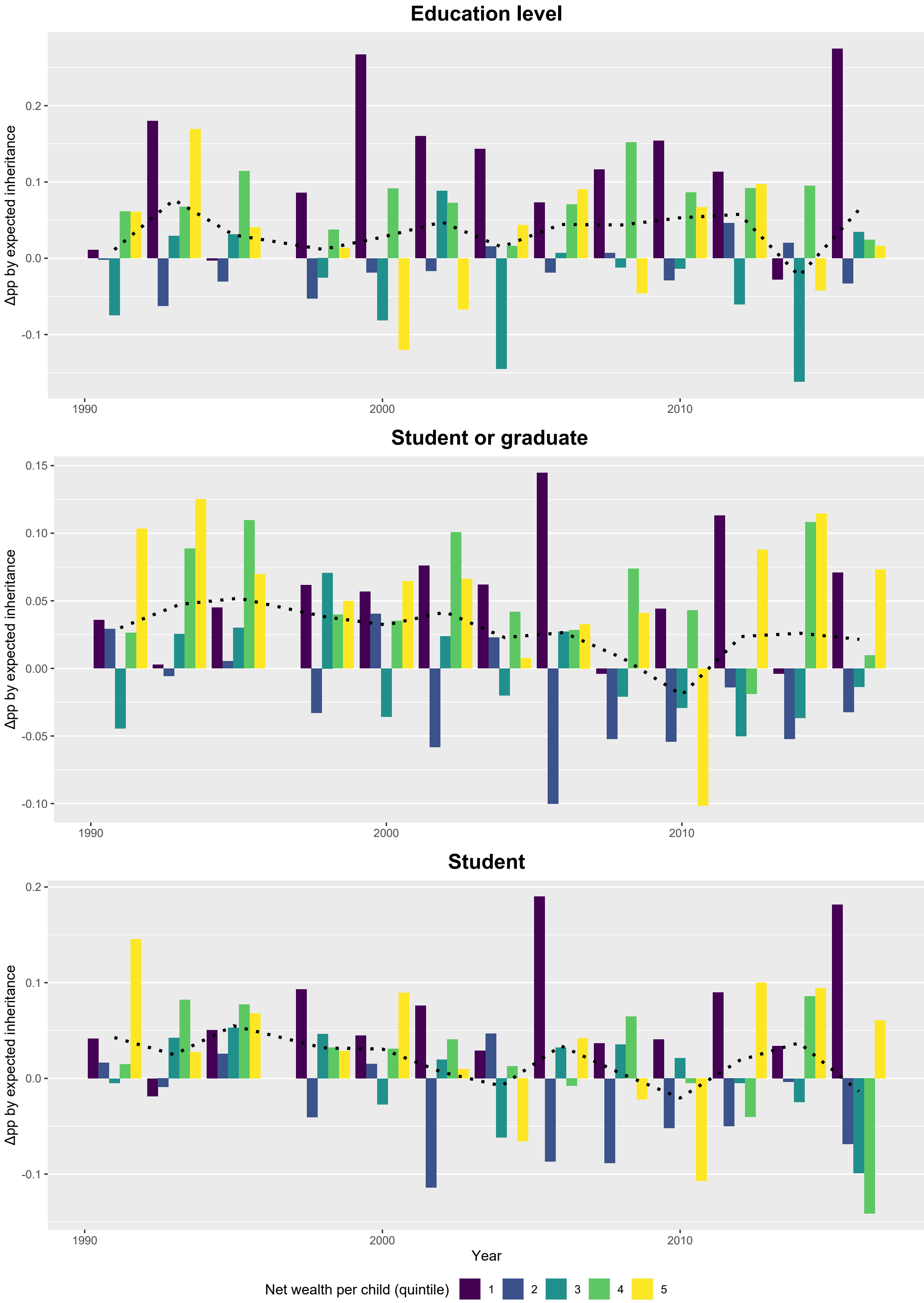



Figure 30: Net percentage point differences in (i) average education level, (ii) share of students or graduates and (iii) share of students, across groups, within quintiles of household wealth per child. Samples: (i) and (ii) co-residents aged 18-30, (iii) co-residents aged 18-25.

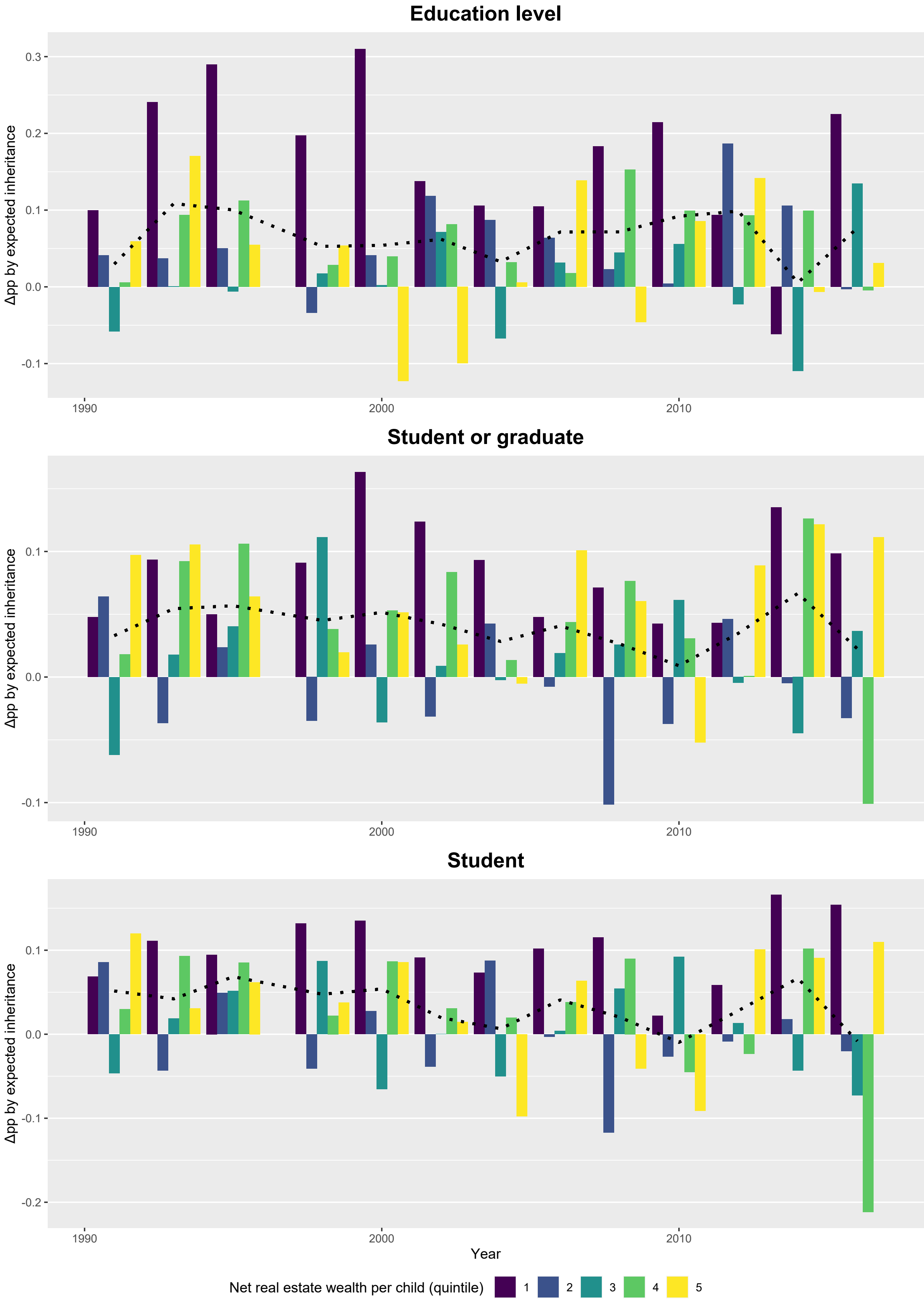



Figure 31: Net percentage point differences in (i) average education level, (ii) share of students or graduates and (iii) share of students, across groups, within quintiles of household real estate wealth per child. Samples: (i) and (ii) co-residents aged 18-30, (iii) co-residents aged 18-25.

## B.3 Robustness Checks

I run three main types of robustness checks. In the first, I extend the sample to dependents aged 18-33. In the second, I widen the dependent variable to include graduates (with all the caveats about the economic significance of such inclusion mentioned in the previous section). In the last one, I take the inverse hyperbolic sine transformation of all monetary values in order to correct for the possible effect of outliers in driving the results, while preserving zeros (and negative values, when it comes to net household wealth).

Tables 25 reports the results of the same regressions of the empirical section in the main body with the extended sample. Results are entirely consistent with those obtained before. Expecting an inheritance, especially in the form of housing, is associated with higher probability of being enrolled at university.

Table 25: Extended sample (co-residents aged 18-33)

| | *Dependent variable:* | | |
|---|---|---|---|
| | | Student | |
| Expected inheritance (€) | 0.117** | 0.116** | 0.100* |
| | (0.046) | (0.047) | (0.054) |
| Expected inheritance (0-1) | 0.795** | 0.800** | 0.779** |
| | (0.321) | (0.333) | (0.335) |
| Expected inheritance (housing, €) | 0.187*** | 0.186*** | 0.196*** |
| | (0.056) | (0.056) | (0.059) |
| Expected inheritance (housing, 0-1) | 0.852*** | 0.862*** | 0.854*** |
| | (0.298) | (0.311) | (0.316) |
| Squared parents' income | No | Yes | Yes |
| Wealth components | No | No | Yes |
| Observations | 1,018 | 1,018 | 1,018 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*Controls include: age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, parents' income, household's net wealth per household member, number of siblings, father's education, mother's education.*

The second check is potentially more interesting, as I now include as 1s in the dependent variable, in the 18-33 subsample, also those who already graduated. Table 26 reports the results with continuous variables in the first case. Across specifications, the coefficient on expected housing inheritance remains positive, and significant at 10% level.

The conditional association between expected inheritance in terms of housing and education remains very strong (significance always at 1%) when binary variables are considered (see the last two rows of Table 26).

Table 26: Student or graduate (co-residents aged 18-33)

| | *Dependent variable:* | | |
|---|---|---|---|
| | Student/graduate | | |
| Expected inheritance (housing, €) | 0.093* | 0.090* | 0.113* |
| | (0.052) | (0.052) | (0.057) |
| Expected inheritance (housing, 0-1) | 0.981*** | 0.985*** | 0.999*** |
| | (0.275) | (0.287) | (0.291) |
| Squared parents' income | No | Yes | Yes |
| Wealth components | No | No | Yes |
| Observations | 1,018 | 1,018 | 1,018 |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 | | |

*The whole analysis is run including survey weights provided by the Bank of Italy.*
*Controls include: age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, parents' income, household's net wealth per household member, number of siblings, father's education, mother's education.*

**3-class expectations.** Now I replace the binary inheritance expectations variable with an ordered variable, where values 2 and 0 correspond to the previous 1 and 0, respectively, and 1 corresponds to a co-resident individual whose parents are uncertain about their intention to leave a bequest. The results are reported in Table 27:

Table 27: 3-class expectations (co-residents aged 18-25)

| | *Dependent variable:* | | |
|---|---|---|---|
| | student | | |
| | (1) | (2) | (3) |
| Expected inheritance (0-1-2) | 0.325** | 0.318* | 0.305* |
| | (0.161) | (0.163) | (0.164) |
| Squared parents' income | No | Yes | Yes |
| Wealth components | No | No | Yes |
| Observations | 836 | 836 | 836 |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 | | |

The last check is meant to downplay the potential role of outliers. To this end, I take the inverse hyperbolic sine transformation of all monetary variables, so far expressed in hundreds of thousands of euros (parental income, household's net wealth per member, household's wealth in housing and businesses per member and individual expected inheritance in housing and businesses). Such operation, differently from a logarithmic transformation, allows me to preserve the numerous zeros associated to these variables (in addition to the negative ones, which are present, although very rare, in the case of wealth). Results are reported in Table 28 and attribute very strong conditional impact of expected inheritance in terms of housing, at 1% significance level under every possible specification.

Table 28: Inverse hyperbolic sine, continuous expectations (children aged 18-25)

| | *Dependent variable:* | | |
|---|---|---|---|
| | student | | |
| | (1) | (2) | (3) |
| Expected inheritance (housing) | 0.955*** | 0.963*** | 0.897*** |
| | (0.265) | (0.283) | (0.292) |
| Wealth components | No | Yes | Yes |
| Grade | No | No | Yes |
| Observations | 617 | 617 | 398 |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 | | |

*The whole analysis is run including survey weights provided by the Bank of Italy. Controls include: age (and its square), sex, a categorical variable for municipality size, a categorical variable for macro-regions, parents' income, household's net wealth per household member, number of siblings, father's education, mother's education.*

# Appendix C Theory

## C.1 Analytical model

*Proof of Proposition 1.* Including the budget constraints (3) and (4) into (2), we obtain:

$$V_i = u(c_1(w_1(h_i))) + \beta \left[u(c_2(w_2(h_i), I_i, b_i)) + v(b_i, I_i)\right]$$

The first order conditions with respect to $h_i$ and $b_i$ are respectively given by:

$$F_1 \equiv u'(c_1(w_1(h_i)))w_1'(h_i) + \beta u'(c_2(w_2(h_i), I_i, b_i))w_2'(h_i) \leq 0 \tag{43}$$

and

$$F_2 \equiv -u'(c_2(w_2(h_i), I_i, b_i)) + v_b(b_i, I_i) \leq 0 \tag{44}$$

This is standard inter-temporal and intra-temporal optimization: (43) shows that the marginal cost of education in terms of consumption in the 1st period has to correspond to or be smaller than its discounted marginal benefit, equal to the marginal utility of additional consumption in period 2 allowed by the associated marginal increase in wage. Equation (44) requires marginal cost is in foregone consumption to be smaller or equal to its marginal benefit in additional utility derived through bequest. Henceforth, we focus on the problem for the unconstrained agent.

Assume $I_i$ enters the individual problem only through its impact on the 2nd period budget constraint. Starting from (43) and (44), total differentiation gives, respectively:

$$\left[u''w_1'^2 + u'w_1'' + \beta(u''w_2'^2 + u'w_2'')\right]\frac{\partial h}{\partial I} - \beta u''w_2'\frac{\partial b}{\partial I} + \beta u''w_2' = 0 \tag{45}$$

$$-u''w_2'\frac{\partial h}{\partial I} + (u'' + v_{bb})\frac{\partial b}{\partial I} - u'' = 0 \tag{46}$$

The relationship between optimal capital and expected inheritance when only *mid-life* heterogeneity operates is therefore given by:

$$\frac{\partial h_i}{\partial I_i}_M = \frac{-\beta u''w_2'v_{bb}}{(u''+v_{bb})(u''w_1'^2 + u'w_1'' + \beta u'w_2'') - \beta v_{bb}u''w_2'^2} \equiv \chi v_{bb} \leq 0 \tag{47}$$

Now assume instead that inheritance $I_i$ does not contribute to wealth holdings in the 2nd period (as if it was fully taxed), but matters through its relationship with dynastic altruism, i.e. via

$v_{bI} > 0$. Total differentiation of (43) and (44) now results in:

$$\left[u''w_1'^2 + u'w_1'' + \beta(u''w_2'^2 + u'w_2'')\right] \frac{\partial h}{\partial I} - \beta u''w_2' \frac{\partial b}{\partial I} = 0 \tag{48}$$

$$-u''w_2' \frac{\partial h}{\partial I} + (u'' + v_{bb}) \frac{\partial b}{\partial I} + v_{bI} = 0 \tag{49}$$

Hence, the relationship between optimal capital and expected inheritance when only the *late-life* determinant is active is given by:

$$\frac{\partial h_i}{\partial I_i}_L = \frac{-\beta u''w_2' v_{bI}}{(u'' + v_{bb})(u''w_1'^2 + u'w_1'' + \beta u'w_2'') - \beta v_{bb} u'' w_2'^2} \equiv \chi v_{bI} \geq 0 \tag{50}$$

$\square$

*Proof of Proposition 2.* Total differentiation of (43), with lighter notation, gives:

$$\left[u''w_1'^2 + u'w_1'' + \beta(u''w_2'^2 + u'w_2'')\right] \frac{\partial h}{\partial I} - \beta u''w_2' \frac{\partial b}{\partial I} + \beta u''w_2' = 0 \tag{51}$$

Total differentiation of (44) gives:

$$-u''w_2' \frac{\partial h}{\partial I} + (u'' + v_{bb}) \frac{\partial b}{\partial I} - u'' + v_{bI} = 0 \tag{52}$$

Rearranging and simplifying:

$$\frac{\partial h}{\partial I} = \frac{\beta u''w_2'}{u''w_1'^2 + u'w_1'' + \beta(u''w_2'^2 + u'w_2'')} \left(\frac{\partial b}{\partial I} - 1\right) \tag{53}$$

$$\frac{\partial b}{\partial I} = \frac{u'' - v_{bI} + u''w_2' \frac{\partial h}{\partial I}}{u'' + v_{bb}} \tag{54}$$

Therefore, we end up with:

$$\frac{\partial h_i}{\partial I_i} = \frac{-\beta u''w_2'(v_{bI} + v_{bb})}{(u'' + v_{bb})(u''w_1'^2 + u'w_1'' + \beta u'w_2'') - \beta v_{bb} u'' w_2'^2} \tag{55}$$

According to (55), the sign of the relationship between the optimal choice of education and anticipated inheritance entirely depends on the relative size of $v_{bI}$ and $v_{bb}$, and will be positive iff $|v_{bI}| > |v_{bb}|$. In economic terms, this corresponds to a preference environment where the decrease in marginal utility from additional bequests is lower than the increase in the marginal utility from bequest associated with larger received inheritances. □

*Proof of Proposition 3.* Assume that only *early-life* heterogeneity matters, and rewrite (43):

$$F_1 \equiv u'(c_1(w_1(h_i), I_i))w_1'(h_i) + \beta u'(c_2(w_2(h_i), b_i))w_2'(h_i) \leq 0 \tag{56}$$

and

$$F_2 \equiv -u'(c_2(w_2(h_i), b_i)) + v_b(b_i) \leq 0 \tag{57}$$

Total differentiation gives:

$$\left[u''w_1'^2 + u'w_1'' + \beta(u''w_2'^2 + u'w_2'')\right] \frac{\partial h}{\partial I} - \beta u''w_2' \frac{\partial b}{\partial I} + u''w_1'c_{1_I} = 0 \tag{58}$$

$$-u''w_2' \frac{\partial h}{\partial I} + (u'' + v_{bb}) \frac{\partial b}{\partial I} = 0 \tag{59}$$

Combining the two, we obtain:

$$\frac{\partial h_i}{\partial I_i}_E = \frac{-(u'' + v_{bb})u''w_1'c_{1_I}}{(u'' + v_{bb})(u''w_1'^2 + u'w_1'' + \beta u'w_2'') - \beta v_{bb}u''w_2'^2} \equiv \frac{\Gamma}{\Theta} m_{i1_I} > 0 \tag{60}$$

□

*Proof of Proposition 4.* As first order conditions, we now have:

$$F_1 \equiv u'(c_1(w_1(h_i), I_i))w_1'(h_i) + \beta u'(c_2(w_2(h_i), I_i, b_i))w_2'(h_i) \leq 0 \tag{61}$$

and

$$F_2 \equiv -u'(c_2(w_2(h_i), I_i, b_i)) + v_b(b_i, I_i) \leq 0 \tag{62}$$

Total differentiation gives:

$$\left[u''w_1'^2 + u'w_1'' + \beta(u''w_2'^2 + u'w_2'')\right] \frac{\partial h}{\partial I} - \beta u''w_2' \frac{\partial b}{\partial I} + u'c_{1_I}w_1' + \beta u''w_2' = 0 \tag{63}$$

$$-u''w_2' \frac{\partial h}{\partial I} + (u'' + v_{bb}) \frac{\partial b}{\partial I} - u'' + v_{bI} = 0 \tag{64}$$

Rearranging and simplifying:

$$\frac{\partial h}{\partial I}=\frac{\beta u''w_2'\left(\frac{\partial b}{\partial I}-1\right)-u'c_{1_I}w_1'}{u''w_1'^2+u'w_1''+\beta(u''w_2'^2+u'w_2'')} \tag{65}$$

$$\frac{\partial b}{\partial I}=\frac{u''-v_{bI}+u''w_2'\frac{\partial h}{\partial I}}{u''+v_{bb}} \tag{66}$$

As a result:

$$\frac{\partial h_i}{\partial I_i}=\frac{-\beta u''w_2'(v_{bI}+v_{bb})-(u''+v_{bb})u''w_1'c_{1_I}}{(u''+v_{bb})(u''w_1'^2+u'w_1''+\beta u'w_2'')-\beta v_{bb}u''w_2'^2} \tag{67}$$

Since the denominator is always positive, the sign of this expression coincides with the sign of its numerator. □

*Proof of Proposition 5.* We have:

$$h_i^*(I_i)=\begin{cases}1+\log\left(1+I_i\right)-\frac{1}{\beta\chi\phi_1(\kappa+I_i)} & \text{if} \quad \chi>\frac{\frac{1+\beta}{\beta\phi_1(\kappa+I_i)}-(1+I_i)}{1+\log\left(1+I_i\right)}\\ 0 & \text{otherwise}\end{cases}$$

Therefore:

$$\frac{dh_i^*(I_i)}{dI_i}=\frac{1}{1+I_i}+\frac{1}{\beta\chi\phi_1(\kappa+I_i)^2}$$

$$\frac{\left(\frac{dh_i^*(I_i)}{dI_i}\right)}{d\chi}=-\frac{1}{\beta\phi_1[\chi(\kappa+I_i)]^2}<0$$

□

# Appendix D Calibration

Here, I report the values of some objects estimated outside the model (the followed procedure is explained in Section 5).

**Survival probability.** The original data from ISTAT give survival rates by 5-year age classes. I first derive conditional probability of death from 33 (age of child birth) to 63 (when agents can die in the model). I treat 5-year probabilities as equal for each year and attribute them to 3-year classes in the model accordingly. I multiply the first class probability to the conditional probability of death from 33 to 63. This mechanically overestimates the probability of death from 63 to 66 but represents a very conservative bound of the impact of inheritances, given that any effect of transmission before the parent turns 63 is muted.

| $j$ | **Survival probability** |
|---|---|
| 15 | 0.9415 |
| 16 | 0.9479 |
| 17 | 0.9606 |
| 18 | 0.9424 |
| 19 | 0.9335 |
| 20 | 0.8824 |
| 21 | 0.8507 |
| 22 | 0.7907 |
| 23 | 0.6810 |
| 24 | 0.0000 |

Table 29: Conditional survival probabilities.

**Co-residence probability.** Individuals are potentially allowed to co-reside with parents in the first 5 periods of life. Similarly, parents can have co-residing children from $j = 12$ until $j = 16$ included. Exogenous probabilities differ across altruism classes in the following way:

| $j$ | $\phi 1_{low}$ | $\phi 1_{mid}, \phi 1_{high}$ |
|---|---|---|
| 1 | 0.9606 | 0.8352 |
| 2 | 0.9228 | 0.6975 |
| 3 | 0.8864 | 0.5826 |
| 4 | 0.8515 | 0.4865 |
| 5 | 0.8180 | 0.4063 |

Table 30: Unconditional co-residence probabilities across altruism groups.

Once parents, probabilities in Table 30 are shifted 11 periods forward.

**Deterministic income component.** For employed workers, Table 31 reports the estimated lifecycle deterministic income coefficients $\epsilon_{kh}$, where $h$ distinguishes across education groups, $k = 0$ constitutes the intercept and each $k = l$ multiplies age $j^l$.

For unemployed, all education groups are pooled together, and I have an additional coef-

| Parameter | Value |
|---|---|
| $\epsilon_{01}$ | 8.5070 |
| $\epsilon_{11}$ | 0.2257 |
| $\epsilon_{21}$ | -0.0185 |
| $\epsilon_{31}$ | 0.0005 |
| $\epsilon_{02}$ | 8.1452 |
| $\epsilon_{12}$ | 0.3559 |
| $\epsilon_{22}$ | -0.0254 |
| $\epsilon_{32}$ | 0.0007 |
| $\epsilon_{03}$ | 8.9136 |
| $\epsilon_{13}$ | 0.0672 |
| $\epsilon_{23}$ | 0.0145 |
| $\epsilon_{33}$ | -0.0008 |

Table 31: Lifecycle log income coefficients (employed individuals).

ficient $\epsilon_{hu}$ multiplying the educational level (see Table 32).

| Parameter | Value |
|---|---|
| $\epsilon_{0u}$ | 0.2595 |
| $\epsilon_{1u}$ | 7.2301 |
| $\epsilon_{2u}$ | 0.1597 |
| $\epsilon_{3u}$ | -0.0176 |
| $\epsilon_{hu}$ | 0.0008 |

Table 32: Lifecycle log income coefficients (unemployed individuals).

**Income transitions.** The transition matrix across working states is homogenous across education classes:

| | Future $z$ | | |
|---|---|---|---|
| **Current** $z$ | $z_1$ | $z_2$ | $z_3$ |
| $z_1$ | 0.1749 | 0.5052 | 0.3199 |
| $z_2$ | 0.1686 | 0.4852 | 0.3462 |
| $z_3$ | 0.1514 | 0.4307 | 0.4179 |

Table 33: Transition across working states (all education groups).

I calculate the transition between employment and unemployment separately for individuals with and without higher education.

Combining transitions across income and employment states, I end up with the full transition matrix $\Pi(z(h_j), h_j)$. For an adult with and without higher education, respectively, we have the transition matrix $\Pi(z(1), 1)$ reported in Tables 36 and 37 (where $z_0$ corresponds to unemployment).

**Inheritance expectation coefficients.** I estimate the regression on inheritance expectations separately for each altruism quantile, defined in terms of residuals from a household-level regression with planned bequest as a dependent variable and a set of socio-economic controls.

| | Future state | |
|---|---|---|
| **Current state** | Unemployed | Employed |
| Unemployed | 0.0074 | 0.9926 |
| Employed | 0.0053 | 0.9947 |

Table 34: Transition across employment status ($h > 1$).

| | Future state | |
|---|---|---|
| **Current state** | Unemployed | Employed |
| Unemployed | 0.4245 | 0.5755 |
| Employed | 0.0472 | 0.9528 |

Table 35: Transition across employment status ($h = 1$).

| | Future $z$ | | | |
|---|---|---|---|---|
| **Current** $z$ | $z_0$ | $z_1$ | $z_2$ | $z_3$ |
| $z_0$ | 0.0074 | 0.1736 | 0.5014 | 0.3176 |
| $z_1$ | 0.0053 | 0.1740 | 0.5025 | 0.3182 |
| $z_2$ | 0.0053 | 0.1677 | 0.4826 | 0.3444 |
| $z_3$ | 0.0053 | 0.1506 | 0.4285 | 0.4157 |

Table 36: Transition across income and employment states ($h > 1$).

| | Future $z$ | | | |
|---|---|---|---|---|
| **Current** $z$ | $z_0$ | $z_1$ | $z_2$ | $z_3$ |
| $z_0$ | 0.4245 | 0.1007 | 0.2907 | 0.1841 |
| $z_1$ | 0.0472 | 0.1667 | 0.4813 | 0.3048 |
| $z_2$ | 0.0472 | 0.1606 | 0.4623 | 0.3299 |
| $z_3$ | 0.0472 | 0.1442 | 0.4104 | 0.3981 |

Table 37: Transition across income and employment states ($h = 1$).

Each household head is attributed to an altruism group $\{\phi 1_{low}, \phi 1_{mid}, \phi 1_{high}\}$, which is then extended to each co-resident child. On the sample of co-resident children, I then estimate a regression with expected inheritance as dependent variable, and among the controls a polynomial in age and parental education. Table 38 reports the resulting coefficients.

| **Coefficient** | $\phi 1_{mid}$ | $\phi 1_{high}$ |
|---|---|---|
| $\beta_{0\phi_1}$ | 0.9252 | 1.7280 |
| $\beta_{1\phi_1}$ | -0.0503 | 0.0055 |
| $\beta_{2\phi_1}$ | -0.0001 | -0.0074 |
| $\beta_{3\phi_1}$ | 0.4514 | 1.8025 |

Table 38: Coefficients on expected inheritance by altruism class.