Inheritance Expectations, Dynastic Altruism, and Education*

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Abstract

This paper shows that intergenerational asset transfers matter for intragenerational education choices. Based on Italian micro-data, I document that, controlling for parental income, wealth, and education, (i) expecting an inheritance predicts university enrollment, and (ii) having received or expecting an inheritance predicts the intention to leave a bequest, consistent with heterogeneity in dynastic altruism. I rationalize these findings with a stylized model where individuals from altruistic dynasties accumulate human capital to increase long-term earnings, hence the ability to finance bequests. Through a richer quantitative lifecycle model, I show that heterogeneity in bequest motives and coresidence patterns can account for more than 40% of the observed university enrollment gap between youths who do and do not expect an inheritance, whereas the expected financial transfer itself disincentivizes education. Policy experiments indicate that (i) estate taxation can raise enrollment rates, and (ii) the link between inheritance expectations and education is stronger when the discounted returns to education are lower.

Keywords: intergenerational inequality, social mobility, human capital, education, inheritance, altruism

JEL Codes: I23, I24, J24, J62

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1 Introduction

Economists have long recognized family's influence on early-life outcomes.[1] Parental investment in human capital (Parsons, 1975; Becker and Tomes, 1979, 1986), parenting styles (Doepke and Zilibotti, 2017), and the genetic and environmental transmission of skills (Becker and Tomes, 1979; Heckman, 2008) are but a few of the channels through which families affect youths' lifes. However, far less is known about the role played by *expectations* of family transfers. Do expected future transfers impact current youths' choices? If so, what are the implications for social mobility and intergenerational inequality?

To the best of my knowledge, this is the first paper to focus on how the expected intergenerational transmission of wealth relates to one of the main drivers of social mobility: higher education. It is not obvious how expecting wealth in the future would impact education choices in the present. Relevant features correlated with future inheritances should be captured by contemporaneous variables, such as family wealth, parental education, or coresidence arrangements. Furthermore, any residual association would most likely be negative, as the 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). However, the income effect of expected inheritances turns out to be of second order importance, as this paper shows that (i) the conditional variation in inheritance expectations largely stems from heterogeneity in the underlying preference for altruism, and (ii) such heterogeneity in altruism influences education choices to a greater extent than the expected financial transfer itself.

I begin by uncovering a strong positive association between inheritance expectations and university enrollment, using Italian micro-data. *Inter*generational asset transmission thus matters for *intra*generational human capital accumulation. I then document remarkable persistence along dynasties in the preference for altruism: having received or expecting to receive an inheritance strongly predicts the intention to leave a bequest. Differences in inheritance expectations map individuals into distinct types, respectively defined by the importance their dynasty attaches to wealth transfers, and intergenerational altruism at large.

This heterogeneity in what I label *dynastic altruism* is the key element of a simple two-period model rationalizing the uncovered link between education and inheritance expectations. Agents expecting an inheritance have stronger bequest motives. They accumulate human capital to increase life-time earnings, hence the ability to fund bequests. Intergenerational persistence in education, income, and wealth ensues.

I integrate this central insight in a life-cycle, overlapping generations model featuring mul-

[1] See Doepke and Tertilt (2016) for a comprehensive review.

tiple dimensions of heterogeneity and uncertainty. Under the estimated parameters, heterogeneity in bequest motives and coresidence patterns can explain more than 40% of the gap in enrollment rates between youths who do and do not expect an inheritance, whereas the actual inheritance – the financial transfer *per se* – has a *negative* effect on human capital accumulation. Counterfactual exercises highlight two main results. First, given the negative effect of inheritance receipt on education, introducing estate taxation would raise enrollment. Second, the link between inheritance expectations and human capital accumulation is inversely related to the present value of the returns to education. Macro-level aggregates and micro-level preferences are therefore jointly responsible for the observed positive relationship between inheritance expectations and higher education.

Several features make Italy ideal for studying intergenerational inequality. First, it is an old, ageing country, with fertility well below the replacement rate (Guner et al., 2020; Villari and Tabellini, 2010).[2] These demographic trends, reinforced by stagnant growth, large private wealth, and a virtually null estate tax, have mechanically increased the importance of intergenerational wealth transfers over disposable income (Acciari and Morelli, 2020). Second, Italy is characterized by strong intergenerational persistence in educational attainments and a low higher education wage premium: the intergenerational elasticity of earnings hovers around 50%, whereas the university earnings premium for males in the age group 25–34 is only slightly above 10% (Corak, 2013). My paper 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, low returns to education, and low social mobility (Checchi et al., 1999; Hoffmann et al., 2022; Acciari et al., 2021b). I also offer new insights on the complementary role of coresidence patterns, famously long-lasting in Italy (Manacorda and Moretti, 2006; Giannelli and Monfardini, 2003).

While based on Italian data, the results of this paper are consistent with two 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 intergenerational persistence in educational achievements. This relationship holds even though there is almost no correlation between inequality in lifetime income and disparities in skills *per se*, as measured through

[2]Appendix A includes figures and tables supporting these motivating facts.

standardized tests. Granting a role for the anticipated transmission of wealth in determining education achievements, at the expenses of innate ability, can contribute to rationalizing this puzzle. Second, educational achievements persist across multiple generations, well beyond the parent-child pair (Adermon et al., 2021). Heterogeneity in dynastic altruism can help explain why.

The first part of the paper illustrates the empirical results. I exploit a special 2002 supplement to the Bank of Italy's Survey on Households' Income and Wealth (SHIW), featuring expected 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. According to baseline estimates, expecting an inheritance is associated with an increase in the likelihood of being enrolled at university of 15.5–18.3 percentage points, *ceteris paribus*. The predicted probability of enrollment is also increasing in the amount individuals expect to inherit. The available data do not have a longitudinal dimension, but, using the SHIW 1989–2016 panel dataset, I show that youths whose families acquired some housing through inheritance have higher educational attainments, all else – including household wealth and housing stock – equal. This is in line with a rich literature addressing the ties between housing wealth and education (Kaplan, 2012; Lovenheim, 2011).

The consistency between results based on inherited real estate and surveyed expected inheritances addresses two possible, related, concerns. First, parents can in principle express their intention to leave a bequest *as a consequence* of their heirs' enrollment at university.[3] Second, *inter vivos* transfers can be partially correlated with both enrollment decisions (Keane and Wolpin, 2001) and the expressed intention to bequeath. However, intergenerational asset transmission embedded in inherited family dwellings does not arise as a result of either children's education decisions or short-term altruistic transfers, and rather indicates the presence of long-term drivers linking expected inheritance and education, while underlining the importance of housing wealth in intergenerational transfers (Barczyk et al., 2023). 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. While previous research stressed the impact of expected inheritances on physical capital transmission (De Nardi, 2004), savings (De Nardi, 2004; Weil, 1996) or the labour supply (Kindermann et al., 2020), I analyse their influence in the transmission of human capital across generations. Furthermore, I study inheritance ex-

[3] This reverse association would nevertheless be implausible even in the cross-sectional analysis, as it would imply a full-commitment joint decision by all siblings to undertake higher education. If children expecting the same wealth transfers took different education decisions, the observed positive association between inheritance expectations and enrollment would not occur.

pectations directly, rather than imputing them *ex-post* from realized asset transfers, which have been studied more extensively, along with their impact on capital accumulation, 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 received an inheritance, or expect to receive one, are up to 55pp more likely to express the intention of leaving a bequest, holding household's current wealth and income constant. This result points at strong heterogeneity across and persistence along dynasties in the preference for intergenerational altruism. I contribute to the rich literature documenting the importance of intergenerational transmission of preferences (Falk et al., 2018; Doepke and Zilibotti, 2008) by focusing specifically on the persistence of the preference for altruism, along with its potential contribution to the observed correlation of human capital and wealth across multiple generations (Barone and Mocetti, 2016; Benhabib et al., 2011, 2022; Clark, 2014; Fagereng et al., 2020).

To rationalize the empirical findings, I propose a simple 2-period model centered on dynastic altruism. The strength of the bequest motive, increasing in anticipated inheritance, reproduces the positive association between inheritance and education. The anticipation of an inheritance, like a patience multiplier, shifts the intertemporal trade-offs associated to education. It decreases the relative upfront costs of education in the first period, in terms of foregone labor earnings, vis-a-vis its long-term benefits, namely higher labor earnings in the second period, hence the ability to leave a more generous bequest. Heterogeneity in bequest motives – which I label *late-life* heterogeneity – can therefore trump the possibly disincentivizing effect of inheritance receipt *per se* (i.e., *mid-life* heterogeneity). 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 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* coresidence patterns: youths expecting an inheritance are more likely to live with their parents for longer, implying lower short-term costs of education in terms of private consumption.

Building on the analytical representation, I introduce a quantitative, overlapping generations, lifecycle model. Agents are *ex ante* heterogeneous along multiple dimensions, choose consumption-savings allocations over the lifecycle, and can acquire higher education at the beginning, to increase their expected lifetime earnings. The calibrated model matches several data moments concerning asset transfers, capital accumulation, and education, fully capturing the positive relation between human capital and expected inheritance.

Under the calibrated parameters, heterogeneity in late-life bequest motives can explain around 18% of the observed difference in student rates across dynastic altruism groups, whereas heterogeneous early-life coresidence patterns are responsible for another 25%. The mid-life dimension runs in the opposite direction, since 11% more youths expecting an inheritance would be enrolled in the absence of any actual financial transfer, implicitly vindicating the Carnegie Conjecture. Crucially, however, only heterogeneity in transfers *to be given* in the future – under the form of bequests or prolonged coresidence with one's own children – can explain the observed student gap across inheritance expectations groups within currently coresiding youths.

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

First, I simulate the effect of introducing sizeable estate taxation. This raises enrollment rates for all dynastic altruism groups, but especially among those expecting an inheritance. Inheritance taxes, high ones in particular, weaken the negative effect of inheritance receipt on education, thereby increasing the student gap across inheritance expectations groups. The link between inheritance expectations and education becomes sligthly stronger as a result.

Second, I complement estate taxation with unconditional income support for students. Here, enrollment rates increase quite uniformly across groups, due to the lower earnings costs of education. As a consequence, the student gap remains roughly constant in percentage point terms, but decreases in relative terms, and the conditional association between binary inheritance expectations and enrollment rates weakens.

Third, I alter age-education earning dynamics. When returns to education, compared to the baseline scenario, are (i) certain but lower, (ii) faster but constant, or (iii) higher, the gap in student rates across youths who do and do not expect an inheritance narrows, sometimes substantially, and the conditional correlation between inheritance expectations and enrollment decreases. In line with insights from the analytical model, the association between dynastic altruism and education is inversely related to the discounted expected returns to education over the lifecycle. When the present value of expected returns to education increases, the upsides to education *within the lifecycle* do as well, and become relatively more important than late-life motives. Micro-level preferences and aggregate macro-variables jointly determine the positive association between inheritance expectations and education. This result bears implications for both policy and theory, as the relevance of altruistic preferences for individual education choices reverberates at the aggregate level, affecting graduates' pool of skills and, as a consequence, equilibrium wages. Understanding the marginal role of the intergenerational 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 life-cycle 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 counterfactual scenarios. Section 8 concludes.

2 Empirical Analysis

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.[4] 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.[5] An important limitation is that these questions are only asked to household heads (defined as the household's breadwinner) and their 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 coreside with their parents. As shown by Figure 19 in Appendix B.1, Italian youths tend to coreside for a very long time with their parents: 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.

[4] The only exception being the source of households' real estate property. More on this in Section 2.4.

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

Table 1: Summary statistics on bequests

Question	Answer: Yes	Answer: No	Answer: Unsure
Ever received inheritance/gift?	2,498 (24.1%)	7,874 (75.9%)	–
Ever transferred bequest/gift?	265 (2.5%)	10,107 (97.5%)	–
Expect to receive inheritance/gift?	1,476 (14.2%)	8,896 (85.8%)	–
Expect to leave bequest/gift?	4,768 (46.0%)	2,881 (27.8%)	2,723 (26.2%)

To impute consistent inheritance expectations to young coresidents, I drop households whose heads and spouses are uncertain about whether they will leave any bequest (one fourth of the total),[6] and consider only those destined for children and grandchildren. Imputed coresiding 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 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 coresidents' expected inheritance refer to the variables described above.

Expected inheritance:	No (N = 402)	Yes (N = 767)
Age (median)	24.00	24.00
Age (mean)	24.35	24.39
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 (coresidents aged 18-33, monetary values in 100k euros).

Tables 2 and 3 report a list of important individual and household characteristics across two groups: coresidents who expect no inheritance, and those who expect some. Unsurprisingly, coresiding youths expecting an inheritance tend to come from families with larger wealth holdings and higher earnings. The share of men is higher among young coresidents 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 that in the South it is less common to transmit wealth, arguably due to its lower average level.

[6] Table 29 in Appendix B.1 shows that results are robust to the inclusion of an intermediate category for household where expectations are uncertain.

Expected inheritance:	No (N = 402)	Yes (N = 767)
Sex:		
Man	59.5%	52.7%
Woman	40.5%	47.3%
3-class geographic area:		
North	21.9%	42.2%
Centre	10.4%	24.9%
South	67.7%	32.9%
4-class municipality size:		
1-20,000	36.8%	49.5%
20-40,000	21.6%	14.0%
40-500,000	27.1%	24.3%
500,000+	14.4%	12.4%
Graduated father	7.5%	7.0%
Graduated mother	2.8%	6.9%

Table 3: Summary statistics by expected inheritance (coresidents 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.[7] Denoting student status by y_i, I estimate:

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

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 coresidents and independent young individuals, I drop parental income and household net wealth per houshold member.

I mainly focus on student status, rather than on education level, for two reasons.[8] 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, the cross-sectional structure of the data only allows to claim a link between *current* expectations and decisions. An individual's achieved education level is the result of decisions taken under possibly different expectations, and no association between the two can be inferred from the

[7] In Appendix B.1, I also consider alternative binary regressands.
[8] In Appendix B.3 I include a broader set of dependent variables.

simple observation of one wave of survey data. Given the limited size of the sample of graduates in the survey within this age cohort, however, results including graduates are very similar.

Samples. The main sample includes coresidents aged 18-25. As a robustness check, and to expand the sample size, I also reproduce results for coresidents aged 18-33, the age bracket where at least 1% of sampled individuals are higher education students at any age. This also represents a balanced compromise between sample size and proportion of coresiding individuals. 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.[9]

2.3 Results

The first two columns of Table 4 show 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 coreside with them. On the one hand, this represents the largest possible sample. On the other, important financial controls that the SHIW dataset only collects at household level cannot be included.

To appropriately control for individuals' economic background, I focus on the subsample of young coresidents, for whom financial variables are largely attributable to parental efforts. The last two columns of Table 4 shows that the amount of expected inheritance is positively 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 among controls the amount per household member of wealth held in housing and businesses.

To have a sense of the magnitude of the effect, the right panel of Figure 1 plots predicted probabilities depending on the expected amount of inheritance. A young man expecting no inheritance in the North has some 30% 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 35pp if he expects to receive half a million euros. Similar increases apply to women, and in other macro-regions, as shown by Figure 23 in Appendix B.1.

The effect is present also if we consider binary expectations only (see the second row of Table 4). Youths expecting an inheritance, other things equal (including net household wealth

[9]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**	0.314***	0.283***
	(0.085)	(0.046)	(0.085)	(0.091)
Expected inheritance (0-1)	0.747**	0.619**	0.746**	0.709*
	(0.322)	(0.272)	(0.362)	(0.368)
Hh economic covariates	No	No	Yes	Yes
Wealth components	No	No	No	Yes
Group	All	All	Cor.	Cor.
Age	18–25	18–33	18–25	18–25
Observations	683	1,445	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 include: parental income per household member, household's net wealth per household member.

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.

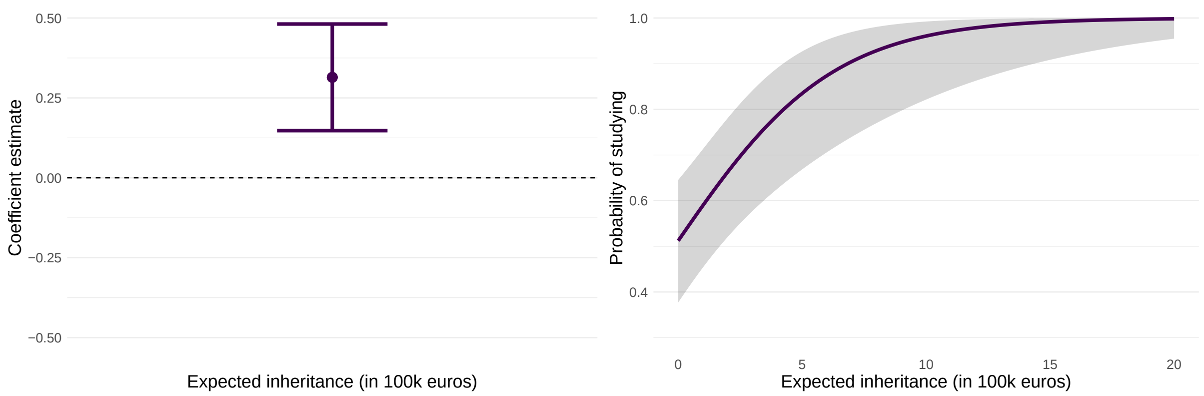

Figure 1: Left panel: estimated coefficient (with 95% confidence intervals) on continuous expected inheritance. Right panel: predicted probability (with 95% confidence intervals) of being a student. Estimates taken from the baseline model with continuous inheritance expectations (first row of Table 4) for a young man from the Centre of Italy at median value of continuous countrols.

The point estimates for the impact of binary expectations are even clearer: a young man from the Centre's likelihood to be a student increases from 22.8% to 38.4% if he expects any inheritance, whereas a woman's move from 35.7% to 53.9% – see the right panel of Figure 2. The relative magnitude of the effect is comparable by macro-region and sex, as shown in Figure 22 in Appendix B: in the North, women's (men's) probability of attending university increases from 41.7% (27.6%) to 60.2% (44.5%); in the South, from 45.3% (30.6%) to 63.6% (48.1%).

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

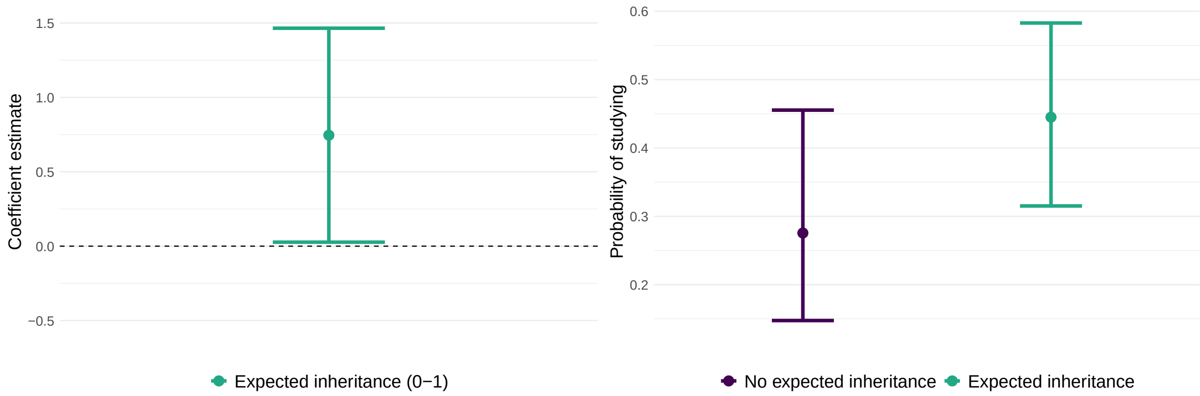

Figure 2: Left panel: estimated coefficient (with 95% confidence intervals) on binary expected inheritance. Right panel: predicted probability (with 95% confidence intervals) of being a student. Estimates taken from the baseline model with binary inheritance expectations (second row of Table 4) for a young man from the Centre of Italy at median value of continuous controls.

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. To circumvent this limitation, I proceed in two ways when moving to the SHIW panel archive.

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 coresidents 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 coresidence 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.

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

	Dependent variable:				
	Student		Student/Graduate		Educ. 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	Cor.	Cor.	Cor.	Cor.	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. Cor. stands for coresidents. 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.

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 main driver of the positive association, I use the SHIW panel item on housing property source to study whether this holds in the longer-term as well. In particular, I create a dummy taking value 1 if the youth's household, in a given year, owns any inherited real estate property.[10]

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 3 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 27 and 28 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

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

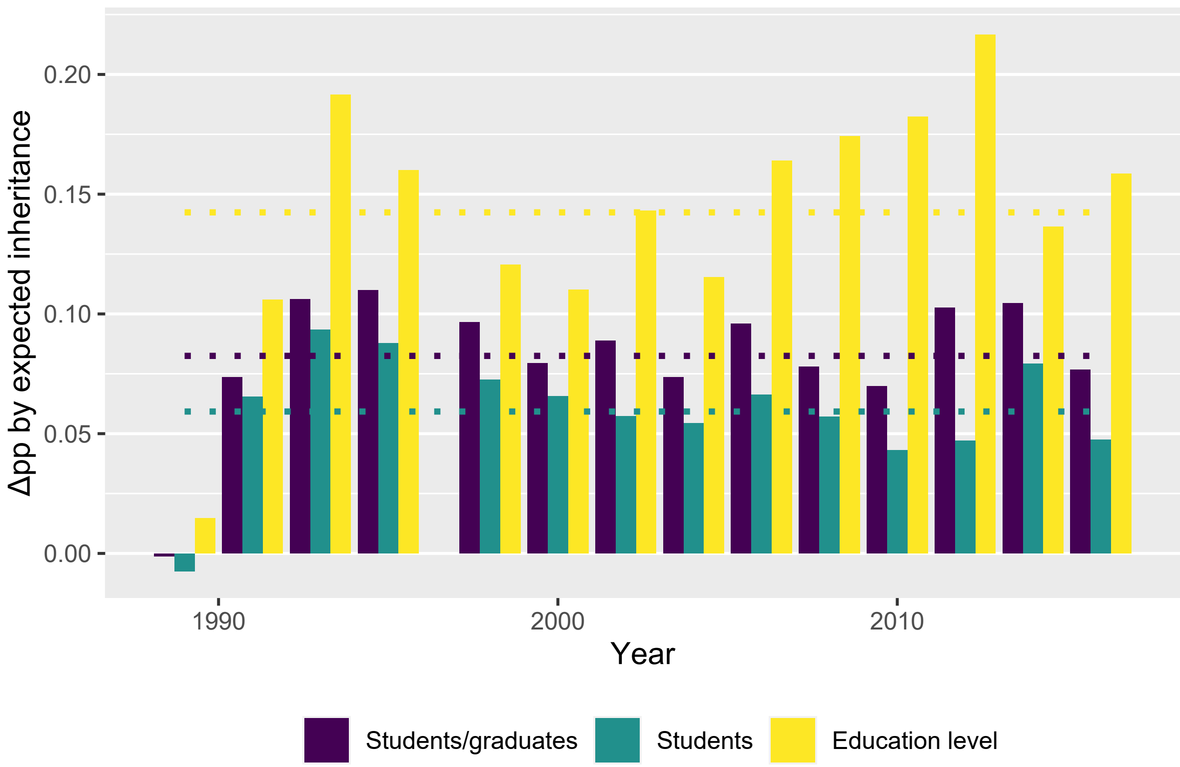

Figure 3: Net percentage point differences in (i) share of students and graduates, (ii) share of students and (iii) average education title across groups. Dotted lines indicate the average of each variable over the whole period. Sample: coresidents aged 18-30.

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 variable, the estimated association is positive across specifications, and strongly significant for the sample of young coresidents 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 coresident 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

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

	Dependent variable:					
	Student		Student/Graduate		Educ. 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	Cor.	Cor.	Cor.	Cor.	Cor.	Cor.
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.

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 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 if parental intention to leave a bequest was correlated with the willingness to help their coresident children financially, the the origin of dwellings ownership 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, parents might express greater likelihood to bequeath *because* their to-be-heir is currently studying. Even though this scenario cannot plausibly explain the cross-sectional results, as it would require all siblings within each houshold to take a joint, binding educational decision, 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.

2.4 Unpacking inheritance expectations

Unpacking what lies behind heterogeneity in inheritance expectations is necessary to understand why they influence education choices. In this section, I focus on three margins of heterogeneity, backed by the data, that differentiate youths expecting an inheritance from those who do not. I label these three margins as the (i) *early-life*, (ii) *mid-life* and (iii) *late-life* determinants, depending on the phase of the life cycle at which such heterogeneity intervenes.

The first margin of heterogeneity, the *early-life* one, concerns the probability of coresiding with parents. As shown by Table 7, youths expecting an inheritance are also more likely to coreside with their parents. Even though (i) youths expecting an inheritance while living independently are much more likely to be studying than those expecting no inheritance while coresiding with parents (see student shares in Table 7) and (ii) results from Table 4 are obtained on a sample comprising coresidents only, the difference in probability of coresiding with parents in the future might still play a differential role in motivating individual educational choices.

		Co-resident	**Independent**
Expected inheritance	%	96.8	3.2
	(% students)	*(41.3)*	*(35.2)*
No expected inheritance	%	78.2	21.8
	(% students)	*(18.7)*	*(14.4)*

Table 7: Co-residence and inheritance expectations (age 18-25). The first number in each cell represents the share of individuals within the corresponding row group (expecting/not expecting) that are co-residing or living independently. The second number in each cell indicates the share of students within the corresponding inheritance expectations-coresidence group.

The second margin of heterogeneity, the *mid-life* one, is the most straightforward one: youths expecting an inheritance expect to receive a positive intergenerational wealth transfer along their life cycle.

The third margin of heterogeneity, the *late-life* one, originates from the investigation of the other side of intergenerational asset transmission: are households expressing their intention to leave a bequest different? To answer this question, I rely again on the 2002 SHIW survey. Table 8 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 8 includes all household heads in the survey with at least one offspring, coresiding or not. Even though the positive coefficient on expected inheritance might just reflect higher expected lifetime wealth, it is not obvious 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 (second column) and whose own and spouse's parents have died (third column). The positive coefficient estimated on received inheritance only becomes stronger.

The strength of this association is clear from the right panel of Figure 4. For example, the average male household head in the North of Italy[11], 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 24 in Appendix B.

Table 8: 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. Sample Heads (1) includes all household heads. Sample Heads (2) includes only household heads whose parents are not alive. Sample 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.

The *late-life* margin of heterogeneity thus refers to the transmission across generations of an altruism motive, whose strength appears to be persistent within, and heterogeneous across, dynasties. Hence, I define it as heterogeneity in *dynastic altruism*, which explains the sizeable predictive power of past wealth transmission on the intention to transmit it further, holding current wealth, income and education within the household constant.

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 education institution in Italy. This holds true for the sample of coresidents aged between 18 and 25, and survives a heterogenous set of robustness checks, including an extended sample (including

[11] The average refers to the control variables in the third column of Table 8: age, number of children, household income, university education, and net household wealth.

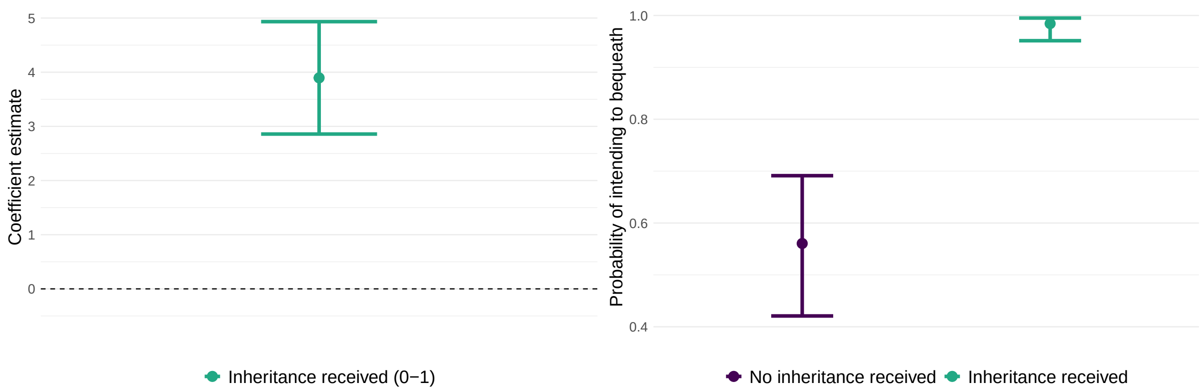

Figure 4: Left panel: estimated coefficient (with 95% confidence intervals) on binary received inheritance. Right panel: predicted intention to leave a bequest. Estimates are taken from the third column of Table 8 for a male household head in the North of Italy, at mean values of all other controls.

coresidents 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 inherited real estate are more likely to be studying than those who do not. The panel results are reassuring: they originate from a different source, downplay the relevance of confounding factors such as *inter vivos* transfers, address potential concerns of the association flowing in the reverse direction, and indicate the presence of long-term family features responsible for the observed positive conditional correlation between expected inheritance and education choices. I finally document three margins of heterogeneity distinguishing youths expecting an inheritance from the others. First, the *early-life* margin, which refers to the probability of coresiding with parents, increasing in expected inheritance. Second, the *mid-life* margin, which refers to the heterogeneity in actual assets to be received. Third, the *late-life* margin, which refers to the uncovered, sizeable difference in the probability of intending to leave a bequest depending on whether the household has received, or expects to receive, an inheritance. This heterogeneity in what I label *dynastic altruism* 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 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.[12] 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.

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:

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

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

[12]As I discuss in the discussion in 7.4 and in the concluding remarks, I inevitably remain agnostic about the underlying source of this persistence in dynastic altruism, i.e., the relative contribution of nature and nurture.

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

$$h_i, b_i \geq 0$$

It is useful to carry over from Section 2.4 the distinction between 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 Λ as :

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

and Θ 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 the third, *early-life* determinant, meant to capture the empirical correlation between expecting an inheritance and coresiding with parents – see again Table 7.

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 Γ 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. $\square$

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 χ 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:[13]

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

[13]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.

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 1^{st} period to finance bequests and (ii) lowering the minimum wage premium χ 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 right panel of Figure 5. 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 2^{nd} period corresponds to the cost in the 1^{st} 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.

The left panel of Figure 5 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 inter-temporal optimization in terms of individual consumption, whereas the positive contribution of inheritance to the relaxation of the budget constraint in the 2^{nd} 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.

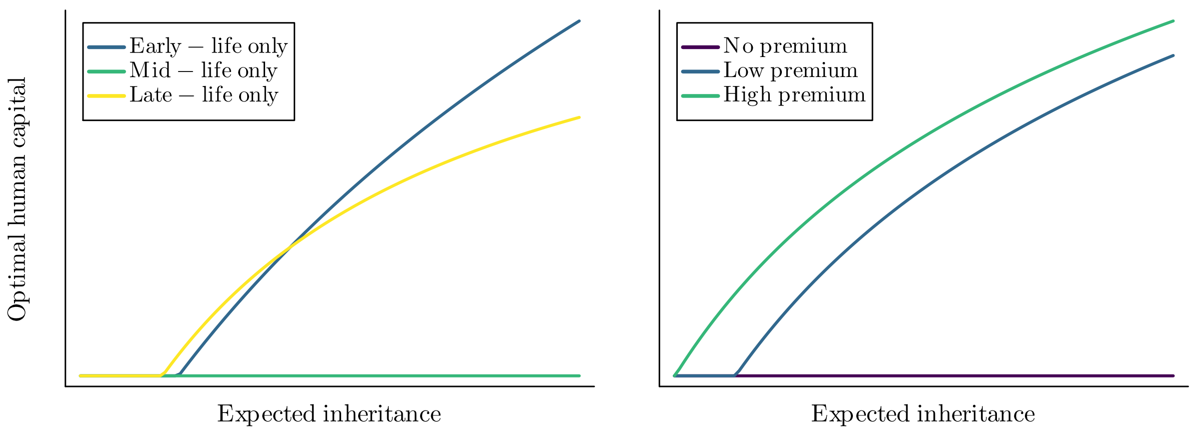

Figure 5: Left panel: relationship between expected inheritance and education, depending on the margin of heterogeneity at work. Right panel: relationship between expected inheritance and education, depending on the education wage premium.

4 Quantitative Model

While the analytical model in Section 3 isolates the main mechanism underlying the link between 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 life-cycle, overlapping-generations model with *ex-ante* heterogeneity in altruism and education taste, and uncertainty about own and parental lifespan, inheritance timing and size, coresidence 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) coresidence state $cr \in \{0, 1\}$ where $cr = 1$ corresponds to a coresidence 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 $hp \in \{0, 1, 2\}$ where 0 corresponds to a dead parent, 1 to a parent with no higher education, 2 to a parent with higher education, (v) a stochastic, permanent preference for education ζ_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 6 and 7).

From age $j = 1$ until $j = 5$, agents can decide at each period whether to work (and

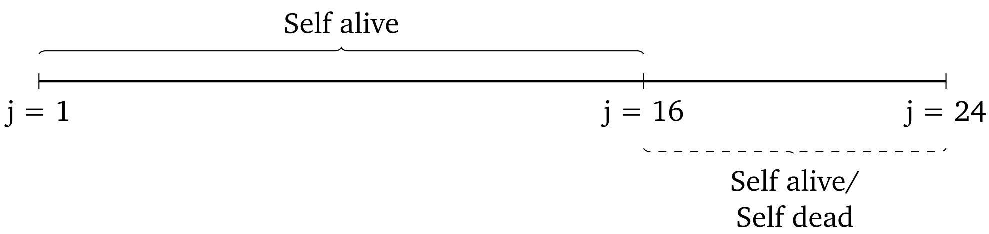

Figure 6: Timeline: Own survival. Dashed braces indicate uncertainty.

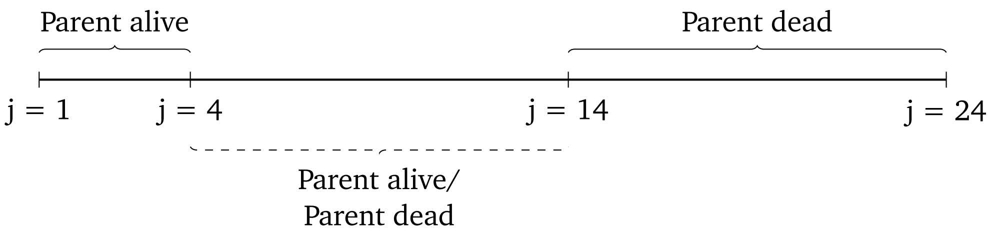

Figure 7: Timeline: Parental survival. Dashed braces indicate uncertainty.

earn labour income) or study, and potentially increase their human capital h by one unit. Such increase is uncertain, 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 η 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 8 depicts these margins of the lifecycle dynamics.

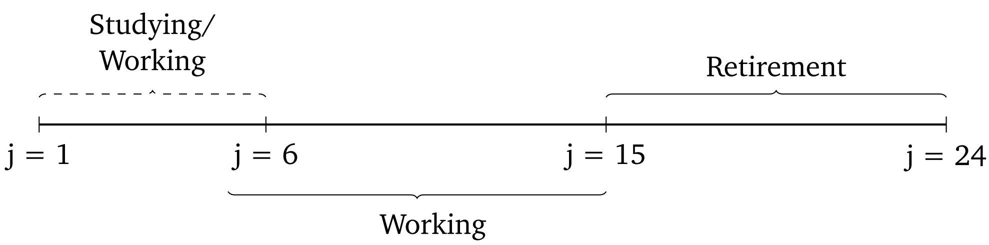

Figure 8: Timeline: Education, work and retirement. Dashed braces indicate uncertainty.

Coresidence determines the relationship between the agent's private consumption and utility, through age-coresidence-specific consumption equivalence scales (CES). Coresidence with the parent is possible in the first 5 periods of life, and impossible ever since. Coresidence 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 9). I assume that once a household splits, in any of the two periods with uncertainty, it cannot coreside 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

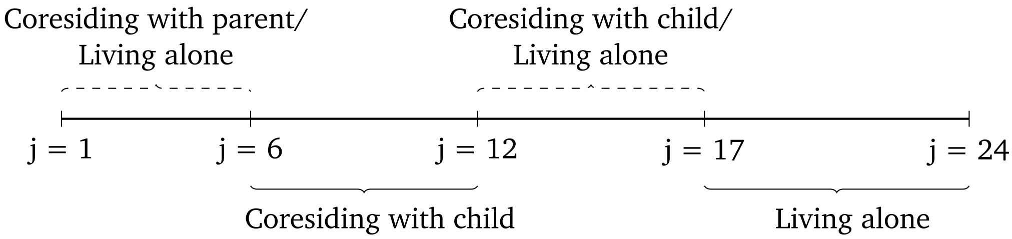

Figure 9: Timeline: Coresidence. Dashed braces indicate uncertainty.

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:

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

subject to:

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

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

whereas the worker's problem is:

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

subject to:

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

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

Equations 25 and 26 jointly show that next period assets a_{j+1} are stochastic if the agent's parent is still alive (i.e., $h_j^p > 0$), as expected inheritance $b(j, h_j^p, \phi_1)$ can turn into realized inheritance if the parent dies next period (i.e., $h_{j+1}^p = 0$). The possible future asset windfall cannot be used to finance current consumption.

Workers' and students' value function differ along three dimensions: (i) instantaneous utilities, (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 ϕ_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 ϵ_{jh} takes the form $\epsilon_{jh} = \xi_{1h} + \xi_{2h} j + \xi_{3h} j^2 + \xi_{4h} j^3$ (Díaz-Saavedra et al., 2023).

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 remains constant (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 parental 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.

Coresidence 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 coresiding is allowed to be correlated with age and expected inheritance, as observed in the data and reported in Table 7.

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 an offspring). The education taste $\zeta_j(\phi_1)$ is distributed normally with mean $\mu_\zeta(\phi_1)$ and variance σ_ζ^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 ϕ_1 is 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.

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

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 coresides with certainty until $j = 12$ and then stochastically. The probability of coresiding 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 the agents' parent is dead with certainty, and they start facing their own probability of death. Income uncertainty disappears, since individuals are retired and earn a replacement rate η_2 of their last working income. Coresidence 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 ϕ_1 and ϕ_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

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, to a first approximation[14], to no higher education degree ($h = 1$), bachelor's degree or equivalent ($h = 2$), master's degree or higher ($h = 3$).

Prices. From the SHIW panel dataset, I estimate the deterministic component of lifecycle profiles. In particular, I consider the sum of household heads' and spouses' labour income, restrict the sample to employed household heads 18 to 60 years old, and with yearly income above €1,000. I regress separately for each household head's 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 $\epsilon_{kh} = [\epsilon_{0h}, \epsilon_{1h}, \epsilon_{2h}, \epsilon_{3h}]$. The left panel of Figure 10 shows the resulting estimates for lifecycle wages of each education group.

[14] 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.

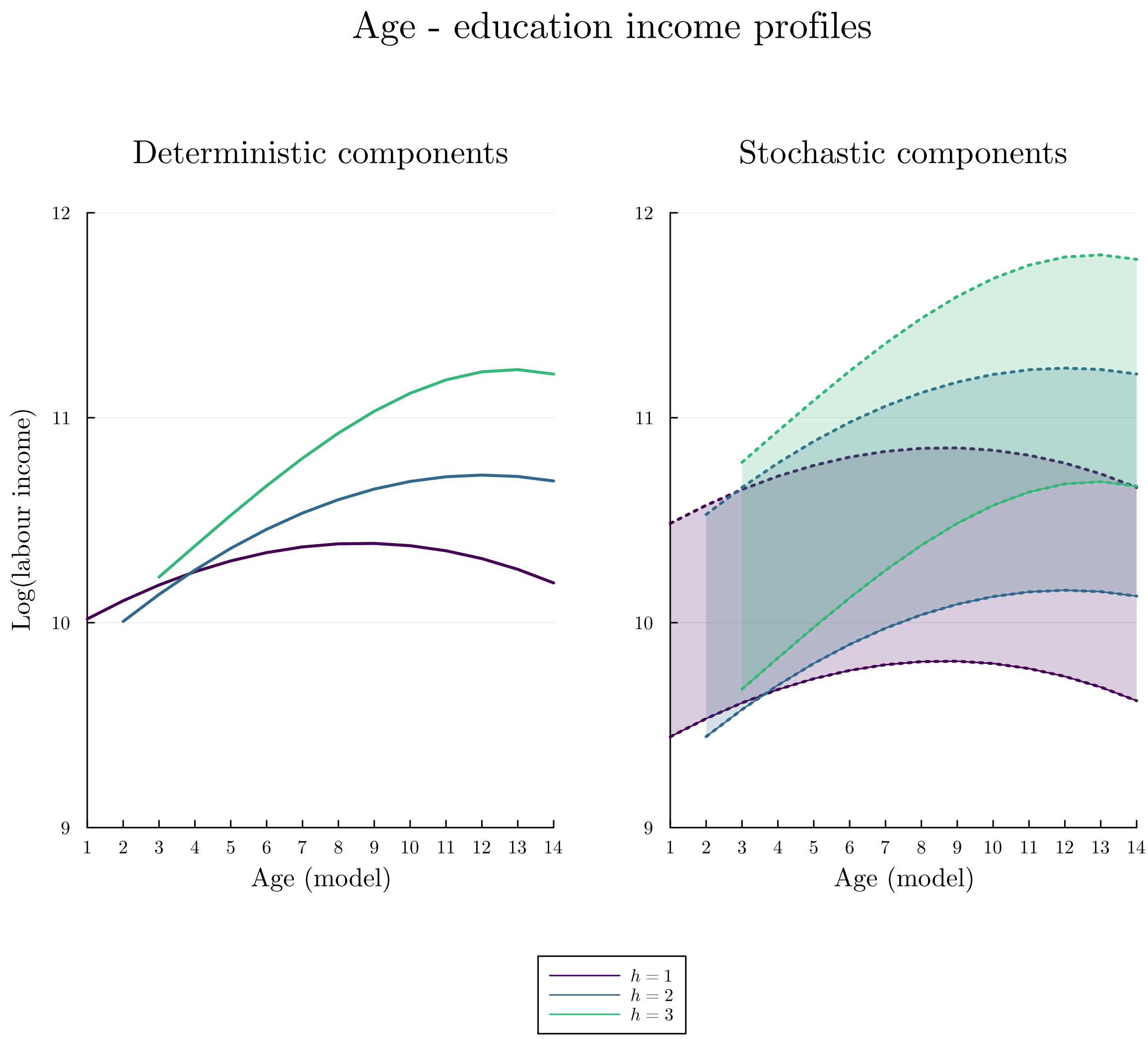

Figure 10: Left panel: the estimated deterministic income component over the lifecycle, by education group. Right panel: the estimated range of income realizations over the lifecycle, by education group.

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 household heads (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 the right panel of Figure 10 shows the very substantial overlap over possible income realizations across education groups over the lifecycle.

Students earn a constant ratio of the expected income they would have earned if working, given their current education level. The ratios are estimated from the SHIW dataset, and correspond to roughly a fourth and a half of working individuals' income for bachelor's and master's students respectively. Earnings levels are reported in Table 34 in Appendix D.

The Italian replacement rate has long been 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., $z_{14} = z_{0h}$), 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 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 coresiding 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 β_is for equation (30), whose resulting predicted values are shown in Figure 26, Appendix D. Unsurprisingly, expected inheritance is increasing in parental human capital, hence parental wealth and income, and is larger for the most altruistic group.[15]

Transitions. Survival probabilities by age are calculated from ISTAT data on mortality. The probability of dropout $p_{dropout}(j, h_j)$ is taken from Nicolò et al. (2016), and is divided in half for master's students (AlmaLaurea, 2023). I calculate the probability of delay in acquiring a degree $p_{delay}(j, h_j)$ starting from the rough figure provided by AlmaLaurea (2023) (0.38 and 0.34 for bachelor's and master's students respectively). Taking this probability at face value, however, would overestimate the average completion time, as individuals who start a degree and those who might have started one in the previous period(s) are observationally equivalent in the model. I therefore assume that the probability of delay is uniformly decreasing over time.

For transition matrices across productivity states, I focus on employed and unemployed household heads' 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,

[15] 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.

based on her regression residuals from (38), with the addition of an education variable:

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

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 available 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 model purposes.

For young adults, the probability of coresidence p_{cr} differs by age and inheritance expectations. Within each age class, I calculate the share of those coresiding with parents, conditional on expecting an inheritance and on not expecting one. Then, I calculate the probability of coresiding next period as simply the share of coresidents in the following age class for the same inheritance group divided by the current one. For parents, I merely shift the same 11 periods forwards, when the household's child can possibly become independent.

Others. Utility derived from consumption is scaled by Ω, 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 coresiding 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 ϕ 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 coresiding 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 Ω between 0.4 and 0.6. I set Ω = 0.5.[16]

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., $\mu_\zeta(\phi_{1_{mid}}) = \mu_\zeta(\phi_{1_{high}}) = \mu_\zeta(\phi_{1_{low}}) + \upsilon = \upsilon$).

Parameter		**Level**	**Source**
$\epsilon(j,h)$	Deterministic wage	[...]	Est. (SHIW)
z	Stochastic wage	[...]	Est. (SHIW)
$\Pi(z_j(h_j), h_j)$	Wage transition	[...]	Est. (SHIW)
η	Replacement rate	0.8	OECD
β_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)
Ω	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.

Internal parameters. There are 9 parameters left to determine. The discount factor β, the inter-temporal elasticity of substitution γ, 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 ϕ_2, the time-linear utility cost of studying μ 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 υ and the variance of the overall taste shock σ^2_ζ). 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, and (ii) in the age group 24–32; (iii) median and (iv) Gini index of the intended bequest-to-wealth ratio in retirement; (v) mean wealth over income in retirement and (vi)

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

median wealth over income in working age; (vii) mean consumption over income in working age; the coefficients from a logit regression with student status as dependent variable on (viii) the binary expected inheritance variable in the subsample of coresidents within the age group 18–26, and (ix) the continuous expected inheritance variable in the subsample of coresidents within the age group 18–26.

6 Results

Table 10 lists the estimated parameters, whereas targeted moments are distributed across Tables 11, 12 and 13. The model fit is remarkably good given how the targeted moments link outcomes very distant in time, such as youth's education decision and bequest motives.

Parameter		**Level**	**Source**
β	Patience (annual)	0.974	Internally estimated
γ	CRRA curvature	2.398	Internally estimated
$\phi 1_{low}$	Bequest motive (1st quantile)	14.493	Internally estimated
$\phi 1_{mid}$	Bequest motive (2nd quantile)	43.504	Internally estimated
$\phi 1_{high}$	Bequest motive (3rd quantile)	253.004	Internally estimated
ϕ_2	Bequest motive (shifter)	3.922	Internally estimated
μ	Utility cost of education (time trend)	-1.051	Internally estimated
σ_ζ	Taste for education (s.d.)	2.425	Internally estimated
υ	Taste for education (shifter)	0.645	Internally estimated

Table 10: Internal Parameters.

The model reproduces the lifecycle evolution of education decision, overall and across targeted sub-samples, captures the dynamics of consumption and capital accumulation, and pinpoints the estimated regression coefficients on both binary and continuous expected inheritance.

Moment	**Age**	**Group**	**Data**	**Model**
% students	18–23	All	33.42	33.92
% students	24–32	All	11.94	12.00

Table 11: Targeted moments - Student shares.

Table 11 reports the shares of students across subperiods (age groups 18–23 and 24–32). The model captures very well the share of students at the beginning of the lifecycle (33.92 in the model vs 33.42 in the data), and the extent of the decline in student shares in the following age bracket (12.00 vs 11.94).

Table 12 focuses on moments pertaining to altruism, consumption, and capital accumulation, during and at the end of the lifecycle. Specifically, the median value and Gini index

Moment	Age	Group	Data	Model
Intended bequest-to-wealth (median)	60+	All	0.75	0.76
Intended bequest-to-wealth (Gini)	60+	All	0.48	0.48
Wealth-to-income (mean)	60+	All	7.83	7.69
Wealth-to-income (median)	33–60	All	5.08	5.13
Consumption-to-income (mean)	33–60	All	0.92	0.93

Table 12: Targeted moments - Altruism and consumption-savings allocation.

of the intended bequest-to-wealth ratio[17] are essentially identical in the model and in the data (respectively, 0.76 vs 0.75, and 0.48 vs 0.48). The mean wealth-to-income ratio is slightly lower than in the data (7.69 vs 7.83), whereas median wealth-to-income of working age households is very slightly above the data target (5.13 vs 5.08). The mean consumption-to-income ratio almost perfectly corresponds to its data counterpart (0.93 vs 0.92).

Moment	Age	Group	Data	Model
β Expected inheritance (0–1)	18–26	Co-residents	0.79	0.80
y Student status (0–1)			[0.14–1.44]	[0.60–1.00]
β Expected inheritance (€s)	18–26	Co-residents	0.30	0.30
y Student status (0–1)			[0.07–0.53]	[0.21–0.40]

Table 13: Targeted moments - Regression coefficients. 95% confidence intervals in parentheses.

Finally, Table 13 lists coefficients from the two main empirical regressions. The dependent variable is student status and the independent ones are binary expected inheritance and continuous expected inheritance, respectively.[18] Coefficients in the model are essentially identical to their data counterparts (0.80 vs 0.79 and 0.30 vs 0.30 in the model and in the data, respectively).

Untargeted moments. Tables 14, 15 and 16 show some untargeted moments, distributed across the same three categories: (i) student rates, (ii) wealth accumulation and bequest motives, and (iii) regression coefficients.

In the first category, the model actually underestimates the gap in student rates between youths expecting and not expecting an inheritance (25.39 and 12.85 in the model vs 28.36

[17]The intention to leave a bequest is not an explicit choice variable in the model. To calculate a proxy, I proceed as follows. I compute policy functions for all possible states with dynastic altruism taking an extra 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, upon death, 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. Formally, defining the age of individual stochastic death as J_D, states beside dynastic altruism as $\mathbf{x}$, and asset policy function at time J_D for individuals with dynastic altruism ϕ_1 as $a^*(\mathbf{x_{J_D}}, \phi_1)$, I define intended bequest b as

$$b = a^*(\mathbf{x_{J_D}}, \phi_1) - a^*(\mathbf{x_{J_D}}, \phi_{1_{selfish}})$$

Such amount is then divided by the wealth position over the adult age to derive the bequest-to-wealth ratio.

[18]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
% students	18–32	Expect	28.36	25.39
% students	18–32	No expect	10.34	12.85
% students	18–29	Co-residents	27.61	30.16
% students	18–29	Independents	9.33	8.64
% students/graduates	18–32	Expect	39.26	43.24
% students/graduates	18–32	No expect	16.27	21.51

Table 14: Untargeted moments - Student and graduate shares.

and 10.34 in the data). On the contrary, the model slightly overestimates the magnitude of the divide between independent and coresident young adults in the age group 18–29: 8.64% (30.16%) are students in the model, whereas in the data the corresponding share is 9.33% (27.61%). The right panel of Figure 11 illustrates how the gaps across coresidence and inheritance expectations groups are very similar in the model and in the data. The model also qualitatively replicates the trends in the evolution of student rates *within* the targeted age groups 18–23 and 24–32, as shown by the left panel of Figure 11. Finally, the model slightly overestimates the share of youths who are either studying or have already earned a higher education degree ($h \geq 2$ in model terms), while perfectly capturing the divide across inheritance expectations groups.

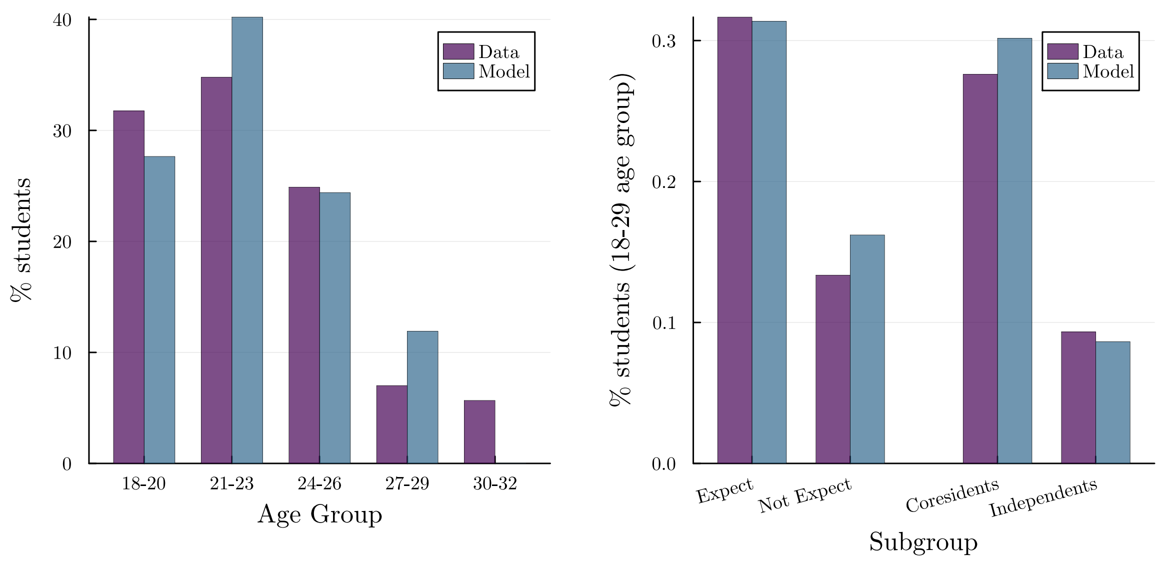

Figure 11: Untargeted moments: student rates. Left panel: by age group. Right panel: by inheritance expectations/residence status.

In the second category, I present values pertaining to wealth accumulation and decumulation over the life-cycle. First, the average intended bequest-to-wealth ratio is slightly above the value estimated in the data (0.73 vs 0.63)., but the model correctly predicts the share of individuals expecting an inheritance intending to leave one (0.91 vs 0.91). Average wealth-to-income ratio for working age individuals is underestimated (5.90 vs 6.74), but the median value of retired households is very close to the data target (6.74 vs 6.64). Working-age median consumption-to-income is overestimated (0.91 vs 0.79), even though it correctly lies below its mean value.

Moment	Age	Group	Data	Model
Intended bequest-to-wealth (mean)	60+	All	0.63	0.73
% intending to bequeath	33+	Expect	0.91	0.91
Wealth-to-income (mean)	33-60	All	6.74	5.90
Wealth-to-income (median)	60+	All	6.64	6.74
Consumption-to-income (median)	33-60	All	0.79	0.91

Table 15: Untargeted moments - Altruism and consumption-savings allocation.

Importantly, these untargeted moments jointly confirm that the link between bequest motives and education decisions is not obtained at the expense of plausible savings behaviors. This is further proved by the left panel of Figure 12, with the untargeted lifecycle evolution of wealth-to-income for households heads over 33. Despite larger wealth holdings in the middle of the lifecycle and lower wealth holdings at the beginning and the end, the overall trajectory is consistent and, crucially, shows that bequest motives are, if anything, underestimated.[19]

This feature of the model is further corroborated by the right panel of Figure 12, 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 largely coincides with available estimates (compare, for instance, with Figure 5 in Fella et al. 2024). The right panel of Figure 12 also implicitly vindicates the importance of integrating heterogeneity in altruism in the analysis of capital accumulation over the lifecycle.[20]

In the last category, I report a new set of regression coefficients. First, the persistence in dynastic altruism is closely captured despite being entirely untargeted. The coefficient on the binary variable indicating whether individuals have received or expect to receive an inheritance, when the dependent variable is represented by the binary intention to leave a bequest, is close to the data value (2.13 vs 2.67).

Second, both binary and continuous regression coefficients are positive in the age subgroups 18–23 and 18–32, close to the data counterparts, and all within the estimated 95% confidence intervals from the data. Finally, and critically, when both binary and continuous

[19]Importantly, 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.

[20]Interestingly, my estimates show a relatively lower degree of non-homotheticity in the Italian case – possibly because of different social norms, or because of widespread homeownership.

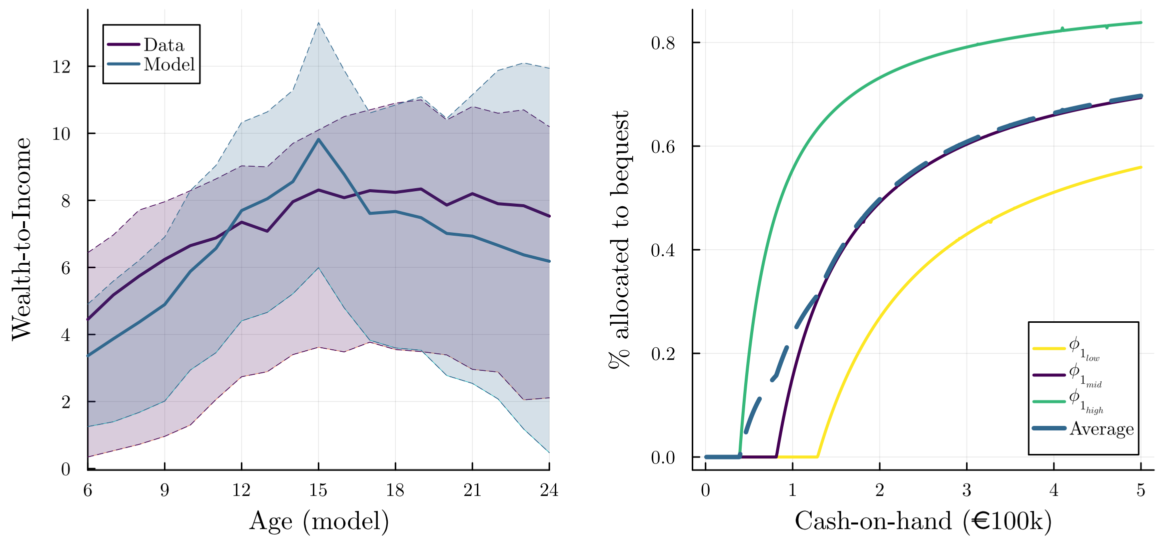

Figure 12: Untargeted moments: wealth accumulation/decumulation and bequest motives. Left panel: wealth-to-income ratio by age for households heads over 33 (model vs data). Solid lines indicate averages, dashed lines indicate cutoffs for first and third quartile. Right panel: the estimated bequest policy by altruism tercile.

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 remarkably close point estimates.

6.1 Determinants

Having validated the calibrated model, I 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 assess to which extent, across the entire life-cycle, transfers in the form of (i) *coresidence* and (ii) *assets* contribute to 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. Results are reported in Table 17 and the left panel of Figure 13.[21]

[21] I report student shares among those from the 2nd and 3rd dynastic altruism terciles (i.e., $\phi_1 \in \{\phi_{1_{mid}}, \phi_{1_{high}}\}$) whose parents are alive, rather than those expecting an inheritance, since (i) agents from the first tercile see no

Moment	Age	Group	Data	Model
β Expected/received inheritance (0–1)	33–60	All	2.67	2.13
y Intention to bequeath (0–1)			[1.87–3.47]	[2.00–2.26]
β Expected inheritance (0–1)	18-23	Co-residents	0.94	1.05
y Student status (0–1)			[0.12–1.76]	[0.82–1.29]
β Expected inheritance (€s)	18-23	Co-residents	0.19	0.43
y Student status (0–1)			[-0.27–0.65]	[0.32–0.54]
β Expected inheritance (0–1)	18-32	Co-residents	0.83	0.70
y Student status (0–1)			[0.26–1.40]	[0.52–0.89]
β Expected inheritance (€s)	18-32	Co-residents	0.12	0.26
y Student status (0–1)			[-0.02–0.26]	[0.17–0.35]
β Expected inheritance (0–1) (c.c.)	18-23	Co-residents	0.86	0.88
y Student status (0–1)			[0.04–1.67]	[0.55–1.21]
β Expected inheritance (€s) (c.c.)	18-23	Co-residents	0.09	0.12
y Student status (0–1)			[-0.22–0.41]	[-0.04–0.28]

Table 16: Untargeted moments - Regression coefficients. 95% confidence intervals in parentheses. The βs 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. In the model, intended bequests are calculated as assets exceeding the level of assets held by agents in the same states except for belonging to a "phantom" selfish class putting no weight at all on bequest motives (i.e., $\phi_{1_{selfish}} = 0$). The goal is to disentangle purely altruistic motives from capital held for consumption smoothing and precautionary purposes.

The *early-life* determinant, i.e., the association between coresidence and inheritance expectations, plays a non-negligible role, as shown in the corresponding columns of Table 17. Shutting down this channel, I assume that those expecting and not expecting inheritance have the same evolution, hence expectations, in terms of coresidence probabilities (namely, the same as those belonging to the lowest altruism group). The share of students in the age group 18–29 from the upper two terciles of dynastic altruism, i.e., those expecting an inheritance, decreases by -3.85pp, corresponding to 25% of the entire gap across groups. The overall effect on student enrollment is therefore unambigously, and substantially, negative. However, the coefficients on binary and continuous expected inheritance among coresidents become *larger*. This happens because the decrease in the student gap is purely due to compositional effects: coresident altruistic youths are now more likely to be students, as they expect to be living independently in the future and want to take advantage of their current coresidence status, but they are also less numerous. As a consequence, the coefficients on binary and continuous expected inheritance decrease for the full sample only. *Early-life* heterogeneity in coresidence patterns can

change in their policy functions, and (ii) comparing across expectations would not be possible, by definition, when muting the *mid-life* or asset channel.

thus explain a substantial part of the student gap between those expecting and not expecting an inheritance, but none of the conditional association between education and inheritance expectations for *currently coresiding* youths.

Moment	**Age**	**Group**	**Baseline**	**E-L ht off**		**M-L ht off**		**L-L ht off**	
				Level	**Δ**	**Level**	**Δ**	**Level**	**Δ**
% students	18–29	$\phi 1_{mid,high}$	31.37	27.52	-3.85	33.06	+1.69	28.67	-2.70
% stud/grad	18–32	$\phi 1_{mid,high}$	43.24	37.62	-5.62	45.52	+2.27	39.69	-3.55
β (0–1)	18–26	Cor.	0.80	0.84	+0.05	–	–	0.65	-0.15
			[0.60–1.00]	[0.64–1.05]				[0.45–0.85]	
β (€s)	18–26	Cor.	0.30	0.35	+0.05			0.20	-0.10
			[0.21–0.40]	[0.25–0.45]				[0.11–0.29]	
β (0–1)	18–32	All	0.88	0.68	-0.20	–	–	0.74	-0.14
			[0.71–1.05]	[0.52–0.85]				[0.58–0.91]	
β (€s)	18–32	All	0.34	0.27	-0.07			0.25	-0.09
			[0.27–0.42]	[0.19–0.35]				[0.17–0.33]	

Table 17: Selected moments – Determinants by time. E-L ht off: no heterogeneity in coresidence trajectories when child. M-L ht off: no heterogeneity in expected and received inheritances. L-L ht off: no heterogeneity in bequest motives.

Heterogeneity in the actual receipt of inheritances constitutes the *mid-life* determinant. Coresidence and bequest motives remain heterogeneous across dynastic altruism groups, but now nobody receives – hence expects – an asset transfer over the lifecycle. This has two competing effects. On the one hand, the Carnegie Conjecture predicts lower student rates for youths expecting an inheritance: the anticipation of future wealth transfers dampens the incentive to accumulate human capital early on. On the other hand, bequests being luxury goods, higher future wealth levels push up the relative importance of bequest motives, hence of the ability to finance bequests through higher human capital. The results shown in the central columns of Table 17 signal that the former effect is much stronger: the share of students among 18–29 youths belonging to the second or third altruism class increases by 1.69pp when the *mid-life* channel is muted. The actual expected financial shock *deters* human capital accumulation when individuals from altruistic dynasties still face different coresidence trajectories and higher bequest motives.

Finally, the last two columns of Table 17 shows the scenarios in which everything remains constant except for heterogeneity in bequest motives, which now are set at $\phi 1_{low}$ for all individuals. In this case, the student share among youths with medium and high dynastic altruism decreases quite substantially (-2.70pp). Heterogeneity in bequest motives accounts for approximately 18% of the student gap across groups. In this scenario, differently from when the early-life margin of heterogeneity was muted, coefficients on both continuous and binary expectations significantly decrease in magnitude too. For the sample of coresidents aged 18–26, the estimated coefficient on binary expected inheritance decreases by almost a fourth, whereas the coefficient on continuous expected inheritance by almost a third.

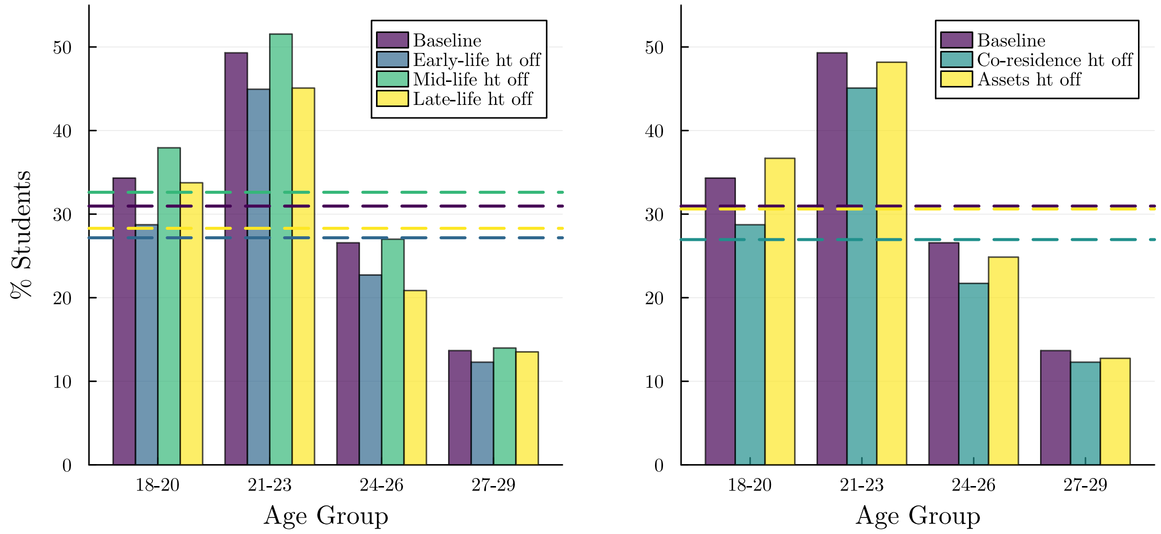

Figure 13: Left panel: student shares by age group and time determinant, for youths with mid or high dynastic altruism factor. Right panel: student shares by transfer type, for youths with mid or high dynastic altruism factor. The dashed lines represent average shares over the entire 18-29 age group.

6.1.2 Transfer type: assets vs coresidence

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 *assets* (combining mid- and late-life factors from the previous analysis) and of *coresidence* (not only at the beginning of the life-cycle, but also during the later stage when the agent's child's expected coresidence pattern depends on dynastic altruism).

Table 18 and the right panel of Figure 13 report the results of these experiments. When *coresidence* expectations are orthogonal to inheritance expectations, the share of students in the age group 18–29 with mid or high dynastic altruism decreases by -4.06pp, 27% of the overall gap.

In the last column, I assume intergenerational *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 coresidence trajectories, when both young and adults. Here the decrease in student shares is much lower (-0.32pp in the age group 18–29, 2% of the gap across groups), since *mid-life* and *late-life* heterogeneity operate in opposite directions and thus almost fully cancel each other. Regression coefficients signifi-

Moment	Age	Group	Baseline	Coresidence off		Assets off	
				Level	Δ	Level	Δ
% students	18–29	$\phi 1_{mid,high}$	31.37	27.30	-4.06	31.04	-0.32
% stud/grad	18–32	$\phi 1_{mid,high}$	43.24	37.33	-5.91	43.30	+0.06
β (0–1)	18–26	Cor.	0.80	0.85	+0.05	–	–
			[0.60–1.00]	[0.64–1.05]			
β (€s)	18–26	Cor.	0.30	0.35	+0.04	–	–
			[0.21–0.40]	[0.25–0.45]			
β (0–1)	18–32	All	0.88	0.67	-0.21	–	–
			[0.71–1.05]	[0.50–0.84]			
β (€s)	18–32	All	0.34	0.26	-0.09	–	–
			[0.27–0.42]	[0.18–0.34]			

Table 18: Selected moments – Determinants by transfer type. Coresidence off: no heterogeneity in coresidence trajectories (when child and parent). Assets off: no heterogeneity in (i) expected and received inheritances and (ii) bequest motives.

cantly decrease for the full sample, and slightly increase for the coresidents sample, when asset transfers are muted (and trivially nonexistent when coresidence is the only transfer at play).

7 Policy Counterfactuals

In this section, I rely on the estimated model to assess the consequences of alternative policies, and the potential role of aggregate variables in determining the link between inheritance expectations and education decisions. I first evaluate the impact of *de facto* introducing estate taxation, then extend the analysis with targeted income support to students. Finally, I consider the consequences of alternative returns to education over the lifecycle, and briefly discuss some policy implications.

7.1 Estate taxation

So far, I have considered both the expected amount of inheritance and the ability to leave a bequest as tax-free. What happens, however, if policy introduces a wedge between gross and net bequests?

I consider two margins along which estate taxation can bite. First, an estate threshold, below which bequests are exempted. Second, a linear estate rate, corresponding to the share of assets the government taxes away from the amount exceeding the threshold before transferring to the heir the resulting net bequest. Through these two levers, the government can manage both expected tax receipts and the degree of tax progressivity. In the following experiments, the estate threshold can be either €25,000 or €400,000, separating the *low progressivity, LP* from

Moment	Age	Group	Baseline	LTLP		LTHP	
				Level	Δ	Level	Δ
% students	18–29	$\phi 1_{mid,high}$	31.37	32.05	+0.68	31.94	+0.58
% students	18–29	$\phi 1_{low}$	16.21	16.56	+0.35	16.35	+0.14
% stud/grad	18–32	$\phi 1_{mid,high}$	43.24	43.88	+0.64	44.03	+0.79
% stud/grad	18–32	$\phi 1_{low}$	21.51	21.90	+0.39	21.56	+0.06
β (0–1)	18–26	Cor.	0.80	0.81	+0.01	0.80	+0.01
			[0.60–1.00]	[0.61–1.01]		[0.61–1.00]	
β (€s)	18–26	Cor.	0.30	0.33	+0.02	0.30	-0.00
			[0.21–0.40]	[0.22–0.44]		[0.21–0.39]	
β (0–1)	18–32	All	0.88	0.89	+0.01	0.90	+0.02
			[0.71–1.05]	[0.72–1.05]		[0.73–1.07]	
β (€s)	18–32	All	0.34	0.38	+0.04	0.34	-0.00
			[0.27–0.42]	[0.29–0.48]		[0.27–0.42]	

Table 19: Selected moments – Alternative tax regimes (Part 1). LTLP: Low Tax, Low Progressivity; LTHP: Low Tax, High Progressivity. Low Tax corresponds to 15%. Low (High) Progressivity corresponds to an exemption threshold of €25000 (€400000).

the *high progressivity, HP* regimes, whereas the tax rate is taken to be either 15% (*low tax, LT*) or 40% (*high tax, HT*).[22]

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 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. The overall effect would thus depend on the strength of income and substitution effects.[23]

A few results stand out. Under all tax policies, enrollment *increases* for both youths who do and do not expect an inheritance. Under all tax policies except the high tax-high progressivity policy mix, the increase is larger for youths expecting an inheritance. For a given tax rate, the increase in student rates among altruistic youths is larger the lower the progressivity of the tax, as this affects a larger share of inheritances to be received, thereby weakening the disincentivizing effect of the mid-life channel. This is most clearly visibile from the estimated regression coefficients on the amount of expected inheritance under the low tax-low progressivity regime. The large increase can be explained by the fact that more altruistic youths are now receiving a substantially lower inheritance. Given that their bequest motives are unchanged, the incentives

[22]The LP tax exemption level is set low enough to assess the consequences of a tax on received inheritances too.

[23]Of course, inelastic labor supply removes an important margin along which agents can react to a change in the inheritance tax regime.

to acquire education are stronger, and so is the association between student status and expected inheritance.

Moment	Age	Group	Baseline	HTLP		HTHP	
				Level	Δ	Level	Δ
% students	18–29	$\phi 1_{mid,high}$	31.37	31.98	+0.61	31.51	+0.14
% students	18–29	$\phi 1_{low}$	16.21	16.35	+0.14	16.70	+0.49
% stud/grad	18–32	$\phi 1_{mid,high}$	43.24	43.97	+0.73	43.59	+0.35
% stud/grad	18–32	$\phi 1_{low}$	21.51	21.73	+0.22	21.79	+0.28
β (0–1)	18–26	Cor.	0.80	0.83	+0.03	0.80	-0.00
			[0.60–1.00]	[0.63–1.02]		[0.60–0.99]	
β (€s)	18–26	Cor.	0.30	0.54	+0.23	0.33	+0.02
			[0.21–0.40]	[0.39–0.69]		[0.23–0.42]	
β (0–1)	18–32	All	0.88	0.90	+0.02	0.85	-0.03
			[0.71–1.05]	[0.73–1.06]		[0.69–1.02]	
β (€s)	18–32	All	0.34	0.59	+0.25	0.35	0.00
			[0.27–0.42]	[0.47–0.71]		[0.27–0.43]	

Table 20: Selected moments – Alternative tax regimes (Part 2). HTLP: High Tax, Low Progressivity; HTHP: High Tax, High Progressivity. High Tax corresponds to 40%. Low (High) Progressivity corresponds to an exemption threshold of €25000 (€400000).

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 (€400,000) tax regime (LTHP) is coupled with a small scholarship (€1,311 extra per year, equivalent to half the average student's income in the data, on top of the baseline students' income). In the second, the *high transfers* one, the policy package includes a twice larger scholarship (€2,622), 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.

Both regimes unequivocally raise university enrollment, as education is now subsidised through a tax regime which had a slightly positive effect on its own. The *high transfers* scenario raises average student rates within mid-to-high altruism youths by 9.68pp over the 18–29 age group, whereas the increase associated with the *low transfers* regime is 4.35pp. Increases take place across dynastic altruism terciles, to a broadly comparable extent in percentage point terms – which translates into a significantly larger % increase among low-altruism youths, and in a slight decrease in the gap across inheritance expectation groups. Consistent with the insights from the tax experiments in Section 7.1, coefficients on binary and continuous expected inheritance decrease under the *low transfers* regime. Under the *high transfers* regime, the coefficient on binary expectations decreases, and the coefficient on continuous expectations increases. This is due to the effect of the HTLP tax regime, which strengthens the relevance of the mid-life margin of heterogeneity.

Moment	Age	Group	Baseline	Low Transfers		High Transfers	
				Level	Δ	Level	Δ
% students	18–29	$\phi 1_{mid,high}$	31.37	35.72	+4.35	41.04	+9.68
% students	18–29	$\phi 1_{low}$	16.21	22.69	+6.48	27.41	+11.21
% stud/grad	18–32	$\phi 1_{mid,high}$	43.24	49.59	+6.35	55.85	+12.61
% stud/grad	18–32	$\phi 1_{low}$	21.51	31.17	+9.66	39.05	+17.54
β (0–1)	18–26	Cor.	0.80	0.69	-0.11	0.64	-0.16
			[0.60–1.00]	[0.50–0.87]		[0.46–0.82]	
β (€s)	18–26	Cor.	0.30	0.27	-0.04	0.44	+0.14
			[0.21–0.40]	[0.17–0.36]		[0.30–0.59]	
β (0–1)	18–32	All	0.88	0.67	-0.21	0.68	-0.20
			[0.71–1.05]	[0.52–0.82]		[0.53–0.83]	
β (€s)	18–32	All	0.34	0.27	-0.07	0.48	+0.14
			[0.27–0.42]	[0.19–0.35]		[0.36–0.60]	

Table 21: Selected moments – Low vs high transfers. Under low transfers, the LTHP estate tax regime is combined with a yearly scholarship of €1311 for students. Under high transfers, the HTLP estate tax regime is combined with a yearly scholarship of €2622 for students.

7.3 Returns to education

Returns to higher educations are particularly low in Italy, especially for young adults aged 25–34 (Corak, 2013). The last exercise in Section 7.2 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. A natural follow-up exercise is to study the response of 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 fixed, closer in time, or altogether larger. Three counterfactual exercises tackle these questions. In the first, I remove all uncertainty around the wage premium associated to higher education, as each education-age combination earns a fixed wage level (*certain* returns). In the second, I keep average lifetime earnings for each education level constant, while shifting their lifecycle evolution in favour of younger workers (*faster* returns). In the last one, *higher* returns, I increase the education-specific deterministic wage profile by 10% compared to the baseline one. Figure 14 illustrates the evolution of the mean age-education wage profiles over the lifecycle under these different scenarios.

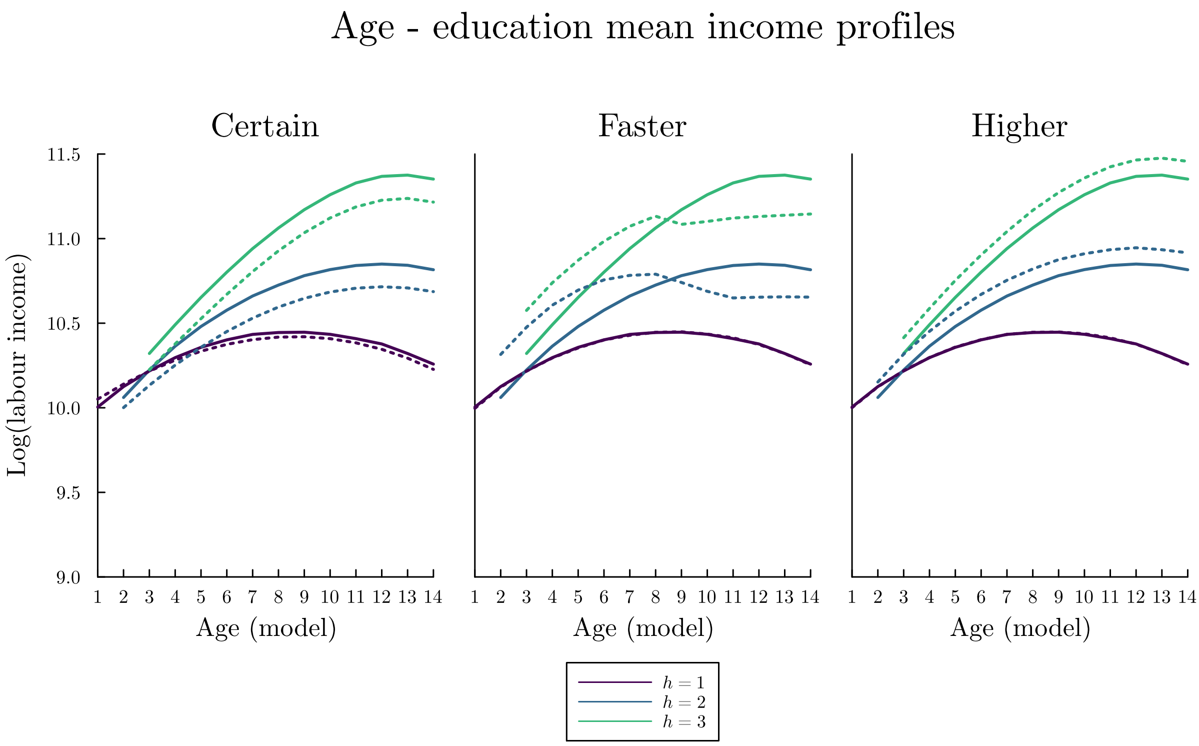

Figure 14: Mean lifecycle evolution of wages, by education. Solid lines represent the average baseline evolution of income by education level. Dotted lines illustrate the respective alternative mean path.

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 one, as the left panel of Figure 14 illustrates, returns to education are now lower than the average ones in the baseline scenario, while the education wage premium remains comparable. Table 22 shows that the latter effect prevails. In particular, student rates decrease within altruistic youths by a staggering -7.19pp, and by -2.54pp among low-altruism youths. As a consequence, the link connecting education decisions and binary inheritance expectations becomes substantially weaker, given that the estimated coefficient on binary expected inheritance moves by -0.17 for the coresidents sample.

Moment	Age	Group	Baseline	Certain		Faster		Higher	
				Level	Δ	Level	Δ	Level	Δ
% students	18–29	$\phi 1_{mid,high}$	31.37	24.17	-7.19	30.97	-0.40	31.76	+0.40
% students	18–29	$\phi 1_{low}$	16.21	13.67	-2.54	16.98	+0.78	18.82	+2.61
% stud/grad	18–32	$\phi 1_{mid,high}$	43.24	32.85	-10.40	43.45	+0.20	45.02	+1.78
% stud/grad	18–32	$\phi 1_{low}$	21.51	16.37	-5.14	22.40	+0.89	26.31	+4.80
β (0–1)	18–26	Cor.	0.80	0.63	-0.17	0.75	-0.05	0.61	-0.18
			[0.60–1.00]	[0.41–0.85]		[0.55–0.94]		[0.42–0.81]	
β (€s)	18–26	Cor.	0.30	0.27	-0.04	0.28	-0.03	0.22	-0.08
			[0.21–0.40]	[0.17–0.37]		[0.19–0.37]		[0.13–0.31]	
β (0–1)	18–32	All	0.88	0.71	-0.17	0.80	-0.08	0.71	-0.17
			[0.71–1.05]	[0.54–0.89]		[0.64–0.97]		[0.55–0.87]	
β (€s)	18–32	All	0.34	0.29	-0.05	0.31	-0.04	0.27	-0.08
			[0.27–0.42]	[0.21–0.38]		[0.23–0.39]		[0.19–0.35]	

Table 22: Selected moments – Different education returns. Under *certain* returns, each individual earns with certainty the central productivity realization corresponding to her age-education profile. Under *faster* returns, the wage premia move from 15% to 40% in the early phase of the lifecycle but decreases later as to remain on average the same as in the baseline scenario. Under *higher* returns, the wage premium is raised by 10% at each point of the lifecycle.

7.3.2 Faster returns

Here, I keep the lifetime average education-specific wage premia 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).[24] I then shift the remaining years of the lifecycle age-education wage to minimize the distance between updated and actual profiles, while smoothing across the remaining years. The counterfactual trajectories are reported in the central panel of Figure 14.

As shown by the second column of Table 22, 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 a similar direction: student rates now slightly *decrease* among mid and high dynastic altruism youths, and increase by 0.78pp among low dynastic altruism ones. The gap narrows , as before , and the link between inheritance expectations and education is slightly weakened, as indicated by the downward 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 substantially lower. Furthermore, *faster* returns

[24] 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).

increase not only the short-term benefits associated to education, but also the opportunity cost of acquiring further higher education. This tension is visible in the *increase* in the share of altruistic youths who are either studying or hold a university degree. Altruistic youths now are more likely to earn a university degree ($h = 2$ in the model) and reap the associated faster wage premium, but less likely to pursue a full cycle ($h = 3$), hence to be students for longer.

7.3.3 Higher returns

In the last exercise, I increase the premium associated to each education level over the working lifecycle by 10%. The resulting evolution is depicted in the right panel of Figure 14. Here, to a higher wage premium in the early adult life, does not correspond a decrease over the following years. As before, student rates increase among those belonging to the low dynastic altruism class by 2.07pp and by 0.32pp among altruistic youths. The estimated coefficients on expected inheritance decrease accordingly (by -0.18 and -0.08 respectively within the coresidents sample). The gap becomes even narrower in terms of youths who are either studying or graduates in the age group 18–32. The rationale for the relative change in student rates across dynastic altruism groups can 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 *late-life* bequest motives among the factors that determine education choices.

7.4 Discussion

In this final subsection, I briefly discuss a few insights drawn from the model, suggest possible extensions, and touch upon some limitations.

Returns to education and feedback effects. The three counterfactual returns to education in Section 7.3 indicate that the association between dynastic altruism and education critically hinges on the extent to which the benefits from education are expected to occur over the lifecycle. Specifically, when the present value of the returns to education is higher – either because returns are frontloaded, or because the wage premium increases – the link between education decisions and binary inheritance expectations is weaker. Higher discounted returns to education *within the lifecycle* decrease the weight of *late-life* motives in justifying human capital accumulation. This result confirms the insights from the analytical model in Section 3: the relative importance of micro-level preferences rests on aggregate macroeconomic conditions.

Micro and macro level are also likely mutually reinforcing. For instance, at least part of the observed slow increase in the Italian higher education wage premium could be due to the relatively low weight played by individual skills as opposed to 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 could push down the prevailing wage rate expected by prospect students, further undermining the link between education and potential 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 pool, (ii) the wage premium for higher education, and (iii) the role of dynastic altruism in undertaking higher education. Taking into account the transmission of intergenerational preferences for altruism can thus enrich our understanding of the sources of wage growth and wage gaps across and within different national or sectoral labour markets (Adda and Dustmann, 2023; Doepke and Gaetani, 2022; Bianchi and Paradisi, 2024).

Estate taxation and income support. Heterogeneity in *late-life* bequest motives bears important policy implications. Under the estimated parameters, estate taxation can increase student rates even when financing wasteful government expenditures (see subsection 7.1), due to the weaker negative effect of inheritance receipt combined with the low elasticity of bequest motives to the wedge between gross and net bequests. Jointly, these two factors leave substantial leeway to policy-makers willing to increase the currently low student rates. Naturally, university enrollment only increases when estate taxation is matched by income support to students (see subsection 7.2). Earmarking revenues from inheritance taxation to fund targeted income support for students represents one possibility among many. For instance, given the quantitative contribution of *early-life* coresidence patterns in explaining student rates, support for housing would likely produce comparable consequences.

Asset liquidity. There is only one liquid asset in the model. Computational considerations aside, this choice is motivated by the fact that the measure of expected housing inheritance is not included in households' survey responses, but constructed assuming constant asset shares within the household, and has two likely consequences. First, the model over-estimates the volatility of wealth holdings over the lifecycle (see again the left panel of Figure 12). While starting and ending wealth positions are close to their data counterparts, the fungibility of assets and income in the model overstates the ability of wealth to smooth consumption both against labour income fluctuations and during retirement. Second, the assumption of perfect asset liquidity might marginally affect the degree of altruism required to replicate the observed intergenerational wealth transfers, given the absence of transaction costs. Importantly, however, this bias (i) is bound to be small and (ii) can *a priori* be upward or downward alike.

Residual taste heterogeneity. The additive taste parameter υ is a parsimonious way to account for unobserved heterogeneity across inheritance expectations groups. Its role is to bridge the distance between the observed gap in education choices and plausible contributions from the identified *early-life*, *mid-life*, and *late-life* margins of heterogeneity. However, another element likely to characterize parents from altruistic dynasties is the willingness to help their children through *inter vivos* transfers – either conditionally on heirs' low income realizations or not (Boar, 2021). While the lack of robust data sources does not allow me to include this channel in the model in a disciplined fashion, hence to estimate its quantitative relevance, *inter vivos* transfers very likely have a substantial impact on the ability of youths from altruistic dynasties to bear the costs and risks associated to education.

Beyond the extensive margin of education, such insurance channel plausibly influences the intensive one too, by affecting the distribution of students across majors. SHIW data on chosen majors are unfortunately too sparse to draw micro-level conclusions, but Italy exhibits a lower share of graduates in STEM disciplines compared to other European countries (European Commission, 2022). The ability to resort to private insurance within the family might contribute to explaining why. Boar and Lashkari (2022), for instance, show that youths from more affluent families often choose occupations with lower expected wages but higher non-pecuniary qualities. Under this account, higher education would be akin to a luxury good for expected heirs. This insurance channel would not necessarily require financial transfers, as it could be at least partially achieved through the option of coresidence (Kaplan, 2012).

Inequality. With the caveat that inelastic labour supply and exogenous prices remove two fundamental equilibrium forces, Table 23 shows how the Gini index and the ratio between the shares of income earned by the top 20 and bottom 20 of earners (S80-S20) vary across different model versions in comparison with the data. First, both indicators are very close in the baseline version of the model and in the data (0.33 vs 0.32 for the Gini index, and 5.53 vs 5.27 for the S80-S20 ratio). Second, inheritance receipts have an *equalizing* effect on income distribution. As before, the increase in inequality is due to the disincentive created by a positive asset windfall on human capital accumulation, hence on expected lifetime labour earnings. On the contrary, inequality in disposable income would be substantially lower absent heterogeneity in bequest motives or, to an even greater extent, in the taste parameter υ. In this last case, education rates would be lower, and the variance in income realizations too.

The origins of dynastic altruism. In the model, dynastic altruism is taken as given. Policy implications however differ depending on the source of heterogeneity in such preference. Panel

Indicator	Data	Model	M-L ht off	L-L ht off	Taste ht off
Gini index	31.50	33.00	33.35	32.25	30.92
S80-S20	5.27	5.53	5.65	5.30	4.86

Table 23: Inequality measures on disposable income and preferences. M-L ht off: no heterogeneity in expected and received inheritances. L-L ht off: no heterogeneity in bequest motives. Taste ht off: no heterogeneity in the unobserved taste heterogeneity correlated with inheritance expectations (i.e., $\upsilon = 0$).

data spanning over multiple generations would be needed to disentangle the role of innate, genetic heterogeneity in preferences, from the contribution of exposure to altruism in fostering one's own. Studies on the intergenerational transmission of educational outcomes, for instance, claim that environmental factors explain at least one third of the long-term persistence, based on adoptees' educational achievements (Adermon et al., 2021). It remains an open yet fundamental question whether altruism is transmitted in a similar fashion, and can thus be to some extent nurtured, or not.

8 Conclusion

In this paper, I show that intergenerational asset transfers are an important driver of education choices.

Empirically, based on Italian micro-data, I document (i) a positive association between inheritance expectations and university enrollment, and (ii) heteorgeneity in altruism across dynasties, as some are much more likely to transmit assets across generations than others.

A simple analytical model, featuring heterogeneity in dynastic altruism, connects the empirical findings. Given stronger bequest motives for individuals expecting an inheritance, their incentive to improve lifetime income through education more than offsets the disincentivizing income effect of receiving an inheritance.

A richer lifecycle, overlapping generations model shows that heterogeneity in late-life bequest motives and early-life coresidence patterns jointly explain more than 40% of the total gap in student rates between youths who do and do not expect an inheritance, partly offset by the negative effect of the expected asset transfer *per se*. Counterfactual exercises demonstrate that (i) estate taxation, especially when coupled with income support for students, raises the share of students, and (ii) the link between inheritance expectations and human capital accumulation is inversely related to the present value of the expected returns to education. Any policy intervention conforms with this last fundamental insight, emphasising how the relevance of dynastic altruism in determining education outcomes, while stemming from micro-level preferences heterogeneity, critically rests on aggregate features of the economy.

The cross-sectional nature of my data on inheritance expectations does not allow me to take a stance on the origins of the documented persistence in altruism, which obviously matter a great deal for welfare analysis and policy implications. Does heterogeneity in altruism arise in response to exposure to altruism, or is it rather mainly innate? 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.

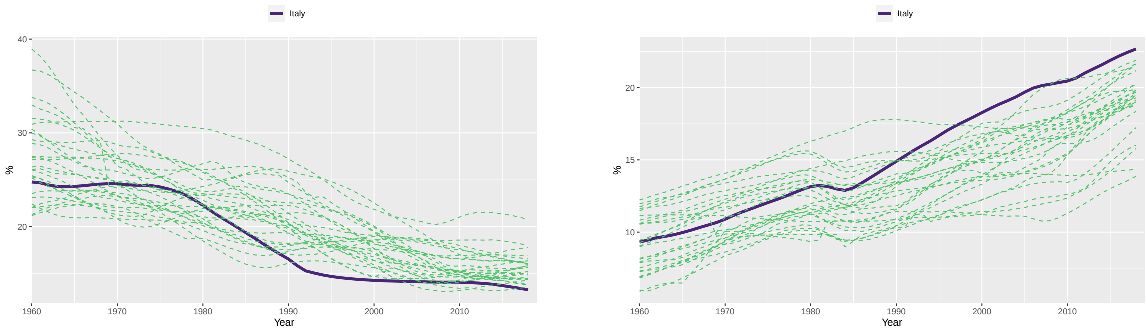

Figure 15: Left panel: share of population aged 15-. Right panel: share of population aged 65+. Background: European countries. Source: OECD.

Figure 15 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 16 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 16 shows how parental low educational levels are very strong predictors of children's education.

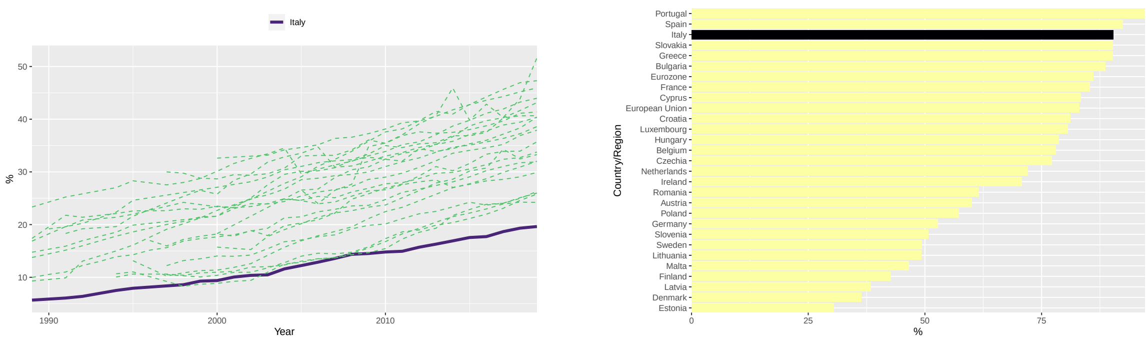

Figure 16: Left panel: share of adults with higher education (population aged 25–64). Background: European countries. Source: OECD. Right panel: transmission of educational attainment level 0-2 (less than primary, primary, and lower secondary) from parents to current adults (population aged 25–59). Source: 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 17, 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).

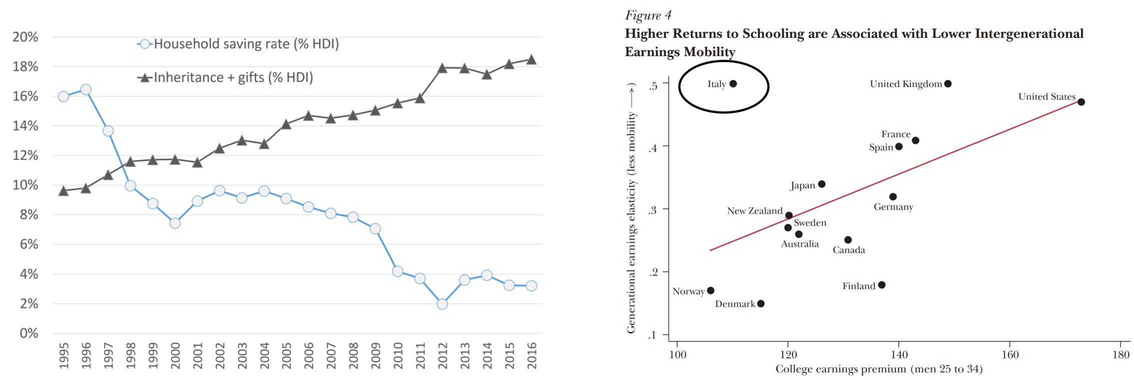

Figure 17: Left panel: Inheritance vs saving rates (% of household disposable income). Source: Acciari and Morelli (2020). Right panel: Source: Corak (2013).

Finally, the left panel of Figure 17 and Table 24 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 24: 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 18 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, arguably, 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%.

Figure 19 shows the share of co-residents by age group, among students and among graduates. The share of co-residents is well above 75% at any age below 26, and does not significantly differ by student status.

Inheritance expectations by asset. I calculate for each household the share of current real and financial wealth[25] 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

[25] Here I abstract from liabilities.

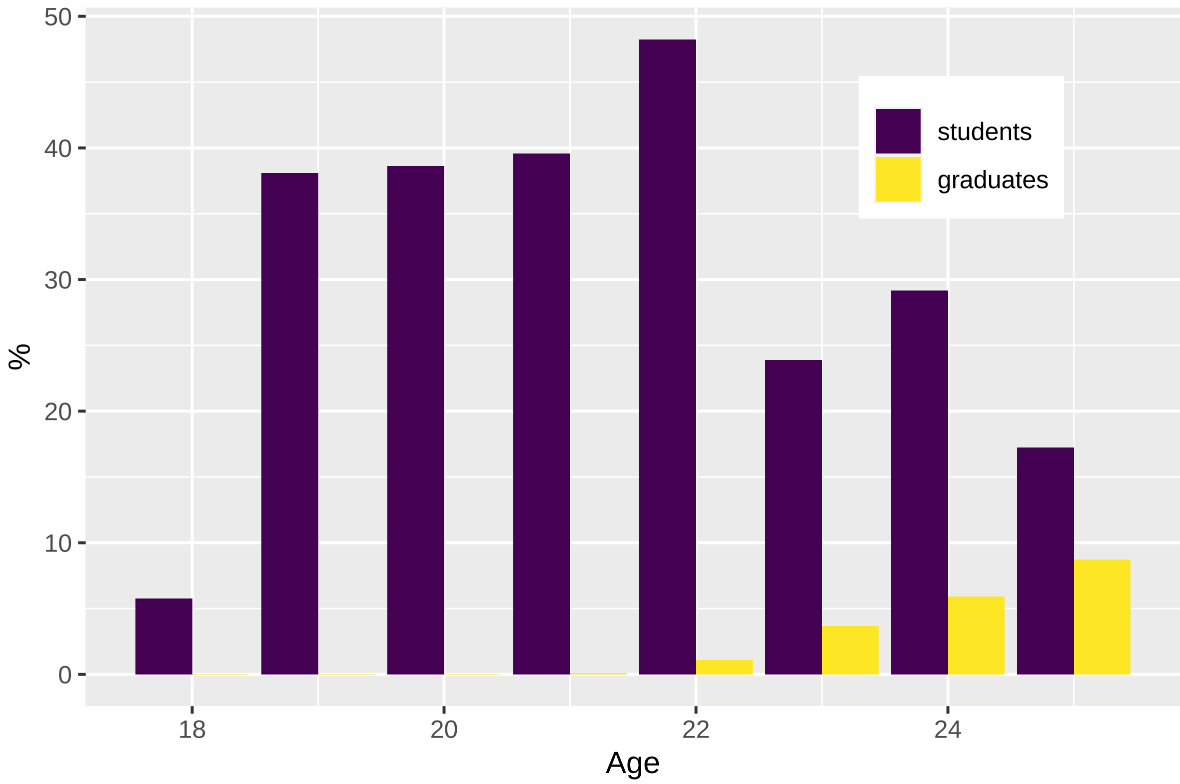

Figure 18: Share of students and graduates, by age.

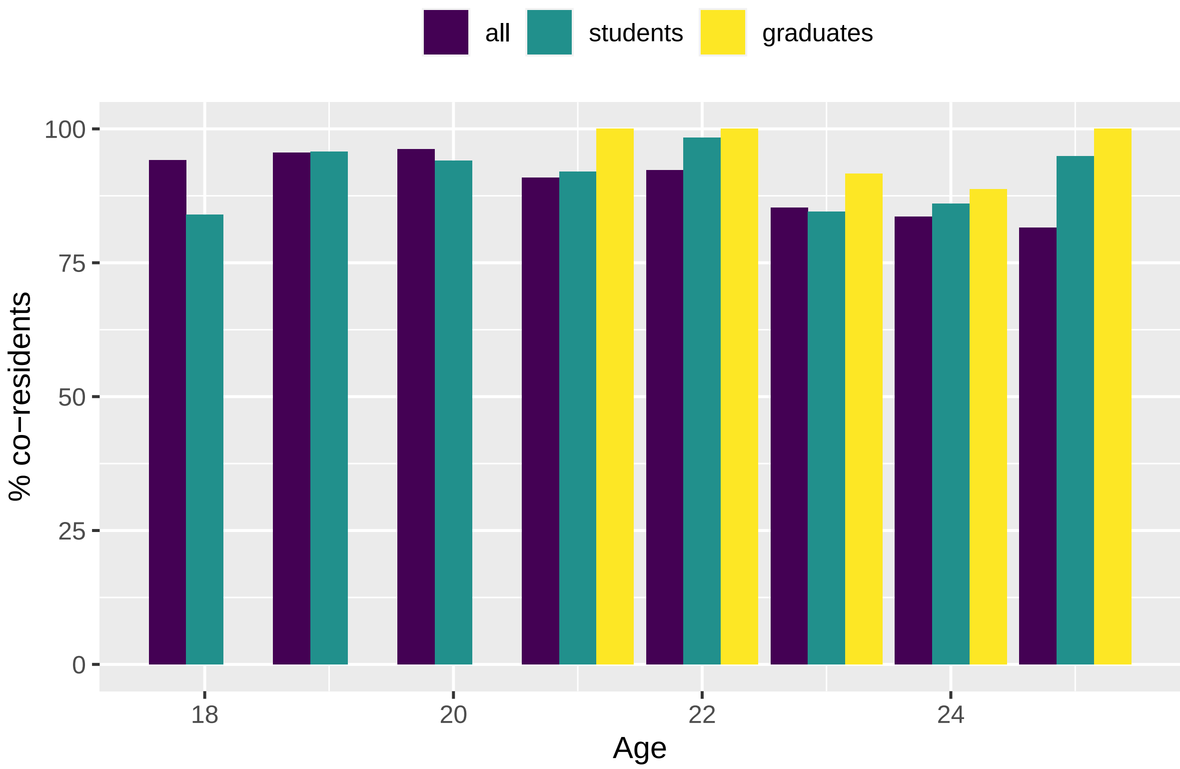

Figure 19: Share of co-residents within education, student status and age group.

remain on average constant.[26] 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.

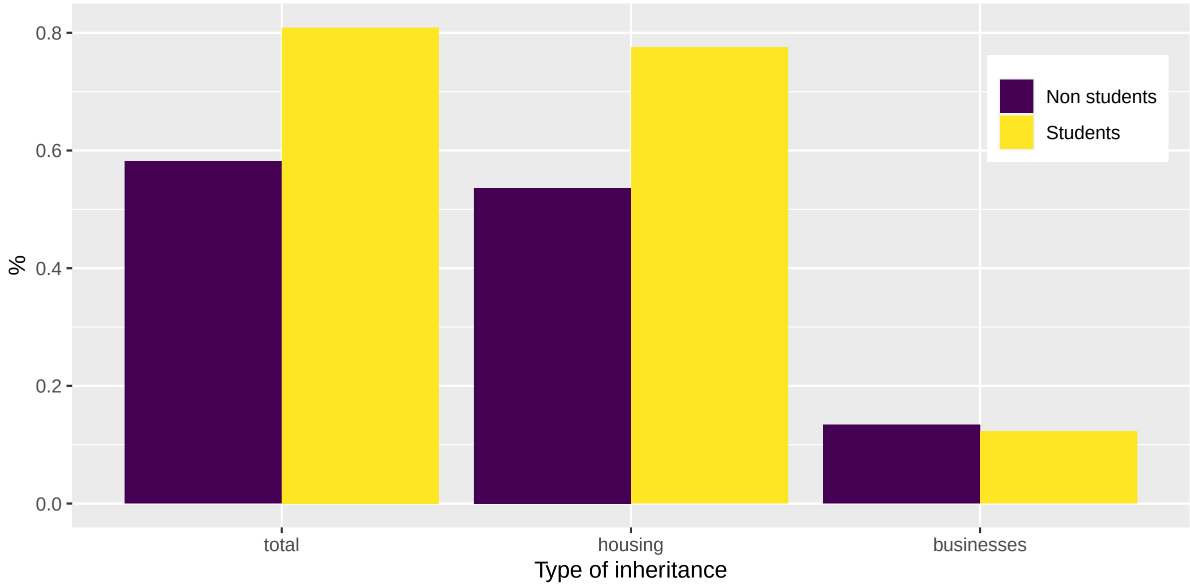

Figure 20: Share of inheritance expectation (type) by student status (children aged 18-25).

The second distinction, illustrated in Figure 20 and 21, 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 20, 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 21), 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.

Complete figures. Figure 22 and 23 report the predicted probabilities of being a student for any combination of macro-region and sex, depending on binary and continuous expected inheritance.

Figure 24 reports the predicted intention to leave a bequest, according to the model in the third column of Table 8, at the mean values of all other controls, for any combination of household head's macro-region and sex.

[26] 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.

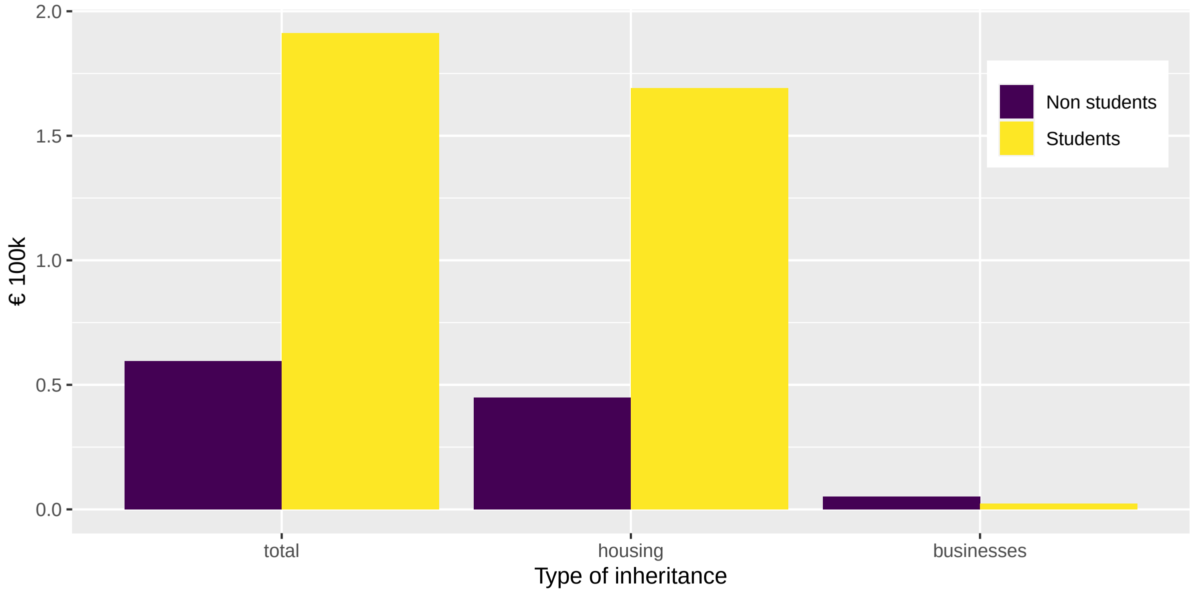

Figure 21: Amount of inheritance expectation (type) by student status (children aged 18-25).

B.2 Housing as a driver

What happens if I differentiate inheritances depending on the type of wealth individuals expect to receive? Table 25 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 25 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. 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%).

Repeated cross section (1989-2016).

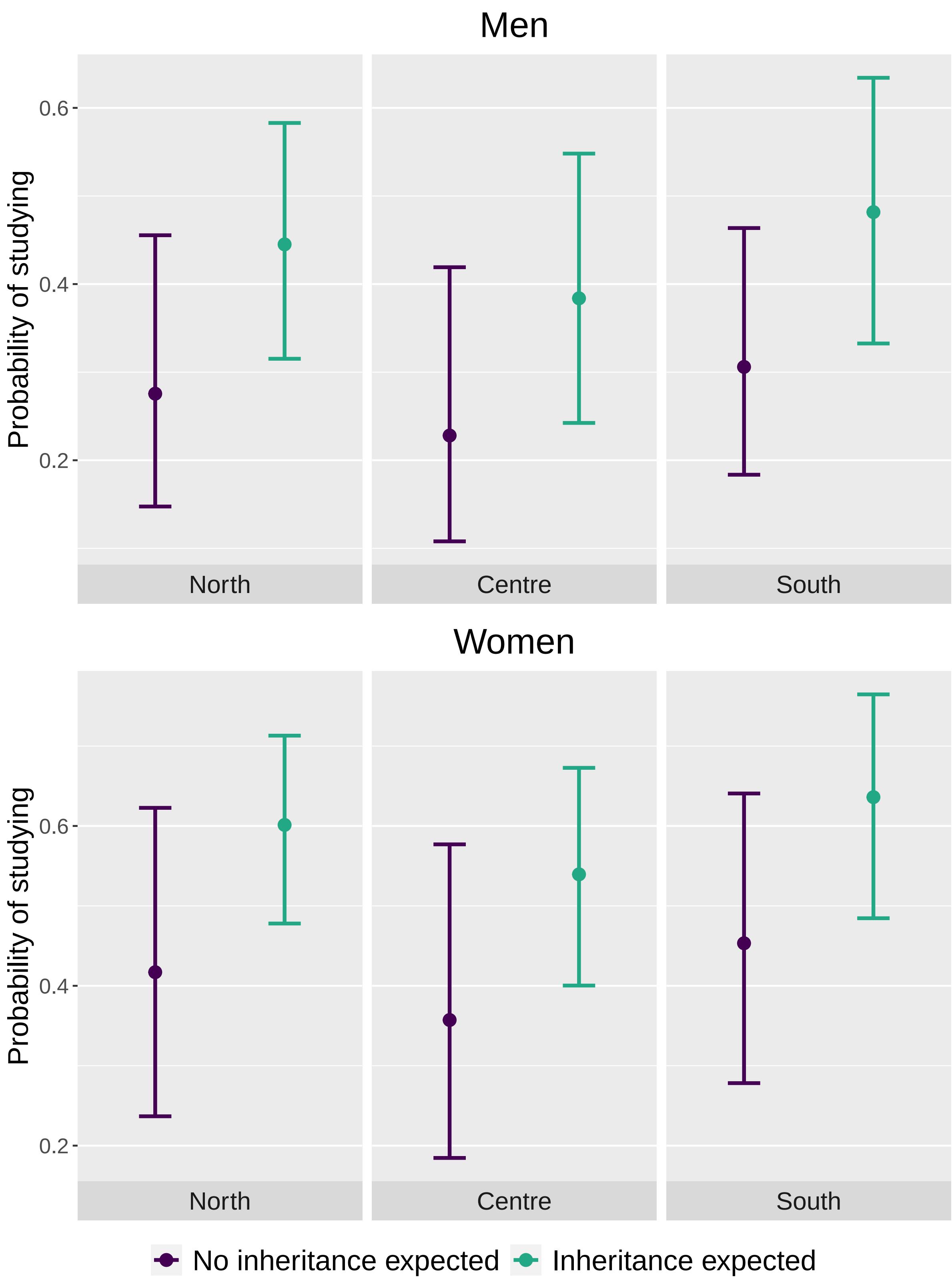

Figure 22: Predicted probabilities of being a student. Estimates are taken for young men living in the North at mean values of all other controls. Bars represent the estimated 95% confidence interval around predicted probabilities.

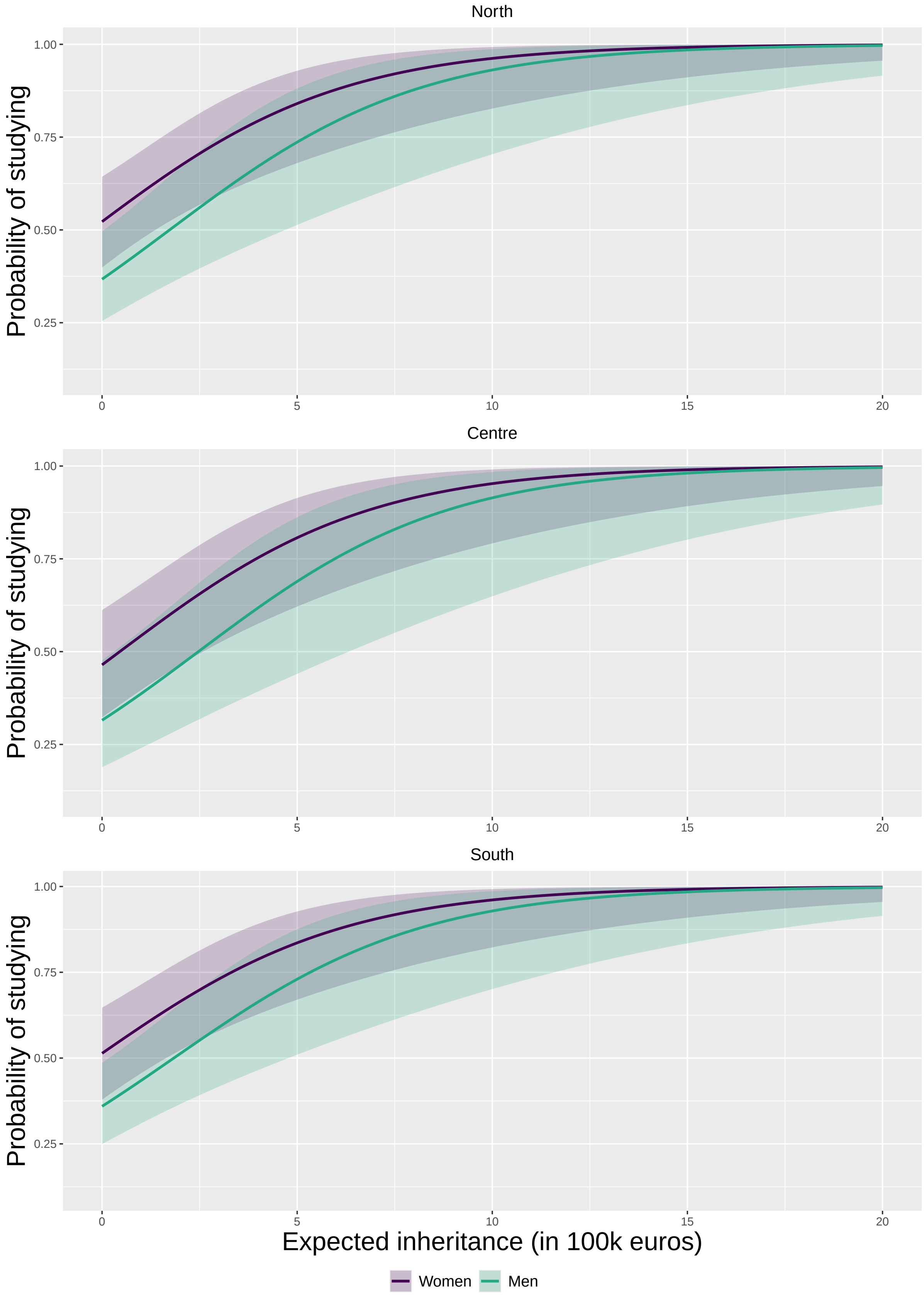

Figure 23: Predicted probabilities (with 95% confidence intervals) of being a student according to the baseline model.

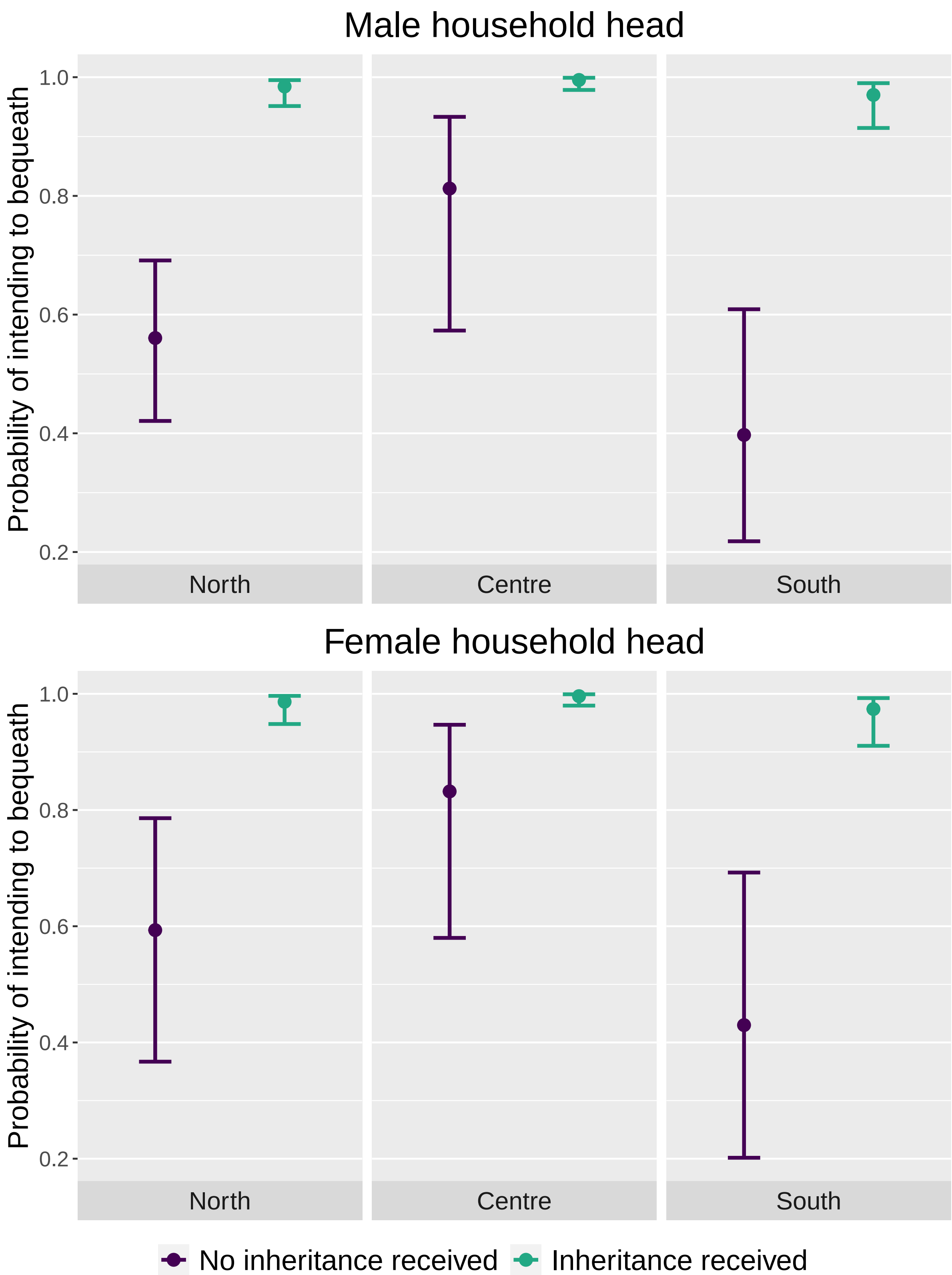

Figure 24: Predicted intention to leave a bequest. Estimates are taken from the third column of Table 8 at mean values of all other controls.

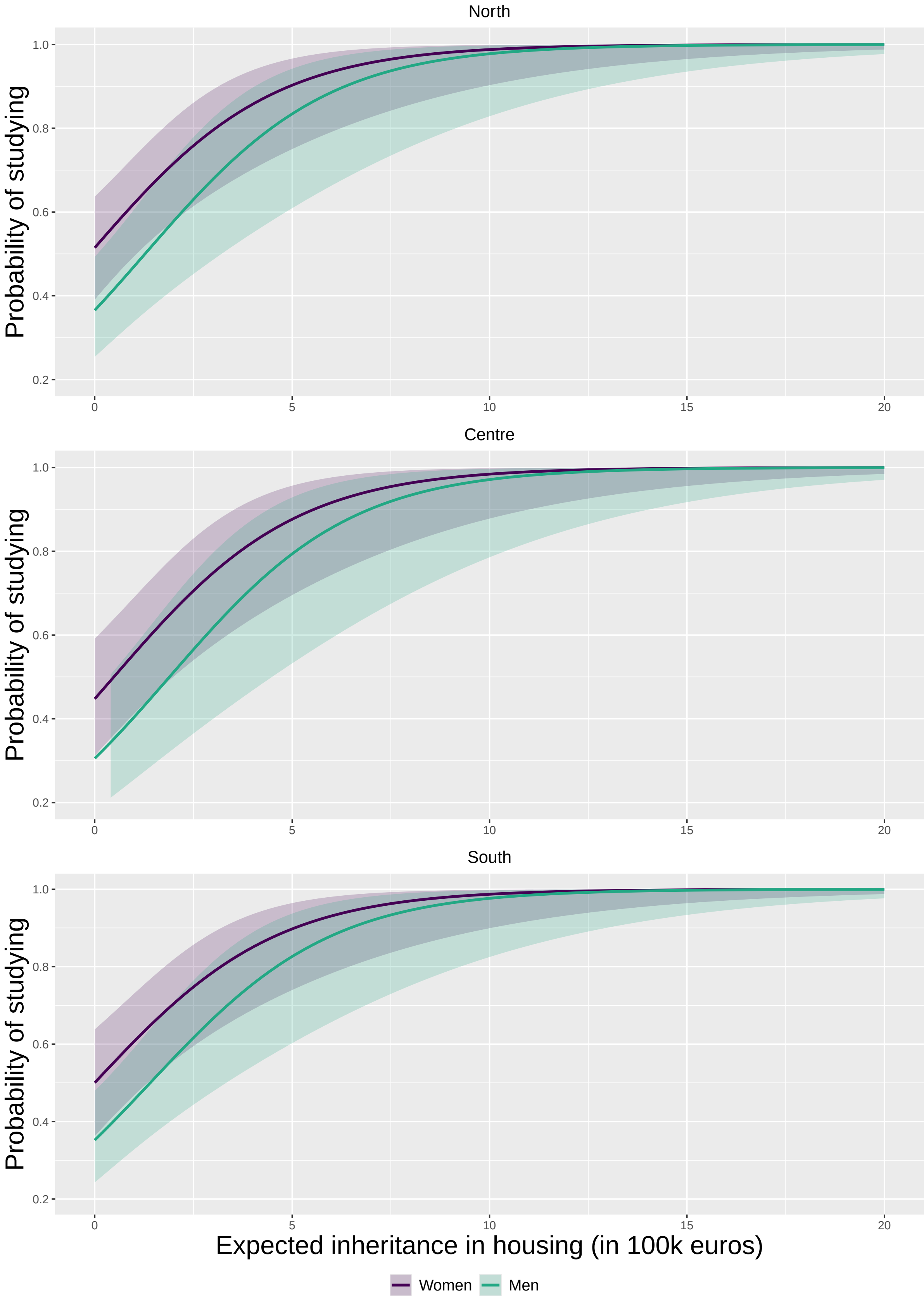

Figure 25: Predicted probabilities (with 95% confidence intervals) of being a student according to the baseline model with component-specific expectations (housing vs businesses).

Table 25: 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.

Table 26: 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.

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 27 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 27: 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 28 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.

Table 28: 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.

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 28).

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 29:

Table 29: 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 30 and attribute very strong conditional impact of expected inheritance in terms of housing, at 1% significance level under every possible specification.

Table 30: 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:

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

□

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:

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

Therefore:

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

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

$\square$

Appendix D Calibration

I report here 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 31: 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	$\phi 1_{low}$	$\phi 1_{mid,high}$
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 32: Unconditional co-residence probabilities across altruism groups.

Once parents, probabilities in Table 32 are shifted 11 periods forward.

Deterministic income component. For workers, Table 33 reports the estimated lifecycle deterministic income coefficients ϵ_{kh}, where h distinguishes across education groups, $k = 0$ constitutes the intercept and each $k = l$ multiplies age j^l. Unemployed workers earn a share 0.52 of the average wage for a worker with the same education level.

Parameter	Level
ϵ_{01}	9.9180
ϵ_{11}	0.1058
ϵ_{21}	-0.0056
ϵ_{31}	-0.0000
ϵ_{02}	9.7047
ϵ_{12}	0.1628
ϵ_{22}	-0.0060
ϵ_{32}	-0.0000
ϵ_{03}	9.7858
ϵ_{13}	0.1341
ϵ_{23}	0.0055
ϵ_{33}	-0.0006

Table 33: Lifecycle log income coefficients (employed individuals).

For students, I estimated age-education earnings (including transfers) from the SHIW panel data, for households and spouses reported. I then calculate the ratio with respect to the labour income of the average worker with the same age and education level. Resulting levels are reported in Table 34.

Age	$h = 1$	$h = 2$
1	8.6494	–
2	8.7380	9.3539
3	8.8149	9.4857
4	8.8799	9.6048
5	8.9327	9.7108

Table 34: Students' log income.

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	0.6476	0.2804	0.0721
z_2	0.2295	0.4315	0.3390
z_3	0.0669	0.2825	0.6506

Table 35: 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 38 and 39 (where z_0 corresponds to unemployment).

	Future state	
Current state	Unemployed	Employed
Unemployed	0.0514	0.9486
Employed	0.0053	0.9947

Table 36: Transition across employment status ($h > 1$).

	Future state	
Current state	Unemployed	Employed
Unemployed	0.5132	0.4868
Employed	0.0333	0.9667

Table 37: Transition across employment status ($h = 1$).

	Future z			
Current z	z_0	z_1	z_2	z_3
z_0	0.0514	0.6143	0.2660	0.0684
z_1	0.0053	0.6441	0.2789	0.0717
z_2	0.0053	0.2283	0.4293	0.3372
z_3	0.0053	0.0666	0.2810	0.6471

Table 38: Transition across income and employment states ($h > 1$).

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. 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 40 reports the resulting coefficients.

These are reported in Figure 26. Expectations for youths belonging to the first altruism

	Future z			
Current z	z_0	z_1	z_2	z_3
z_0	0.5132	0.3152	0.1365	0.0351
z_1	0.0333	0.6260	0.2710	0.0697
z_2	0.0333	0.2219	0.4172	0.3277
z_3	0.0333	0.0647	0.2731	0.6290

Table 39: Transition across income and employment states ($h = 1$).

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 40: Coefficients on expected inheritance by altruism class.

group $\phi_{1_{low}}$ are not shown, since they expect no inheritance at all.

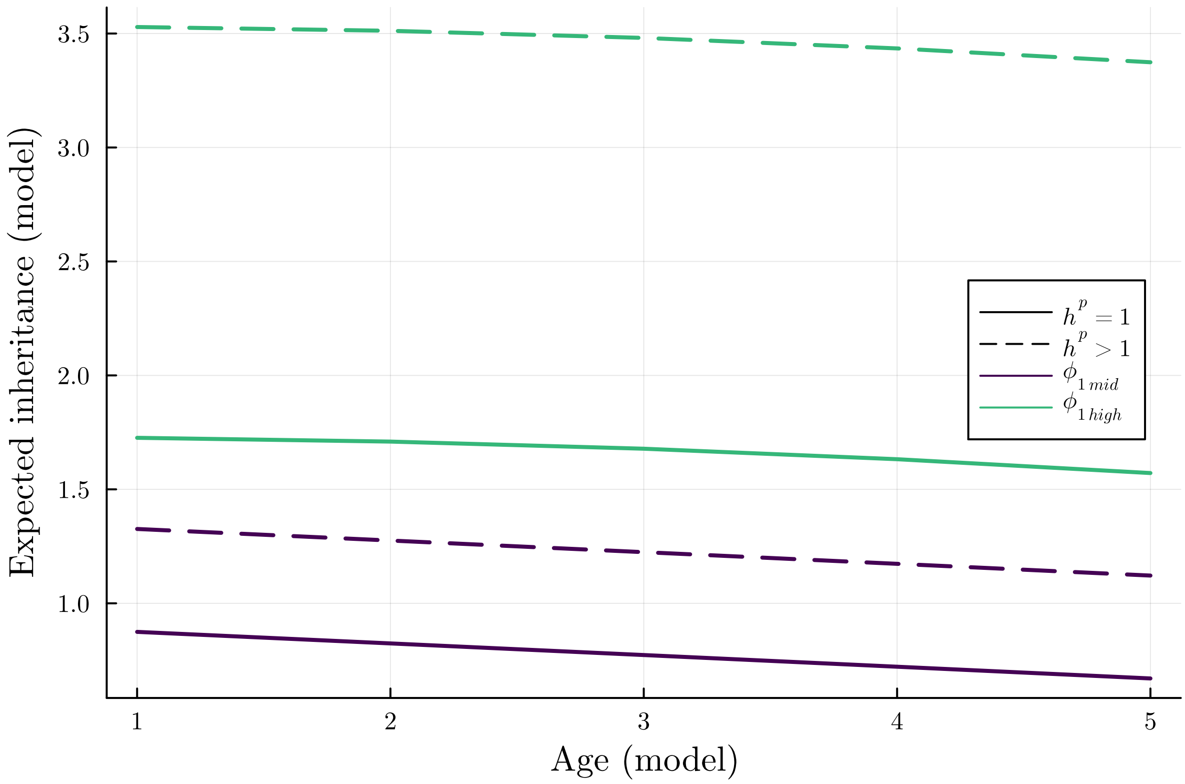

Figure 26: Estimated inheritance expectations by age, parental human capital, and altruism group. The 1st altruism group is not shown as its members expect no inheritance. Values are expressed in 100,000 euros.

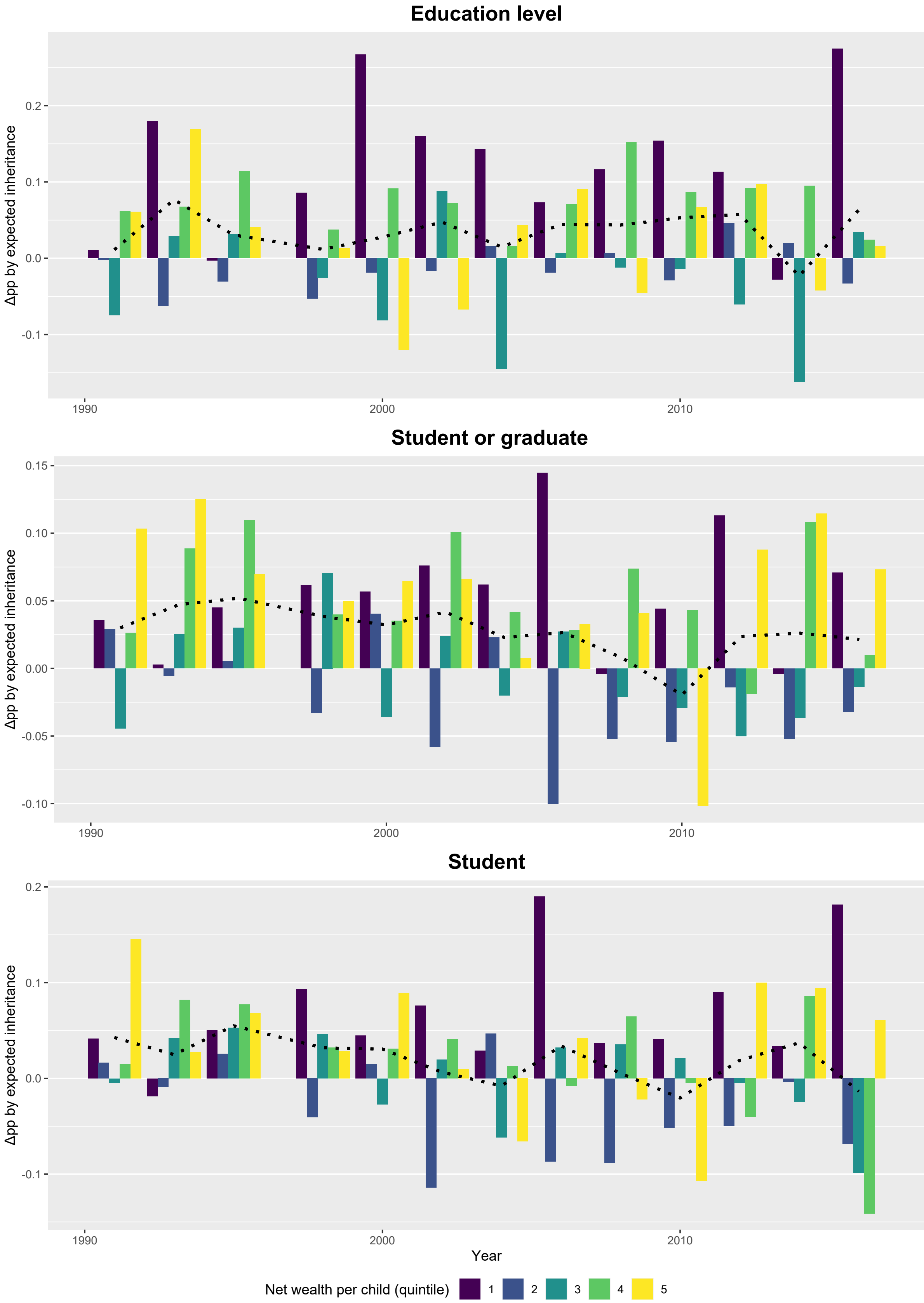

Figure 27: Net percentage point differences in (i) average education level, (ii) share of students or graduates and (iii) share of students, across groups, within quintiles of household wealth per child. Samples: (i) and (ii) co-residents aged 18-30, (iii) co-residents aged 18-25.

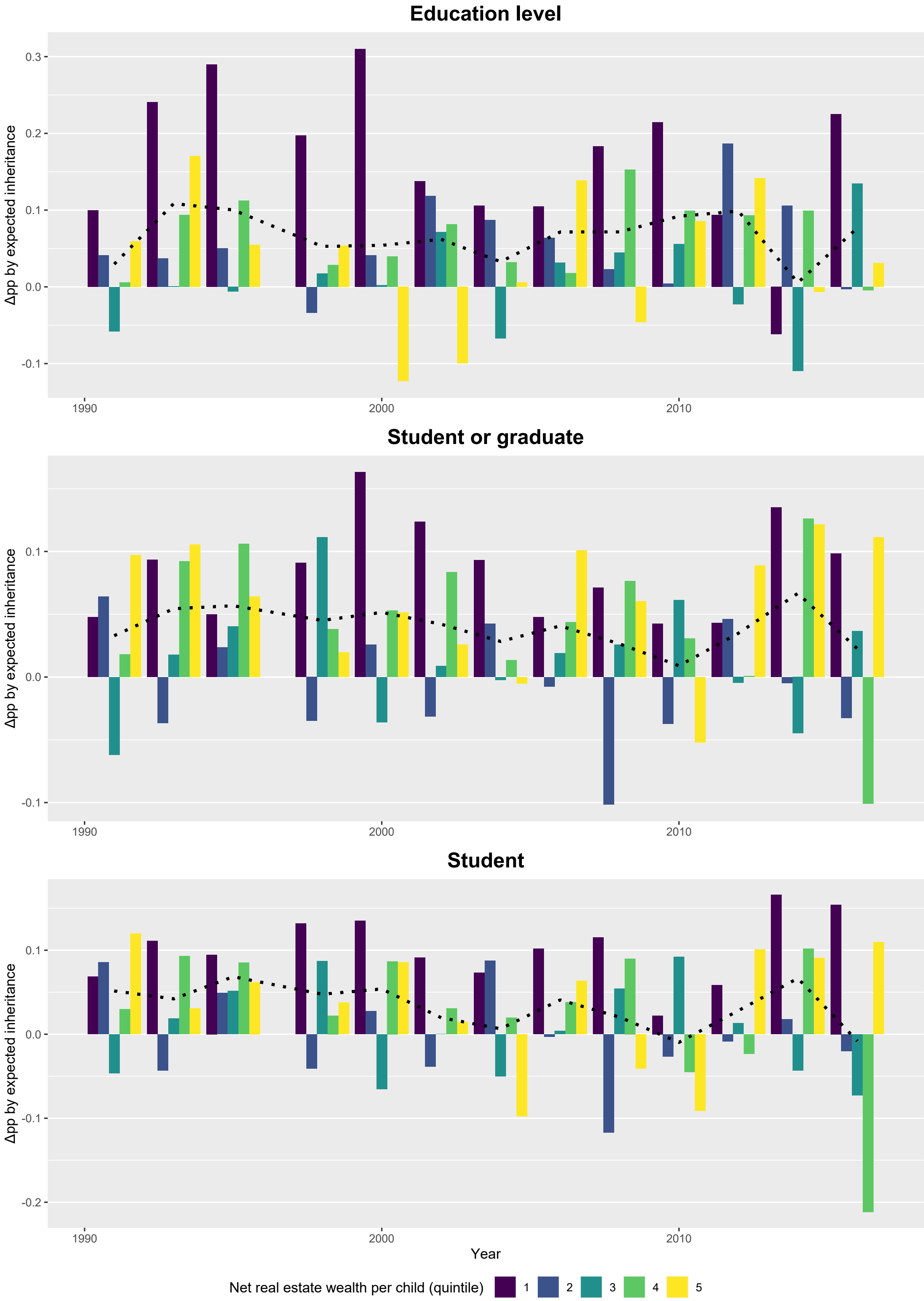

Figure 28: Net percentage point differences in (i) average education level, (ii) share of students or graduates and (iii) share of students, across groups, within quintiles of household real estate wealth per child. Samples: (i) and (ii) co-residents aged 18-30, (iii) co-residents aged 18-25.