The Role of Parental Altruism on College Financial Support and Outcomes in Higher Education: A Dynasty Model Approach*

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Abstract

This paper examines how parent-child interactions and altruism affect college financial support and outcomes. I analyze how parents adjust their consumption levels when their children's wealth changes and how children's consumption shocks affect parent consumption. I use a dynastic overlapped generations model to explore how future transfers from parents to children influence college graduation rates. I find that parent transfer reduces the cost of college but also lowers college returns. Altruism increases college graduation rates for low-ability children with wealthy parents but decreases rates for high-ability children with poor parents. Parental altruism explains most of the college graduation gap between low-ability children with wealthy and poor parents. Understanding parent-child interactions and altruism is crucial for comprehending college investment decisions and outcomes.

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1 Introduction

In the United States, parents play a fundamental role in financing their children's college education. Although in the year 2017, the government spent \$248 billion in college aids[1], the average household with two dependent children is expected to contribute \$6500 per child annually[2]. In this paper, I empirically study how parent consumption depends on children's position on the income distribution. Then, I look at transfers and bequests between parents and children, especially when attending college. Then, I build and estimate a dynastic overlapped generations model where parents are altruistic to their children to study if college transfers can be rationalized as my investment to avoid higher transfers and bequests to my children in the future. Finally, I study how parental transfer affects college graduation rates and whether it can account for the higher graduation rates between low-ability children with wealthy parents and low-ability children with poor parents. My empirical analysis sheds light on the crucial role of parents in financing their children's college education and the impact of my financial decisions on educational outcomes.

To investigate the impact of parent-child interactions on college financial support and outcomes, I analyze consumption data from the Panel Study of Income Dynamics (PSID). My findings show that parents adjust their consumption depending on their children's relative position in the income distribution. However, reported inter-vivos transfers and bequests between parents and children can only partially explain the change in consumption. To further explore this issue, I build and estimate an altruistic dynamic heterogeneous model with endogenous college decisions. In this model, parents have the option either to financially support their college attendance or save for later consumption, transfers, or bequests. Using the model, I analyze how parents' college financial support affects graduation outcomes, particularly for affluent low-skill children with higher graduation rates than poor low-skill children. Through this analysis, I aim to deepen our understanding of the impact of parental transfers on college graduation rates and shed light on the factors contributing to the graduation gap between low-skill children from affluent and low-income families.

Children with low cognitive skills are more likely to graduate from college if their parents

[1] https://research.collegeboard.org/pdf/trends-student-aid-2019-full-report.pdf

[2] https://www.forbes.com/sites/troyonink/2017/01/08/2017-guide-to-college-financial-aid-the-fafsa-and-css-profile/6ee3d28f4cd4

are wealthier. Table 1 shows the proportion of children who graduate from college, categorized by their cognitive ability quartile and parent's wealth, using data from the NLSY97. First, we observe that graduation rates increase with the child's ability. Second, holding ability constant, college graduation rates are higher for children with wealthier parents. For example, children in the lowest ability quartile with parents in the highest wealth quartile are 74% more likely to graduate from college than children with parents in the bottom wealth quartile. Although this advantage decreases to 39% for children in the top ability quartile, it remains substantial. These findings are consistent with Belley and Lochner (2007), which demonstrates that parental income and wealth are less relevant for high school completion but more significant for college graduation, particularly among low-ability children, which can be attributed to credit constraints. Brown et al. (2012) finds that children's college attendance depends on their parents' willingness to support their college education, and the heterogeneity in parents' altruism is a relevant factor in how college aid would affect college graduation. In contrast, Heckman and Mosso (2014) argues that the college enrollment of more affluent children may result from paternalism if education is a normal good and not necessarily due to borrowing constraints. In this paper, I explore an alternative hypothesis that wealthy parents influence graduation rates by reducing their children's college costs through higher monetary transfers, decreasing future transfers and bequests, and increasing their consumption later in life.

Table 1. Children College Attainment by Parent Wealth and Child Ability (NLSY97)

Parents' Wealth\Child's Ability	1	2	3	4
1	0.19	0.24	0.33	0.53
2	0.24	0.30	0.42	0.53
3	0.26	0.40	0.51	0.63
4	0.33	0.46	0.62	0.74
$\Delta\%(Q4-Q1)$	74%	91%	87%	39%

Notes: The table shows the college graduation rate by parents' wealth quartiles and children's ability quartiles. We can observe that the difference in graduation rate between high and low ability children decreases with parents' wealth.

Parents have a significant impact on funding their children's education, and this relationship influences both parties throughout their lifetime. Therefore, the implications of college attainment should be examined not only from a student perspective but also from a household perspective. Analyzing the effects of changes in college costs and policies that alleviate financial constraints or enhance college attainment can provide a better understanding of the returns to education for both parents and children. This creates a connection between two crucial government programs, College Financial Aid and Social Security Retirement, which I plan to explore in future research. These programs have the potential to interact in ways that have significant implications for both students and parents, and understanding these interactions can affect policy benefits and costs.

The consumption of both older parents and adult children is closely linked. My analysis reveals that parents with high incomes and low-earning children consume about $3300 less per year than those with high-earning children. In contrast, parents with low incomes and high-earning children consume up to $5300 more per year than those with low-earning children. While inter-vivos transfers and bequests between children and parents partially account for these consumption changes, it can be challenging to capture them accurately in survey data. I also investigate whether parents insure their children's consumption against shocks and find evidence that they do so for consumption shocks but not for income shocks. Specifically, a 1% change in children's consumption results in a 0.09% change in their parents' consumption. Finally, I explore how parental transfers during college vary by children's ability and parents' wealth. The results show that average parental transfers increase with parents' wealth but not with children's ability. These findings have important implications for policies aimed at reducing income inequality and improving intergenerational mobility.

Finally, I extend the analysis by building and estimating a dynastic overlapped generation model that incorporates college decisions into a similar framework than Nishiyama (2002); Boar (2020). This approach addresses the endogeneity issue resulting from the fact that the children's position on the income distribution is endogenous to their parents' decisions and enables the quantification of the effect of parents' transfer on college attainment. The model accounts for 86% of the gap in college graduation rates between low-ability children by parent wealth, as parents find it optimal to reduce their children's college attendance costs by transferring money today rather than later in case of a negative shock. Additionally, the analysis shows that altruistic parents provide insurance that reduces the value of attending college, leading to a reduction in attendance among high-ability children. Specifically, parent altruism increases college graduation by 80% among low-ability children with wealthy parents, but it reduces college graduation by 18% among high-ability children with poor parents who are unable to provide incentives for their children to attend college today and who provide consumption insurance to their children later in life.

2 Literature

This paper contributes to various branches of literature. First, it connects with the research exploring the influence of parents' investment in their children's education and college attainment, as well as their impact on inter-generational persistence in income and wealth. Relevant studies include Ríos-Rull and Sanchez-Marcos (2002); Lee and Seshadri (2019); Abbott et al. (2019); Daruich and Kozlowski (2019).

Second, the paper is related to the literature on the disparity in college attainment based on cognitive ability and parental wealth. Belley and Lochner (2007); Bailey and Dynarski (2011); Lochner and Monge-Naranjo (2011); Brown et al. (2012) are among the studies that find liquidity constraints affecting college attendance, particularly for low-ability students.

Third, the paper relates to the literature on consumption insurance within families. While studies such as Altonji et al. (1992); Hayashi et al. (1996) reject perfect insurance within families, Attanasio et al. (2018) found significant potential insurance between parents and children. This paper contributes to this literature by studying the insurance parents provide to their children regarding college attendance. This paper also relates to the literature on inter-vivos transfers, bequests, and parents' consumption after retirement. Relevant studies include Nishiyama and Smetters (2002); Lockwood (2018); De Nardi et al. (2016); Kopczuk (2007); Barczyk and Kredler (2018); Barczyk et al. (2019); Haider and McGarry (2018)

Finally, on the quantitative side, this paper is related to the literature that studies family dynamics models without commitment in non-cooperative settings, such as Attanasio and Ríos-Rull (2000); Nishiyama (2002); Barczyk and Kredler (2014a,b); Boar (2020), among others.

3 Empirical Evidence

In this section, I present the empirical evidence of how parents' position in wealth distribution relative to their adult children impacts their consumption. Firstly, it is observed that parents who have children above them in the wealth distribution tend to increase their consumption. In contrast, those with children below them in the distribution tend to decrease it. This change in consumption can be attributed, at least in part, to the transfer of resources between parents and children and changes in bequests from parents to their children. Furthermore, I explore how parents financially support their children's college education and how this support is influenced by their children's wealth and ability levels. My findings suggest that parents' college transfers increase with their wealth but not with their children's cognitive ability.

3.1 Data

To investigate how adult children impact their parents' household consumption, I utilize data from the Panel Study of Income Dynamics (PSID) from the year 1999 onward, when consumption data was first collected. I restrict the sample to parents over 50 years old and children over 26 years old, as the focus is on the impact of adult children on parental consumption. Additionally, to ensure a sufficient sample size, I drop parents and children born in years with less than 100 individuals, and rank individuals by cohort based on their wealth and income. To link parents with their children in the survey, I utilize the FIMS file provided by PSID. This results in a sample size of 8944 observations representing 2338 parent-child pairs. Lastly, I deflate all nominal variables to 2016 prices for consistency.

Additionally, I employ The National Longitudinal Survey of Youth 1997 (NLSY97) to investigate college attainment among children, parents' financial support, and wages after college. The NLSY97 is a longitudinal survey that tracks Americans born between 1980-84, and provides comprehensive information on individuals during their college years. The final sample size for this analysis includes 5400 individuals with complete data on parents' wealth and children's cognitive ability, comprising a total of 97434 observations.

3.2 Parents' Consumption and Children's Position in the Income Distribution.

In this subsection, I examine the impact of adult children's income on their parents' household consumption. I begin by ranking parents by their wealth relative to individuals born in the same year. As many are retired, labor income is not reported, and wealth better predicts their well-being. For children, I rank them by both income and wealth but find that only the child's income position significantly affects their parent's consumption. Given that young adults are beginning to accumulate assets, income is a better welfare indicator. From now onward, I will refer to the difference between parents' position in wealth distribution and their children's position in income distribution as the wealth-income distribution difference.

Since children's position in the income distribution is influenced by their parent's decisions and their inherited characteristics, I focus on the effect of this difference on parents' consumption when their children are older than 26 years old. At this point, I assume that parents have completed investing in their children and cannot directly influence their children's relative position in the income distribution. Nonetheless, parents may still affect their children's welfare through financial support or bequests, which can impact their and their children's consumption.

To measure the difference between parents and children in the wealth-income distribution, I construct a rank-rank variable that measures the relative distance between them in the following form:

1. I rank parents in quartiles by wealth relative to all individuals born in the same year.
2. I rank children in quartiles by income or wealth depending on the specification, relative to all individuals born the same year.
3. Then, I construct a variable $T^{Q_i^p - Q_j^c}$, which is the rank-rank difference between the parents and each of their children in a given year.

For example, for a parent in the fourth quartile who has a child in the first quartile, then $T^{(Q_4^p - Q_1^c)}$ is equal to three. So then, I estimate the following regression:

$$C_{i,t} = \beta_0 + \sum_{q=-3}^{3} \beta_q T_{i,t}^q + \beta_X \mathbf{X_{i,t}} + \varepsilon_t + \epsilon_{i,t}$$

where C is household consumption in dollars, i is the parent household, $T_{i,t}^q$ is the variable described before, $\mathbf{X_{it}}$ is a set of controls (parents' total wealth, parents' non-financial wealth, parents' household income, parents' quartile in the wealth distribution, parents household head in the labor force, number of people in the parents household, parents head born year, parents head education years, parents household US state, parents head age four order polynomial, rent or own house, parents' race and parents' religion), and ε_t is a year fixed effect.

The results of our study are presented in Table 2. The first column shows the ranking of children by wealth, where the relative position of parents with respect to their children does not affect their consumption. In contrast, the second column displays the ranking of children by income, revealing that the relative position of a child in the income distribution to their parents in the wealth distribution significantly affects parental consumption. For instance, a parent in the first quartile with a child in the fourth quartile consumes an average of \$5300 more per year than a parent in the first quartile with a child in the same quartile. Conversely, a parent in the fourth quartile with a child in the first quartile consumes an average of \$3300 less per year than a parent in the same quartile with a child in the same quartile. To support the robustness of my findings, I also estimate the same model using HRS data, as presented in Appendix A. Both surveys lead to the same conclusion: children's position in the income distribution above or below their parents affects parental consumption. However, the magnitude of the effects differs between the surveys. Specifically, the increase in consumption of poor parents with rich children is higher in PSID than in HRS, while the decrease in consumption of wealthy parents with poor children is higher in HRS than in PSID.

Table 2. Parent Consumption Given Kids Transition using PSID data

	(1) Ranking by Children's Wealth	(2) Ranking by Children's Income
	Parent Consumption	Parent Consumption
Child 3 Quartiles Below Parents	718	-1969
	(0.44)	(-0.86)
Child 2 Quartiles Below Parents	-380	-1387
	(-0.34)	(-1.23)
Child 1 Quartiles Below Parents	-246	-1446**
	(-0.30)	(-2.04)
Child Same Quartiles Below Parents	-170	91
	(-0.27)	(0.14)
Child 1 Quartile Above Parent	332	1371**
	(0.50)	(2.25)
Child 2 Quartile Above Parent	1492**	2414***
	(2.18)	(3.60)
Child 3 Quartile Above Parent	1145	3393***
	(1.08)	(2.93)
Constant	-16675	-18993
	(-0.54)	(-0.62)
Observations	7083	7083

Notes: The table shows the results of regressing parent household consumption in dollars to the relative position of their children in the income distribution T and demographic controls X using PSID data. t statistics in parentheses, standard error cluster by household. * $p < .10$, ** $p < .05$, *** $p < .01$.

In this section, I examine how the effect of having a child above or below parents in the wealth distribution varies with parent age. To conduct this analysis, I introduce a third-order polynomial of age and interact it with the relative position between parents and children. Specifically, I estimate the following linear model:

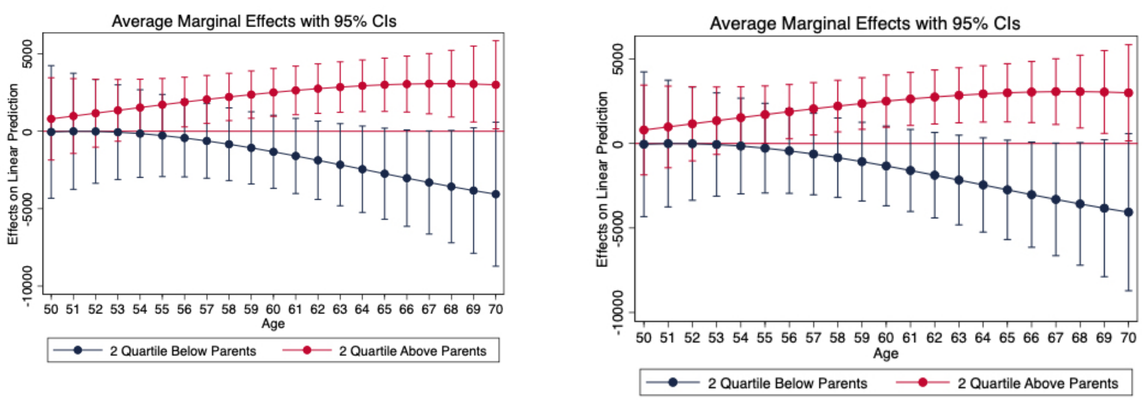
$$C_{i,t} = \beta_0 + \sum_{q=-3}^{3} \beta_q T_{i,t}^{q} f(Age_t) + \beta_X \mathbf{X_{i,t}} + \varepsilon_t + \epsilon_{i,t}$$

By including a polynomial of age in the model, I can capture potential non-linearities in the relationship between parent age and the effect of child position on parental consumption. The interaction term allows us to examine how the effect of child position on parental consumption changes with parent age.

Figure 1. Effect of children position in the income distribution across age

(a) Effect of children position in the income distribution across age (2 Quartiles Above or Below)

(b) Effect of children position in the income distribution across age (Above or Below)



Notes: The figures show the average marginal effect by age on parent household consumption in dollars of having a child in a different part of the wealth distribution than theirs. The left figure displays the difference between parents that are two quartiles above or below their children. The right figure displays the average consumption difference between parents with children above and below them on the income distribution.

I present the results in Figure 1, which displays the marginal effect of having a child above or below a parent's quartile, controlling for observables. Specifically, Figure 1a shows the effect of having a child two quartiles above or below the parent's quartile, while Figure 1b examines the same relationship without differentiating by the number of quartiles. My analysis reveals that the relative position of a child in parental consumption is not significant until age 60, after which a gap emerges between parents with poor and rich children. Wealthy parents with poor children significantly decrease their consumption compared to parents with children in the same quartile. Conversely, the difference in consumption between poor parents with rich children and those with children in the same quartile is stable across ages.

3.3 Inter-vivos Transfers, Bequests and Income Distribution.

This section aims to investigate the potential role of inter-vivos transfers and bequests in shaping the consumption behavior of parents and children, and whether they could explain why parents adjust their consumption depending on the relative position of their children in the income distribution. To conduct this analysis, I utilize data from the Health and Retirement Study (HRS), which provides more detailed information on transfers and has a larger sample of older parent-child pairs than the PSID.

To examine the relationship between transfers and the relative position of children in the income distribution, I estimate differences in transfers between siblings using the following specification:

$$IVT_{ijt} = \beta_0 + \sum_{q=-3}^{3} \beta_q T^q_{ij,t} + \beta_X \mathbf{X_j} + \varepsilon_i + \epsilon_{jt}$$

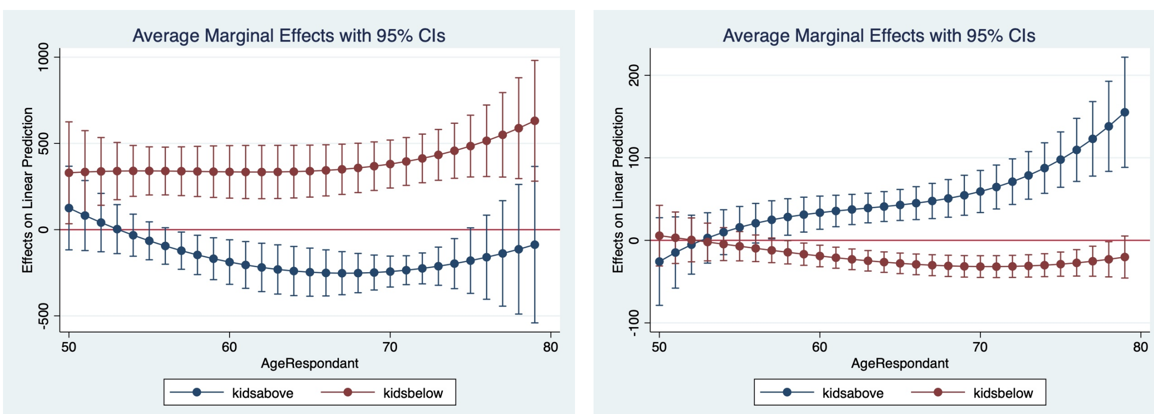
where IVT are intervivos transfers between parent and children, i is the parent household, j is the child, $T^q_{ij,t}$ is the relative position of the child i to his parents j, $\mathbf{X_j}$ is a set of controls (the year that child born and child blood relationship) and ε_i is a family fixed effect.

Table 3 presents the estimation results. In column 1, we observe that children with higher income than their parents transfer slightly more than those whose income is similar to their parents. However, these transfer differences are not statistically significant at conventional levels, and the magnitudes are economically small. For instance, the average transfer from a child in the fourth quartile to a parent in the first quartile is only \$100 more per year than a transfer from a child in the fourth quartile to a parent in the same quartile. In contrast, parents transfer more to children in a lower income-wealth position relative to them. Specifically, a parent in the fourth quartile transfers approximately \$500 more per year to a child in the first quartile compared to a child in the fourth quartile. Despite these differences, these transfer amounts are insufficient to explain the observed changes in parent consumption.

Next, I investigate how transfers change across parents' age by interacting a third-order polynomial with the parent-child relative position, as in subsection 3.2. The results are displayed in figure 2. Figure 2a shows transfers from parents to children, while figure 2b displays transfers from children to parents. The findings suggest that transfers from wealthy parents to poorer children remain flat between 50 and 70 but increase after 70. In contrast, transfers from poor parents to rich children decrease with. Moreover, the difference in transfers from rich children to poor parents increases after 70. In contrast, the difference in transfer from poor children to wealthy parents is not significantly different from zero and remains flat over time. These results support that parents with poor children consume less than parents with rich children. On the other hand, wealthy children support parents more in their later years, which are usually particularly expensive given health and care expenditures.

Figure 2. Effect of children position in the income distribution in transfers from parents to children and children to parents

(a) Parents to Children (b) Children to Parents



Notes: The figures show the average marginal effect by age on intervivos transfer between parents and children of the relative position on wealth distribution. The left figure displays the effect of age on the transfer from parents to children. The correct figure displays the effect of age on transfers from children to parents.

In Appendix B, I investigate whether parents receive in-kind support from their children depending on the relative position of their children in the wealth-income distribution. The analysis reveals that children above their parents in the income distribution are slightly more likely to provide financial assistance for health-related expenses but less likely to help with daily life activities compared to children in the same position as their parents. Additionally, parents expect more help from children above them in the wealth-income distribution than those in the same position.

Table 3. Parent Transfers and bequest by Relative Position in the Income Distribution

	(1) Annual Transfer Kids to Parents US$	(2) Annual Transfer Parents to Kids US$	(3) Total Wealth Last Period US$
Child 3 Quartiles Below Parents	-32***	512***	-31175
	(-2.73)	(6.18)	(-0.97)
Child 2 Quartiles Below Parents	-21***	306***	19839
	(-5.28)	(7.77)	(1.20)
Child 1 Quartile Below Parents	-18***	90***	5838
	(-4.26)	(2.93)	(0.28)
Child Same Quartile Parents			5052
			(0.56)
Child 1 Quartile Above Parents	14***	-94***	-25682***
	(4.27)	(-6.56)	(-3.43)
Child 2 Quartile Above Parents	51***	-127***	-17497*
	(7.17)	(-7.78)	(-1.85)
Child 3 Quartile Above Parents	105***	-179***	-13380
	(6.40)	(-8.85)	(-1.61)
Observations	76374	79136	5197

Notes: The table shows the results of regressing intervivos transfer between parent and children on the relative position of their children in the income distribution T, controls X, and household fixes effect using PSID data. t statistics in parentheses, standard error cluster by household. * $p < .10$, ** $p < .05$, *** $p < .01$.

In the third column of table 3, I examine the effect of relative child position on parents' assets in the last survey before death, which serves as a proxy for bequests. The results show that parents with a child above them in the income distribution have fewer assets than parents with a child in the same quartile. However, as before, these results only partially explain the consumption differences between parents with children in different positions of the income distribution. For instance, a parent with a child one quartile above them has $25,000 less in assets in the last survey before dying.

Several possible explanations exist for why transfers and bequests cannot fully account for consumption differences. One possibility is measurement error, as transfers are self-reported by parents, and they may forget to report some transfers. Another explanation is that parents and children engage in transfers that they do not consider as transfers when reporting them in the survey, such as gifts. Another plausible explanation, which I develop later in the paper, is that part of the decrease in parent consumption is due to spending more on the college education of low-skill children, who are likely to have a lower position in the wealth-income distribution than their parents in the future reducing parents' savings and future consumption.

3.4 Transmission of Children Income Shocks to Parent Consumption

In this subsection, I analyze if parents' consumption depends on children's income shocks following Blundell et al. (2008). First, I regress parents' and children's log income and log consumption in predictable individual components (education, born year, gender, number of members of the household, race, labor force status, states and parents, and interactions of year dummies with education, race, employment, labor force status, and parents fix effects). Additionally, I include parents-year fix effects to capture income shocks common to the family. Then I use the residual as a measure of the unpredictable part of consumption $\hat{c_{jt}}$ and income $\hat{y_{jt}}$, as shown below:

$$\hat{c_{jt}} = \log c_{jt} - \beta_t \mathbf{Z_{jt}}$$
$$\hat{y_{jt}} = \log y_{jt} - \beta_t \mathbf{Z_{jt}}$$

where c is consumption, y is income, j is the individual (parent or child), $\mathbf{Z_{jt}}$ is the predictable part of income describe above. Then I regress the first differences of the unpredictable part of consumption on the first differences of the unpredictable part of both incomes, which gives the parent consumption response to own and children's income shocks.

$$\Delta \hat{c_{pt}} = \delta_p \Delta \hat{y_{pt}} + \delta_k \Delta \hat{y_{kt}} + \epsilon_{it}$$

where p are parents, k are children, $\Delta \hat{c}$ is the first difference in the consumption residual, and $\Delta \hat{y}$ is the first difference in the income residuals. Following Kaplan et al. (2014), I use future differences in income residuals as instruments.

Table 4. Consumption Pass-Through of Children Income Shocks

	(1)	(2)	(3)
	Δ Consumption Parents	Δ Consumption Parents	Δ Consumption Parents
Δ Income Parents	0.11***	0.11***	0.10***
	(5.26)	(5.29)	(3.80)
Δ Income Children		-0.01	-0.03
		(-0.89)	(-1.44)
Δ Consumption Children			0.09***
			(6.55)
Constant	-0.00	-0.00	0.00
	(-0.39)	(-0.13)	(0.47)
Observations	7945	7945	5499

Notes: The table shows the results of regressing changes in parents' consumption on their and their children's income shocks. In the last column, I add the parent consumption response to changes in children's consumption. t statistics in parentheses, standard error cluster by household. * $p < .10$, ** $p < .05$, *** $p < .01$.

The estimation results are displayed in table 4, where we can see that children's income shock does not affect parent consumption. On the other hand, parent income shocks affect parent consumption with an income-consumption pass-through of 0.11. The previous result is consistent with Attanasio et al. (2018) finding that individual's consumption does not respond equally to their own or family income shocks in PSID data between 1999-2008, where families are defined as parents and the children who have left the parent household unit. In column 3, I add the unpredictable changes in children's consumption controlled by parents' income shocks finding that the correlation between changes in children's consumption and parent consumption is 0.09, meaning that an increase or decrease of 1% in child consumption increase or decrease parent consumption on 0.09%. Parents do not provide insurance for children's income shocks, but they provide insurance for consumption shocks. These results are consistent with the fact that most transfers between parents and their children occur when they face major shocks such as divorce or unemployment, and change in consumption is a better predictor of uninsurable shocks.

3.5 Parents Support During College and Cognitive Ability

In this subsection, I analyze how parent college support depends on children's cognitive ability. Cognitive ability is proxied by the Armed Forces Qualification Test (AFQT). I drop from the sample college dropout as I focus on children who attend and graduate from college. Parent wealth is approximated by the total net household worth in the 1997 survey. I rank ability and wealth in four quartiles, calculating the yearly average transfer not expected to be repaid plus allowance from parents to children in college. Results are shown in table 5—the average transfer amount increases in parents' wealth and children's cognitive ability. We do not observe that conditionally on wealth, parents give more to low-ability children to compensate them for higher college costs. However, I do not observe in the data institution tuition, and high-ability children may attend more expensive institutions.

Table 5. Total non-expected to repay college transfers plus allowances by parents' wealth and children's ability quartile (NLSY97 Data).

Parents' Wealth Quartile \ Child's Ability Quartile	1	2	3	4
1	2122	3252	4646	2332
2	2070	3311	6579	5478
3	2870	4924	5901	5699
4	5762	5830	8650	8755

Notes: The table displays the average non-expected to repay college transfers plus allowances from parents to children during college by parents' wealth and children's ability quartile.

Additionally, to control by observable, I estimate the following linear model:

$$\text{College Transfer}_{it} = \beta_0 + \beta_1 \ln(\text{AFQT})_i + \beta_X \mathbf{X_i} + \varepsilon_t + \epsilon_{it}$$

i is the child, t is the year, AFQT is the AFQT test percentile, and $\mathbf{X_i}$ is a set of controls (high school GPA, college GPA, parents' household net worth, kid gender, kid race, parents' educational attainment, census region, and college type), and ε_t is a year fixed effects.

Table 6. SAT and AFQT on Parent Support (NLSY97 Data)

	(1)
	College Transfers US$
Log AFQT	151.72
	(0.16)
Female	-876.37
	(-0.91)
Parents Household Wealth 1997	0.01*
	(1.89)
Private not-for-profit institution	3397.94**
	(2.55)
Private for-profit institution	272.35
	(0.15)
Constant	7429.25
	(1.11)
Observations	182

Notes: The table reports the results of regressing parent transfers to children in college on ability, high school GPA, college GPA, parents' household net worth, kid gender, kid race, parents' educational attainment, census region, and college type year fixed effects. t statistics in parentheses, standard error cluster by household. * $p < .10$, ** $p < .05$, *** $p < .01$.

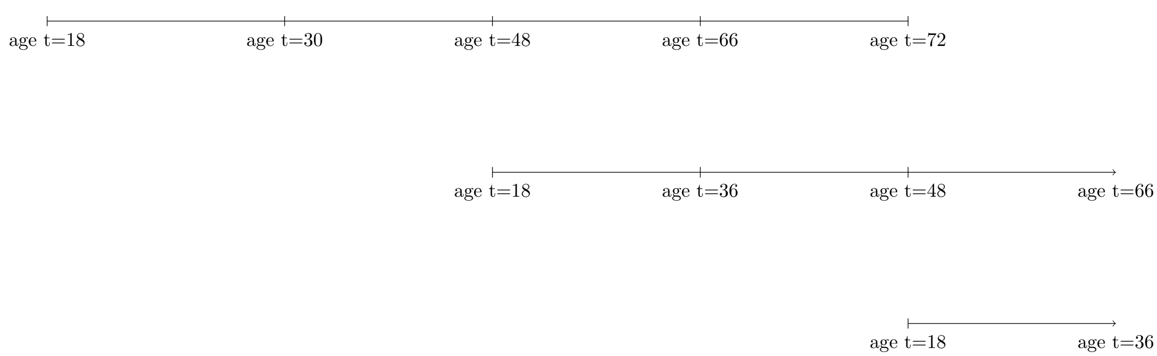
Table 6 shows that differences in college transfers are significant in parents' wealth but not in children's abilities. Then parents seem to support all children with the same amount. However, the sample size of children, which reports all the variables necessary for the regression, is very small.

4 The Model

In this section, I model the interactions between parents and adult children in a non-cooperative and without-commitment setting to quantify how family transfers and bequests shape college transfers, college attendance, and retirement. I build and estimate an overlapping generation heterogeneous agent model similar to Nishiyama (2002), adding a college education decision. The model comprises dynasties formed by one parent and one child. Parents are altruistic to their children's current and future utility. The dynasty separately decides consumption, savings, transfers, bequests, and college. Parents can realize monetary transfer each period and leave a bequest in the last period. As a result, parents and kids behave strategically. The equilibrium properties are derivated in appendix C. Parents and children have incentives to over-consume as children saving reduce future transfers and parent saving reduce children's savings. Barczyk and Kredler (2014a) called this the *dynamic Samaritan's dilemma*.

4.1 Model Demographics

Figure 3. Family Time Line



The economy consists of six years periods. Each agent overlaps their parents between 18 and 42 years old, as shown in figure 3. At 42, each child becomes a parent and has an 18-year-old child. The agent retires at 66, and after this, he receives social security until his death at 72. In every period, the parent can transfer money to his child. To keep the state space treatable, parents' income between 46 and 67 only depends on their education. At each moment, half of the population are parents, and the other half are children. Households face incomplete markets, as they can only save in a non-contingent bond. Parents can transfer money to their children every period and decide on a bequest in the last period before their death. The child receives the bequest in the next period when he becomes a parent.

4.2 Model Decision Timing

The paper follows a stage game in which the parent decides first and children decide conditional on the previous parent's decision, similar to Boar (2020) in contrast to a simultaneous game like Nishiyama (2002) or Barczyk and Kredler (2014a) to simplify the computational solution. The fact that parents' and children's decisions depend on each other choices is important as children decide on education, consumption, and saving, conditional on how much support they expect from their parents in the future. On the other hand, parents can not force children to attend college and cannot commit to not supporting them in the future.

The parent-child game consists of periods divided into subperiod where each decision is made. College attendance is decided in the first period, divided into three stages or subperiods: In the first stage, the child born as a high school graduate decides college enrollment. The model does not have college dropout, so children that attend college will become college graduates $e_c = C$ and the ones that do not attend will continue as high school graduate $e_c = HS$ In the second stage, the parent knowing the child's college decision, decides his consumption c_p, saving a_p, and the money transfer to the child t_p. Finally, in the third and last stage, the child decides on his consumption c_c and saving a_c, given his parent's previous decisions. After the second period, the game comprises two stages. Then, in the first stage, the parent decides on his consumption c_p, saving a_p, and the money transfer to the child t_p. In the second stage, the child decides on c_c and savings a_c, given the parent's choices. In the last period, parent savings a_p will become in bequest b_p that the child receives in the next period.

Children are in the labor market receiving an idiosyncratic income $w\epsilon(\theta, e, z, j)$ that depends on ability θ, education level e, an idiosyncratic income shock z and age j. Parents receive an income of $y(e)$ that depends on their education level. Finally, the ability is transmitted between generations following an AR(1) process with persistence ρ_θ. As a result, the endogenous states variables are the dynasty assets $a_c, a_p \in A$ and education $e_p, e_c \in E = \{\text{HS}, \text{C}\}$. The exogenous state variables are the child's ability $\theta \in \Theta$ and idiosyncratic income shock $z \in Z$.

4.3 Parent-Child Decision Problem

4.3.1 Parent-Child Problem in Last Parent Period

The parent's last period is the child's last period as he will become a parent next period. I denote this period as $j = T_c$, representing 18 and 72 years old for the child and the parent, respectively. They solve a two-stage game where the parent knows that he dies this period with certainty, and the child will receive all the parent remaining assets as a bequest next period. Then, the child in the second subperiod has the following Bellman equation:

$$V^c_{j=T_c}(a_c, e_c, e_p, \theta, z, t_p, a'_p) = \max_{c_c, a'_c} \{u(c_c) + \beta \int V^c_{j=T_c+1}(b_p + a'_c, 0, e'_c, e_c, \theta', 0) f(\theta'|\theta) d\theta\}$$

$$s.t: \; a'_c + c = w\epsilon_{j=T_c} + (1+r)a_c + t_p$$

$$\log \epsilon = \log(\alpha_e \theta^{\beta_e}) + A_{e_c, j=T_c} + z$$

$$\log \theta' = \rho_\theta \log \theta + \epsilon_\theta$$

$$\epsilon_\theta \sim N(0, \sigma_\theta), a'_c \geq 0$$

where c_c is the child consumption, a_c is the child assets, e_c is the child education level, e_p is the parent education level, θ is the cognitive ability that affects income through $\alpha_e \theta^{\beta_e}$, A is the life cycle component of income, z is the idiosyncratic labor productivity, b_p is the parent bequest decided in the first stage that is received the next period, and t_p is the parent transfer decided by the parent in the previous sub-period and received by the child this sub-period. The ability of the next generation θ' follows an AR(1) process with persistence ρ_{theta} and normally distributed idiosyncratic shocks $\epsilon_\theta \sim N(0, \sigma_\theta)$. Finally, agents only can save on an asset that pays with certainty next period.

In the first stage, parents know how their children in the next stage will respond to their transfer and bequest decisions. Then, their Bellman equation is:

$$V^p_{j=T_c}(a_p, a_c, e_c, e_p, \theta, z) = \max_{c_p, b_p, t_p} \{u(c_p) + \eta u(c_c^*(a_p, a_c, e_c, e_p, \theta, z, t_p, b_p))$$

$$+\eta_d \beta \int V^c_{T_c+1}(b_p + a_c^{'*}(a_p, a_c, e_c, e_p, z, \theta, t_p, b_p), a'_c, e'_c, e_c, \theta', z') f(\theta'|\theta) d\theta\}$$

$$s.t: \; c_p + b_p = w\mathrm{SS}(e_p) + (1+r)a_p - t_p$$

$$\log \theta' = \rho_\theta \log \theta + \epsilon_\theta$$

$$\epsilon_\theta \sim N(0, \sigma_\theta), b_p \geq 0$$

$$a'_c = 0, z' = 0$$

where c_p is the parent consumption, a_p is the parent assets, η is the parent altruism through their child during the period, and η_d is the parent altruism after his death. During this period, parents are retired and receive a social security transfer depending on their education SS(e_p). It is important to notice that children saving $a_c^{'*}$ is a function of parents' choices as parents consider children's behavior when deciding consumption, savings, transfers, and bequests.

4.3.2 Parent-Child Problem After College and Before Parent Last Period

These periods represent when parents are between $48 - 72$, and their children are between $18 - 48$ years old. The dynasty plays the same two-stage game as before, except parents do not decide on bequests. Parents decide on consumption, transfers, and saving in the first stage. In the second stage, the child decides on consumption and saving, given their parents' decisions. The Bellman equation of the child, in the second stage, is the following:

$$V_j(a_c, e_c, e_p, \theta, z, t_p, a_p') = \max_{c_c, a_c'} \{u(c_c)$$

$$+\beta \int V_{j+1}(a_c', e_c, e_p, \theta, z', t_p^{'*}(a_p', a_c', e_c, e_p, \theta, z'), a_p^{*''}(a_p', a_c', e_c, e_p, \theta, z'))f(z'|z)dz'\}$$

$$s.t: \; a_c' + c_c = w\epsilon_j + (1+r)a_c + t_p$$

$$\log \epsilon_j = \log(\alpha_e \theta^{\beta_e}) + A_{e_c,j} + z$$

$$z' = \rho_z z + \epsilon_z, \epsilon_z \sim N(0, \sigma_{z,e_c}), a_c' \geq 0$$

where t_p and a_p' are parents' transfer, and savings decided on the previous stage and are state variables from the children's perspective. However, transfer tomorrow $t_p^{'*}$ and parent saving tomorrow $a_p^{''*}$ are function of children current decisions. For this reason, the children consider at the moment of making a decision how their consumption and saving today will affect their parent transfers and saving tomorrow.

Parents decide at the beginning of the period, in the first stage. For this reason, they consider how their decision will affect their children's tomorrow's behaviors. Therefore, the parent Bellman equation in this stage is:

$$V_j(a_p, a_c, e_c, e_p, \theta, z) = \max_{c_p, a_p', t_p} \{u(c_p) + \eta u(c_c^*(a_c, e_c, e_p, \theta, z, t_p, a_p'))$$

$$+\beta \int V_{j+1}(a_p', a_c^{'*}(a_c, e_c, e_p, \theta, z, t_p, a_p'), e_c, e_p, \theta, z')f(z'|z)dz'\}$$

$$s.t: \; c_p + a_p' = wy(e_p, j) + (1+r)a_p - t_p$$

$$y(e_p, j) = \begin{cases} y(e_p, j) & j < j_{ret} \\ \text{SS}(e_p) & \text{o.w} \end{cases}$$

$$a_p' \geq 0, z' \sim N(0, \sigma_{z,e_c})$$

In order to reduce the state space in the model, parents do not face uncertainty in their income. However, they consider their children's income risk z to decide transfers t_p and savings a_p'. Before retirement, parents receive an income $y(e_p, j)$ that depends on their education and age. After retirement, they receive a fixed social security transfer that only depends on their education.

4.3.3 Parent-Child Problem at College Decision

The child is born in period one as a high school graduate. The timing of the decision is: First, the child decides to attend college or not. Second, the parent chooses consumption, saving, and transfers conditionally on the children's college choice. Finally, children decide on consumption and saving conditional on parent savings and transfers. The children Bellman equation during the consumption saving subperiod is the following:

$$V_{j=1}(a_c, e_c, e_p, \theta, z, t_p, a_p') = \max_{c_c, a_c'} \{u(c_c)$$

$$+\beta \int V_{j=2}(a_c', e_c, e_p, \theta, z', t_p^{'*}(a_p', a_c', e_c, e_p, \theta, z'), a_p^{*''}(a_p', a_c', e_c, e_p, \theta, z'))f(z'|z)dz'\}$$

$$s.t: \ a_c' + c_c = \tau(e_c)w\theta - \phi 1_{e_c=C} + t_p$$

$$\log\theta = \log(\alpha_e \theta^{\beta_e}) + \gamma_{e_c,1} + z$$

$$z' \sim N(0, \sigma_{z,e_c}), a_c' \geq 0, c_c \geq 0$$

$$a_c = 0, z = 0$$

where $t_p^{'*}$ and $a_p^{''*}$ are the parent transfer and saving policies functions in the next period, ϕ is the monetary college cost, A is a parameter that captures life cycle effects on wages, $\tau(e_c)$ is the percentage of hours that a college student can work as a high-school graduate, α_e and β_e are the parameters that shape college return on ability, and z is an idiosyncratic income shock that depends on education. All children begin with the mean productivity $z = 0$.

In the second stage, the parents decide on saving and consumption, given their children's education decisions. Then, the parent Bellman equation is:

$$V_j(a_p, a_c, e_c, e_p, \theta, z) = \max_{c_p, a_p', t_p} \{u(c_p) + \eta u(c_c^*(a_c, e_c, e_p, \theta, z, t_p, a_p'))$$
$$+\beta \int V_{j+1}(a_p', a_c^{'*}(a_c, e_c, e_p, \theta, z, t_p, a_p'), e_c, e_p, \theta, z') f(z'|z) dz'\}$$
$$\text{s.t: } c_p + a_p' = wy(e_p, j) + (1+r)(a_p + b_p) - t_p$$
$$z = 0, a_p' \geq 0, z' \sim N(0, \sigma_{z,e_c})$$

where c_c^* and $a_p^{'*}$ are the child policy function in the third stage. Additionally, to the own saving from the previous period a_p, the parent has the bequest that his parent left to him. Finally, in the first stage, children decide whether attend college or not; then, their Bellman equation is:

$$\hat{V}_1^*(a_p, a_c, e_p, \theta, z) = \max_{i \in [HS, C]} \{V_1(a_c, i, e_p, \theta, z, t_p^*(a_p, a_c, i, e_p, \theta, z), a_p^{*'}(a_p, a_c, i, e_p, \theta, z)$$
$$+1_{e_c = C} \kappa(\theta) + \epsilon_i)\}$$

where $\kappa(\theta)$ is the psych cost of attending college which is decreasing on ability, and ϵ is a type I extreme value shock with scale parameter σ_{cd}. Finally, as t_p^* and a_p^* depend on the children's college choices, parents can influence their children's college, consumption, and saving decisions through their future support.

4.4 Equilibrium Definition

The recursive equilibrium, which is also a Markov-Perfect equilibrium, is the set of value functions $\{V_t(s)\}_{t=1}^T$ and policy functions $\{c_p^t(s), a_p'^t(s), t_p^t(s)\}_{t=1}^T$, $\{c_c^t(s), a_c'^t(s)\}_{t=1}^T$ and $e_c^1(a_p, a_k, e_p, \theta, z)$, where T is the number of periods that a cohort lives and $s = (a_p, a_k, e_p, e_c, \theta, z)$ are the dynasty state variables, such that in each repetition of the parent-child stage game:

- In period $t = 1$ when the children decide whether attend college or not:

  1. Solve the children's college attendance problem.

2. Solve the parents' problem given their children and their state variables.

3. Solve the children's problem, given their parents and their state variables, after seeing their parents' decisions and receiving the transfer.

- In period $t = 2$ to $t = J - 1$, there is not college decision, then:

  1. Solve the parents' problem, given the children's state variables and their state variables.

  2. Solve the children's problem, given their parent and their state variables, after seeing his parents' decisions and receiving the transfer.

- In period $t = J$, the parents die with certain:

  1. Solve the parents' problem, given their children's and their state variables.

  2. Solve children's problem, given their parents and their state variables, after seeing their parents' decision about bequests and receiving the transfer.

4.5 Solution Algorithm

To solve the computational problem, I adapt Boar (2020) solution algorithm the model:

1. Set a grid on assets, ability, education, and income. Then the size of the state space is given by $T \times A^2 \times H \times E^2 \times Y$. Finally, the ability and income process are discretized using the Tauchen method.

2. Solve the problem for generation J which is not altruistic $V^T(a_p, a_c, e_c, e_p, \theta, z)_{t=1}^T$.

3. Starting from the previous generation, solve the problem backward over the parent-child pairs to obtain $V^{J-1}(a_p, a_c, e_c, e_p, \theta, z)_{t=1}^T$. I do this by solving the problem backward $(T, T-1, ..., 1)$ using the previous solution as the continuation value for the next cohort in T:

   (a) Solve the child optimization problem $c_c^{'**}(t, a_c, e_c, e_p, \theta, z, a_p')$, $a_c^{'**}(t, a_c, e_c, e_p, \theta, z, a_p')$ without parent transfers.

(b) Solve the parent optimization problem in two steps to get the policy functions $c_p^*(t, a_p, a_c, e_c, e_p, \theta, z)$, $a'^*_p(t, a_p, a_c, e_c, e_p, \theta, z)$ and $t_p^*(t, a_p, a_c, e_c, e_p, \theta, z)$:
First, solve the optimal transfer t_p conditional on a_p. Second, solve the optimal parental policy saving a'_p given the optimal transfer $t_p^{**}(t, a_p, a_c, e_c, e_p, \theta, z, a'_p)$. Then using linear interpolation recover $t_p^*(t, a_p, a_c, e_c, e_p, \theta, z)$ and child policies $c_c^*(t, a_p, a_c, e_c, e_p, \theta, z)$, $a_c^{'*}(t, a_p, a_c, e_c, e_p, \theta, z)$.

(c) Then if $V^{T-1}(18, a_p, a_c, C, e_p, \theta, z) > V^{T-1}(18, a_p, a_c, HS, e_p, \theta, z)$ we have that $e^*(a_p, a_c, e_p, \theta, z) = C$ and $e^*(a_p, a_c, e_p, \theta, z) = HS$ otherwise.

4. Solve the problem backward until the difference between V^{T-j} and V^{T-j-1} is small enough.

5 Estimation

I estimate the model parameters in three groups. First, I take some parameters directly from the literature as preferences. Second, the income process is estimated separately from the data. Third, I calibrated the remaining parameters using the indirect method of moments. I used 20 data moments to estimate 11 model parameters. The parameters estimated in the first two stages are displayed in table 7, and the ones estimated in the third stage are displayed in table 9.

5.1 Functional Forms and Preferences

Consumption: Parent and Children utility is CRRA with the relative risk aversion equal to 1.5 following Abbott et al. (2019).

Psych Cost: As shown by Cunha et al. (2005) and Heckman et al. (2006), psychic costs are an important component of schooling decisions. As this cost is decreasing on cognitive ability, the psych cost of attending college is parametrized as $\kappa(\theta) = \frac{\omega_{c_1}}{\theta^{\omega_{c_2}}}$.

I estimated the discount factor β using the average wealth to average income ratio set to 6.218 following Boar (2020).

Table 7. Parameters from the data or estimated outside the model

Parameter	Description	Value	Source
	Preferences		
r	Interest Rate	0.03	Daruich and Kozlowski (2019)
γ	Risk Aversion	1.5	Abbott et al. (2019)
	College Cost		
ϕ_C	Annual College Cost	\$12200	NLSY97
$\tau(e_c)$	Fraction of Time Work In College	0.56	Census
	Income Process		
ρ_c	College Graduate Income Persistence	0.90	NLSY97
σ_c	College Graduate Income Variance	0.049	NLSY97
ρ_{HC}	High School Graduate Income Persistence	0.93	NLSY97
σ_{HC}	High School Graduate Income Variance	.032	NLSY97
$\overline{w}$	Average Income	\$70000	Census
	Retirement Income		
SS_C	Retirement Income College Graduate	\$25500	HRS
SS_{HC}	Retirement Income High-School Graduate	\$31200	HRS

Notes:

5.2 College Cost

As before, all nominal quantities are deflated to 2016 dollars using CPI. The annual college cost in the model is \$12.200, which is the average tuition cost after grants and scholarships reported by college students at the NLSY97 survey. I do not find a significant difference in the net cost of attending college given parent income, which is consistent with the findings of Abbott et al. (2019) using data from the National Center for Education Statistics, which is explained by high-income children receiving more merit aid compensating for higher tuition costs.

5.3 Retirement Income

The estimated retirement income is the average sum of Retirement Social Security Income, Supplemental Security Income, Disability Income, and Employers Pension programs by education group in households where the respondent is retired and older than 67 years old. The results are shown in table 7.

5.4 Income Process

The income process is given by $\log \epsilon_j = \log(\alpha_e \theta^{\beta_e}) + \gamma_{e,j} + z_j$. I estimate this process using NLSY97 households' labor earnings following Abbott et al. (2019). Because the sample comprises young individuals (the older is 37 years old in the last survey), I estimated the income age profile using a second-order polynomial in PSID data for households where the head is between 18-67 for high school and 23-67 for college graduates. Table 8 shows these results. Then, I regress the part of household income not explained by the age profile on the AFQT test score to control by ability. Then, I use the residual to estimate the income shocks. For this, I assume that the process follows by the log income residual is the following:

$$z^e_{iat} = \log y_{it} - \widehat{f^e(a_{it})} - \hat{\beta}_0 - \hat{\beta}_1 \text{AFQT}_i$$

$$z^e_{iat} = \rho_e z^e_{i,a-1,t-1} + \eta^e_{iat}$$

$$\eta^e_{iat} \sim N(0, \sigma^e_\eta), \;\; z^e_{i0t} \sim N(0, \sigma^e_{z_0})$$

where z is a income shock with a persistance rho and initial dispersion $\sigma^e_{z_0}$, y is income, $\widehat{f^e(a_{it})}$ is the age profile estimated previously from PSID, and η is an innovation of the income shock. Then the parameters ρ_e, σ^e_η and $\sigma^e_{z_0}$ are estimated using the Minimum Distance Estimator for the co-variance of wage residual for all possible lags by age and education group. The estimated results are displayed in table 8.

5.5 Return on Ability

I have $\gamma_{e,t}$ and the exogenous shocks z process estimation from the previous subsection. To estimate the ability return by education group $\alpha_e \theta^{\beta_e}$, I follow Daruich and Kozlowski (2019) and I calibrate α_e and β_e targeting the college premium and income volatility for high-school and college graduate between 36-42 years old. As the NLSY97 participants, today are between 36 and 40. I assume they have the same college premium and income variance as PSID data. The parameters that result from the calibration are shown in table 9.

Table 8. Income Process and Age-Profile

	Age Profile	
	High-School	College Graduate
β_A	0.067	0.115
$\beta_{A^2} * 1000$	-6.831	-11.97
	Income Process	
	High-School	College Graduate
ρ_z	0.93	0.90
σ_{eta}	0.032	0.049
σ_{z_0}	0.14	0.16

Notes: The table shows the estimated income process from NLSY79 and PSID data. In the Age Profile, we observe the estimated parameters of regressing $\log y_{t,i} = \beta_0 + \beta_A Age_{t,i} + \beta_{A^2} Age_{t,i}^2$ by education groups. In the bottom, we observe the income process parameters ρ_e, σ_η^e and $\sigma_{z_0}^e$ using the Minimum Distance Estimator for the co-variance of wage residual for all possible lags by age and education group.

5.6 Ability, Parent Altruism, and Psych College Cost

The inter-generational ability process is given by $\log \theta^c = \rho_\theta \log \theta^p + \epsilon_{h_0}$ and $\epsilon_{h_0} \sim N(0, \sigma_{h_0})$. The previous parameters $(\rho_\theta,\ \sigma_{h_0})$, parent altruism η and the college psych cost $(\omega_{c_1}, \omega_{c_2})$ are estimated using college attainment by children's ability and parents' income group. The results are shown in table 9.

Table 9. Parameters Estimated Using the Indirect Method of Moments

Parameter	Description	Value
	Preferences	
β	Discount Factor	0.88
σ_{cd}	EV Scale Parameter	0.027
	Parent Altruism	
η	Parent Altruism Before Death	0.26
η_d	Parent Altruism After Death	η
	Return to Ability	
α_c	College Level	1.79
α_{HS}	High School Level	0.35
β_c	College Concavity	0.12
β_{HS}	High School Concavity	0.23
ω_{c1}, ω_{c2}	College Psych Cost	0.6, 4.6
	Intergenational Transmission of Ability	
ρ_H	Human Capital Persistence	0.06
σ_H	Human Capital Standard Deviation	0.46

Notes: Parameters that are estimated from the data using the indirect method of moments.

6 Model Results

Table 10 shows the model fit on college attainment, parent college transfers, and income moments. First, the model replicates the two main characteristics of the data that college attainment is increasing on ability and parent wealth. However, underpredict the college attainment for high-ability children. The model closely matches the college premium and the income-wealth ratio but considerably over-predicts the income volatility for high school and college graduates.

Parent altruism can explain the higher college graduation rate between low-ability children with wealthy parents and low-ability children with poor parents. Children with parents in the highest wealth quartile have a 64% higher college graduation rate than low-ability children with parents in the first wealth quartile, which explains 86% of the gap in attendance by parent income.

Table 10. Targeted Moments

College Attainment by HH Wealth and AFQT Quartile (NLSY97) v/s Model College Attainment				
Parents' Wealth Quartile \ Child's Ability Quartile	1	2	3	4
1	0.19	0.35	0.39	0.38
	(0.19)	(0.24)	(0.33)	(0.53)
2	0.15	0.28	0.38	0.45
	(0.24)	(0.30)	(0.42)	(0.53)
3	0.18	0.41	0.43	0.43
	(0.26)	(0.40)	(0.51)	(0.63)
4	0.31	0.38	0.45	0.44
	(0.33)	(0.46)	(0.62)	(0.74)
Transfer + Allowances Yearly, Model v/s Data (NLSY97)				

Income Moments		
	Model	Data
High-School/College mean Income Ratio	0.46	0.57
High-School HH Income S.D	134000	39600
College HH Income S.D	200000	60000
Income-Wealth Ratio	5.90	6.22

Notes: Used moments to estimate the unknown parameters using the Indirect Method of Moments. The first group of moments is college graduation rates by age and ability used to estimate parents' altruism and inter-generational ability persistence. The numbers without parenthesis are the model moments, and those with parenthesis are the data moments. In the bottom half of the table, we observe the moments used to estimate the income process and the discount factor.

Table 11 shows transfers from parents to their children in the model. Parents' transfers increase with wealth, as in the data. On the other hand, transfers decline with children's ability which is counterfactual as transfers increase with ability in the data. However, in the data, we can not adjust for college price and heterogeneous return by college quality. If high-ability children attend more expensive colleges, this would explain the higher support from parents to high ability children that we see in the data.

Table 11. Parents College Transfers

Transfer + Allowances Yearly, Model v/s Data (NLSY97)				
Parents' Wealth Quartile\Child's Ability Quartile	1	2	3	4
1	4110	770	0	0
	(2122)	(3252)	(4646)	(2332)
2	7000	161	0	0
	(2070)	(3311)	(6579)	(5478)
3	14592	2435	0	0
	(2870)	(4924)	(5901)	(5699)
4	15645	4178	900	320
	(5762)	(5830)	(8650)	(8755)

Notes: Parents yearly transfer by ability and wealth quartiles during college age. The numbers without parenthesis are the model moments, and those with parenthesis are the data moments.

7 The role of Parent Transfers on Education Achievement

This section analyzes parent transfers' role in children's college achievement. To do this, I set $\eta = 0$ such that parents do not care about their children and do not affect their children's choices through conditioning present and future transfers on education outcomes. Parent transfers reduce the cost of attending college and increase college graduation rates for low-ability children but reduce college attendance for high-ability children, as attending college reduces future parent transfers.

We can see the exercise results in table 12. As expected, college attendance does not depend on parents' wealth, and low-ability children with rich or poor parents attend at the same rate. Altruist parents increase college attendance through transfers. However, they make college less attractive by providing consumption insurance to their children. As a result, without parents' altruism, college attendance decreases for low-ability children and increases for high ability as college higher income is more attractive given the lack of parental insurance.

Table 12. College Attainment Model with Dynamic Altruistic Transfers vs without Dynamic Altruistic Transfers

College Attainment with Altruist Parents				
Parents' Wealth Quartile\ Child's Ability Quartile	1	2	3	4
1	0.19	0.35	0.39	0.38
2	0.15	0.28	0.38	0.45
3	0.18	0.41	0.43	0.43
4	0.31	0.38	0.45	0.44
College Attainment with Non Altruist Parents				
Parents' Wealth Quartile\ Child's Ability Quartile	1	2	3	4
1	0.17	0.33	0.40	0.46
2	0.17	0.33	0.40	0.46
3	0.17	0.33	0.40	0.46
4	0.17	0.33	0.40	0.46

Notes: The table compares college attendance when parents are altruistic with a model without altruism. At the top of the table is college graduation with altruist parents ($\eta = .26$). At the bottom, we observe when parents are not altruistic to their children ($\eta = 0$).

Low-ability children with wealthy parents decrease college attendance by 45%; meanwhile, low-ability children with poor parents decrease attendance by 10%. On the other hand, high-ability children with poor parent increase college graduation by 21%, and high-ability children with wealthy parents increases college graduation by 5%. In the model asset, poor parents are less willing to transfer to their children to fund college. However, they can provide insurance as they receive social security income. As a result, high-ability children with poor parents are the ones whose college attendance is diminished more by their parents' altruism as their parents do not support them to go through college and provide insurance in case of negative income shocks, which decreases the gains from attending college.

8 Conclusion

The paper analyzes how interactions between old parents and adult children affect parents' education investment and their role in the highest college attainment among affluent kids. In the first part, I empirically asset the effect on parent consumption of having richer or poorer kids relative to them. I found that parents with children above them in the wealth-income distribution consume more than parents in the same quartile. This effect on consumption is partially explained because parents increase inter-vivos transfer to poor children and decrease them to wealthy children. Additionally, parents with rich kids reduce bequest and increase consumption, especially among poor parents. However, the inter-vivos transfers and bequests only partially explain the changes in parents' consumption, given their children's position in the wealth-income distribution. Second, the paper explores how parents invest in college depending on their child's ability, not finding a significant difference between low or high-skill children conditional on parents' wealth.

Then, I build and estimate a dynamic altruistic model with endogenous college decisions to asses how future interaction affects parent college transfers and analyze its role in the higher college attainment between affluent low-skill children compared to children with the same ability but poor parents, finding that parent altruism increases college graduation rates among low-ability children. Moreover, the mechanism explains 86% of the gap in college graduation rates between low-ability children by parent wealth, as parents find it optimal to reduce children's college attendance costs than transfer money later in life. On the other hand, altruist parents provide insurance that reduces the value of attending college, reducing the attendance of high-ability children.

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A HRS Consumption Data

As a robustness exercise, I realize the same estimation as in section 3.2 using the Health Retirement Survey (HRS) that collects information on consumption information through the Consumption and Activities Mail Survey (CAMS), which measures household expenditure over the previous 12 months.

First, I use the household consumption measures built by RAND, which comprise the sum of all household consumption, including durable consumption, housing consumption, transportation consumption, and non-durable spending. I also use household spending, which is defined as the sum of all household expenses, including durables, non-durables, transportation, and housing spending. The difference between spending and consumption is that the last incorporates durable goods and housing, bought in one period but consumed for an extended time. Next, I link the CAMS file with the HRS Longitudinal File, which has detailed information on individuals' demographics, income, wealth, and health. Finally, I merge this data to the RAND Family Data, which has information on respondent adult children's income, in-kind transfers, and inter-vivos transfers from 1992-2014. Like before, I only consider children above 26 years old and parents older than 50, dropping parents and children born in years when less than 100 individuals were born. After this, I have a sample size of 19179 parent-child pairs and 98861 observations.

Unlike PSID, in HRS, children's household income is reported by parents, which answers in which of eight brackets are their children. Unfortunately, parents do not report their children's income in every survey. For this reason, I take the average income of each child and rank them to the individuals born in the same year. To construct my variable of the relative position of children to their parents, I average parent total wealth during the observed sample period. Then I rank their respect to all parents born in the same year. As before I realize the following estimation:

$$C_{i,t} = \beta_0 + \sum_{q=-3}^{3} \beta_q T_{i,t}^q + \beta_X \mathbf{X_{i,t}} + \varepsilon_t + \epsilon_{i,t}$$

where C is household consumption in dollars, i is the parent household, $T_{i,t}^q$ is the variable described before, $\mathbf{X_{it}}$ is a set of controls (parents' total wealth, parents' non-financial wealth, parents' household income, parents' quartile in the wealth distribution, parents household head in the labor force, number of people in the parents household, parents head born year, parents head education years, parents household US state, parents head age four order polynomial, rent or own house, parents' race and parents' religion), and ε_t is a year fixed effect.

The results are displayed in table 13. Column 1 shows the results using RAND consumption measure, and column 2 uses household expenditure. PSID and HRS consumption measures differ because the first does not impute durable consumption. However, this is a small fraction of HRS's total consumption, and both measures give the same conclusion. Parents with a child three quartiles below them in the income distribution reduce consumption in \$5500 each year (vs. \$3300 in PSID) to a parent in the same quartile. Parents with a child three quartiles above them increase consumption in \$1100 (vs. \$5000 in PSID) to a parent with a child in the same quartile. As in PSID, the effect on parent consumption increases with the relative distance between parents and children in the wealth-income distribution. Even when both surveys give the same conclusions, the magnitude of the results differs. In PSID, the increase in consumption of poor parents with rich children is higher than in HRS. On the other hand, in HRS, the decrease in consumption of wealthy parents with poor children is higher than in PSID.

Table 13. Parent Consumption Given Kids Transition

	(1) Total HH Consumption	(2) Total HH Expenditure
Child 3 Quartiles Below Parents	-4636***	-2431*
	(-3.56)	(-1.84)
Child 2 Quartiles Below Parents	-1055*	-457
	(-1.85)	(-0.76)
Child 1 Quartile Below Parents	-44	83
	(-0.12)	(0.22)
Child Same Quartile Parents	914***	906***
	(3.09)	(3.10)
Child 1 Quartile Above Parent	1273***	1469***
	(4.01)	(4.22)
Child 2 Quartiles Above Parents	1325***	1764***
	(3.38)	(3.83)
Child 3 Quartiles Above Parents	2113***	2556***
	(3.49)	(3.98)
Observations	19033	19033

Notes: The table shows the results of regressing parent household consumption in dollars to the relative position of their children in the income distribution T and demographic controls X using HRS data. t statistics in parentheses, standard error cluster by household. * $p < .10$, ** $p < .05$, *** $p < .01$.

B In-Kind Transfer

This appendix analyses how children's relative position in the wealth-income distribution affects in-kind transfers from children to parents. To quantify the effect of the relative position of children in the income distribution, I estimate the following model:

$$\mathrm{y}_{i,t} = \beta_0 + \sum_{q=-3}^{3} \beta_q T^q_{i,t} + \beta_X \mathbf{X_{i,t}} + \alpha_p + \varepsilon_t + \epsilon_{i,t}$$

where y is a discrete variable if parents receive a particular type of help (except in the case of the number of hours helped) from child i, $T^q_{i,t}$ is the child position respect to the parent in the income wealth-distribution, $\mathbf{X_{it}}$ is a set of controls (parent's total wealth, parents' non-financial wealth, parent's household income, parent's household head is in the labor force, number of people in parent's HH, the state where the parent's household is located, parents' household head age four order polynomial, parents household rent or own their house, child's education degree, child's marital situation, parent contact frequency with the child, child gender, child blood relationship), α_p is a parent fix effect and ε_t is a year fixed effect.

The estimation results are shown in table 14. In the case of the coefficients that represent probabilities are multiplied by one hundred. In column 1, similar to what is founded previously, children above their parents in wealth-income distribution are more likely to transfer money than children in the same quartile. Column 2 shows that wealthy children are slightly more likely to help their parents cover health costs. In columns 3 and 4, we see no difference in help with daily activities. In column 5, we see the most significant difference; parents expect more support from wealthier kids, which could affect their insurance demand. Finally, column 6 shows that less well-off children spent more hours helping their parents. A child one quartile below spends 20 hours more each month, which could indicate that parents transfer more to poorer children in retribution for care.

Table 14. Transfer from Kids to Parents

	(1)	(2)	(3)	(4)	(5)	(6)
	Prob Transfer	Prob Help Health Cost	Prob Help ADL	Prob Help IADL	Prob Help in Future	Mothly Helped Hours
Child 3 Quartiles Below Parents	1.30***	0.37***	0.08	0.08	-1.95**	10.46
	(5.22)	(3.12)	(0.35)	(0.28)	(-2.01)	(0.81)
Child 2 Quartiles Below Parents	0.36**	0.07	0.12	-0.08	-1.16**	10.04
	(2.20)	(0.98)	(1.20)	(-0.67)	(-1.98)	(1.05)
Child 1 Quartile Below Parents	0.10	0.05	-0.05	0.07	-0.20	19.32**
	(0.86)	(0.80)	(-0.75)	(0.77)	(-0.52)	(2.45)
Child 1 Quartile Above Parents	0.82***	0.04	-0.15*	-0.21*	0.66*	-3.79
	(5.19)	(0.64)	(-1.69)	(-1.85)	(1.72)	(-0.54)
Child 2 Quartiles Above Parents	2.42***	0.40***	-0.24*	-0.41**	0.71	-12.90
	(8.00)	(2.63)	(-1.66)	(-2.17)	(1.22)	(-1.46)
Child 3 Quartiles Above Parents	5.45***	0.90***	-0.57	-0.82**	2.65**	-9.90
	(8.07)	(3.07)	(-1.53)	(-2.05)	(2.57)	(-0.64)
Professional Degree	0.92***	0.17**	-0.05	0.19	-0.85*	8.77
	(5.15)	(2.20)	(-0.50)	(1.52)	(-1.87)	(1.35)
Bachelor Degree	-0.13	0.05	0.09	-0.00	0.77*	-0.64
	(-0.78)	(0.80)	(1.16)	(-0.02)	(1.89)	(-0.13)
College DropOut	-0.68***	-0.10	0.11	0.25**	2.26***	0.61
	(-4.04)	(-1.35)	(1.40)	(2.26)	(5.16)	(0.10)
Married	-0.61***	-0.09	-0.27***	-0.20**	1.21***	-12.13*
	(-5.16)	(-1.62)	(-3.90)	(-2.21)	(3.94)	(-1.87)
Partnered	-0.19	-0.25**	-0.09	0.04	0.53	0.12
	(-1.07)	(-2.45)	(-0.81)	(0.28)	(1.07)	(0.01)
Parent Real Total Wealth	-0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(-0.28)	(0.89)	(-0.50)	(-1.22)	(-0.88)	(-1.13)
Parent Real Total Household Income	-0.00***	-0.00	0.00	0.00	0.00	-0.00*
	(-3.29)	(-0.41)	(1.34)	(1.11)	(0.56)	(-1.77)
Parent Real Non Housing Fin. Wealth	-0.00	-0.00	-0.00	0.00	0.00	0.00
	(-1.34)	(-1.23)	(-0.33)	(0.39)	(0.14)	(0.96)
Child Work	-0.08	0.10	-0.04	0.04	0.91*	4.05
	(-0.50)	(1.06)	(-0.30)	(0.27)	(1.92)	(0.42)
Child Work Partime	0.09	0.16**	-0.13	-0.16	-1.00***	-5.95
	(0.76)	(2.54)	(-1.57)	(-1.48)	(-2.98)	(-1.25)
Contact Frequency	0.00***	0.00***	0.00***	0.00***	0.01***	0.01
	(5.24)	(3.37)	(5.52)	(7.45)	(10.00)	(1.30)
Female	0.19**	0.09**	0.61***	0.91***	9.92***	9.57*
	(2.13)	(2.10)	(10.79)	(12.55)	(37.27)	(1.87)
Step-kid	-0.79***	-0.21***	-0.39***	-0.53***	-16.34***	0.03
	(-5.93)	(-3.49)	(-5.06)	(-5.30)	(-31.83)	(0.00)
Constant	-286.65***	-26.55	113.27	36.43	-133.52	-930.19
	(-2.63)	(-0.26)	(1.31)	(0.40)	(-0.40)	(-0.22)
Observations	156979	128183	157216	157204	153013	2999

t statistics in parentheses, standard error cluster by household

* $p < .10$, ** $p < .05$, *** $p < .01$

C Equilibrium Properties

In this section, I discuss the household problem's equilibrium properties to characterize parents' and children's decisions.

C.1 Parent-Child Problem when the Child Decides College

When children decide on college attendance, the model has three stages. First, the child decides on college attendance conditional on the parent's transfers and savings. In the second stage, the parents decide their consumption, savings, and transfers conditional on their child's education. Finally, given the previous parent's decision and his college decision, the child decides on his saving and consumption. I assume an interior solution to be able to use the first-order condition to characterize the strategic interactions between parents and children. I characterize the optimization problem during this period backward to ease the exposition.

Child problem

The child is born with zero assets choosing consumption and assets in the third and last stage, conditional on his parent's and his own previous decisions. Then, the optimization problem is the following:

$$
\begin{gathered}
V_1(a_c, e_c, e_p, \theta, z, t_p, a_p') = \max_{c_c, a_c'} u(c_c) \\
+\beta E\left[V_2(a_c', e_c, e_p, \theta, z', t_p'^{*}(a_p', a_c', e_c, e_p, \theta, z'), a_p^{*''}(a_p', a_c', e_c, e_p, \theta, z'))|z\right] \\
\text{s.t: } a_c' + c_c = \tau_e y(1, 0, \theta) - \phi 1_{e_c=C} + t_p \\
z = 0, a_c = 0 \\
a_c' \geq 0, c_c \geq 0
\end{gathered}
$$

where $*$ denotes the policies that are equilibrium objects, and E is the expectation for future child income productivity conditional on income productivity today. Then the F.O.C are:

$$c_c : u'(c_c) - \lambda = 0$$
$$a'_c : \beta E V^{t+1}_{a'_c} + \beta E V^{t+1}_{t'^*_p} \frac{\partial t'_p}{\partial a'_c} + \beta E V^{t+1}_{a''^*_p} \frac{\partial a''^*_p}{\partial a'_c} - \lambda = 0$$

Using the envelope theorem:

$$V^{t+1}_{a'_c} = (1+r)u'(c'_c)$$
$$V^{t+1}_{t'_p} = u'(c'_c)$$
$$V^{t+1}_{a''_p} = \beta E[V_{a''_p}{}^{t+2}] = 0$$

we can rearrange this and get the child Generalized Euler Equation:

$$u'(c_c) = \beta(1+r)E[u'(c'_c)] + \beta E[u'(c'_c)\frac{\partial t'_p}{\partial a'_c}] \tag{1}$$

The additional term in the Euler Equation represents the effect of savings for the children as it reduces future parent transfers. When $\frac{\partial t'_p}{\partial a'_c} < 0$, children saving decrease future parents transfers and reduce future consumption creating the *"Good Smarithan Problem"*. As a result, children under-save and overconsume each period compared with the full commitment case. Then, parents want to set $\frac{\partial a'^*_c}{\partial t_p} = 0$ such that their savings do not distort the children saving.

Parent problem

In the period children decide on college attendance, parents solve the following problem:

$$V_{1+j_k}(a_p, a_c, e_p, \theta, z) = \max_{c_p, a'_p, t_p} u(c_p) + \eta u(c_c^*(a_c, e_c, e_p, \theta, z, t_p, a'_p))$$
$$+\beta E\left[V_{1+j_k+1}(a'_p, a_c'^*(a_c, e_c, e_p, \theta, z, t_p, a'_p), e_c, e_p, \theta, z')|z'\right]$$
$$\text{s.t } a'_p + c_p = y(1 + j_k, e_p) - t_p + (1 + r)a_p$$
$$z = 0, a_c = 0$$
$$a'_p \geq 0, c_p, t_p \geq 0$$

Parents decide to transfer after their children have decided if attending college or not. Then, the children's education level is given to the parents, so the first-order conditions are:

$$c_p : u'(c_p) - \lambda = 0$$
$$a'_p : \eta u'(c_c^*)\frac{\partial c_c^*}{\partial a'_p} + \beta E V_{a'_p}^{t+1} + \beta E V_{a_c'^*}^{t+1}\frac{\partial a_c'^*}{\partial a'_p} - \lambda = 0$$
$$t_p : \eta u'(c_c^*)\frac{\partial c_c^*}{\partial t_p} + \eta\beta E V_{a_c'^*}^{t+1}\frac{\partial a_c'^*}{\partial t_p} - \lambda = 0$$

Using the Envelope Theorem we get:

$$V_{a'_p}^{t+1} = (1 + r)\lambda' = u'(c'_p)(1 + r)$$
$$V_{a_c'^*}^{t+1} = \eta u'(c_c'^*)\frac{\partial c_c'^*}{\partial a_c'^*}$$

Then we can rewrite the equation system as:

$$u'(c_p) = \eta u'(c_c^*)\frac{\partial c_c^*}{\partial a'_p} + \beta E[u'(c'_p)(1 + r)] + \beta E[\eta u'(c_c'^*)\frac{\partial c_c'^*}{\partial a_c'^*}]\frac{\partial a_c'^*}{\partial a'_p} \tag{2}$$
$$u'(c_p) = \eta u'(c_c^*)\frac{\partial c_c^*}{\partial t_p} + \eta\beta E[\eta u'(c_c'^*)\frac{\partial c_c'^*}{\partial a_c'^*}]\frac{\partial a_c'^*}{\partial t_p} \tag{3}$$

Equation 2 is the parent Euler Equation representing the effect of parent saving on his and the children's utility. Note that from the derivative of the child budget constrain: $\frac{\partial c_c^*}{\partial a_p^{*\prime}} = -\frac{\partial a_c^{\prime *}}{\partial a_p^\prime}$ and $\frac{\partial c_c^{\prime *}}{\partial a_c^{\prime *}} = (1+r) - \frac{\partial a_c^{\prime\prime *}}{\partial a_c^{\prime *}}$ then we can rewrite as:

$$u'(c_p) = \beta E[u'(c_p')(1+r)] - \eta \frac{\partial c_c^*}{\partial a_p'} \left(u'(c_c^*) - \beta E\left[\left(1 + r - \frac{\partial a_c^{\prime\prime *}}{\partial a_c^{\prime *}} \right) u'(c_c^{\prime *}) \right] \right)$$

The first term on the right side is the standard trade-off between parent consumption today and tomorrow in the parent Euler Equation. The second term is the trade-off that faces parents from saving. If the parent increases saving, they receive an additional utility today as the child increases today's consumption through a decrease in savings, which reduces the children's consumption and parent's utility tomorrow.

Equation 3 represents the trade-off that faces when transferring to their children. Using again the child budget constrain we have that $\frac{\partial c_c^*}{\partial t_p} = 1 - \frac{\partial a_c^{\prime *}}{\partial t_p}$, then, the equation can be rewritten as:

$$u'(c_p) = \eta u'(c_c^*) - \eta \frac{\partial a_c^{\prime *}}{\partial t_p} \left(u'(c_c^*) - \beta E\left[\left(1 + r - \frac{\partial a_c^{\prime\prime *}}{\partial a_c^{\prime *}} \right) u'(c_c^{\prime *}) \right] \right)$$

The first term represents the marginal benefit for the parent of an additional unit of child consumption. The second term is the trade-off between lower child consumption today as transfer increases children saving but higher consumption tomorrow, given higher savings.

Child College Decision

Finally, the first stage is the college attendance decision, where children solve the following problem:

$$\hat{V}_1^*(a_p, a_c, e_p, \theta, z) = \max_{i \in [HS, C]} \{V_1(a_c, i, e_p, \theta, z, t_p^*(a_p, a_c, i, e_p, \theta, z), a_p^{*'}(a_p, a_c, i, e_p, \theta, z)$$
$$+1_{e_c=C}\kappa(\theta) + \epsilon_i)\}$$

The optimization problem implies that the child decides on college not only considering the effect of college on his consumption but also considering the effect on his parent's transfer and wealth. Then, altruists can affect their children's college attendance through transfer and savings.

C.2 Parent-Child Problem After College and Before Parent Last Period

During these periods, the parent always decides first on their consumption, savings, and transfers. Then, given their previous parent's decision, children decide on their savings and consumption. Then, the optimization problem of the parents and children during this period is the same as the problem in the second and third stages in the period when college attendance is decided. Then the trade-offs between consumption, saving, and transfers are identical.

C.3 Parent-Child Problem During Parent Last Period

In this subsection, I characterize the last period in which the parent is alive, where he knows he dies with certain, and the children receive all their savings as bequest during the next period.

Child Problem

This is the last period for the children before they become parents. They solve the following problem:

$$V_{j_k}^{coh}(a_c, \theta^{coh}, e_c, e_p, z, t_p, a_p') = \max_{c_c, a_c'} u(c_c) + \beta E\left[\hat{V}_{j_k}^{coh}(b_p^* + a_c', 0, \theta^{coh+1}, e_c, z_0)|\theta^{coh}\right]$$

$$\text{s.t. } a_c' + c_c = y(j_k, e_c, z) + t_p + (1+r)a_c$$

$$a_c' \geq 0, c_p \geq 0$$

where coh denote a particular cohort, then $coh+1$ are the variables of the next generation. This period is the last one for the parent, and the child decides after him, so the child's decisions do not affect future transfers. Then the F.O.C are:

$$c_c : u'(c_c) - \lambda = 0$$

$$a_c' : \beta E[V_{a_c'}^{j_k}] - \lambda = 0$$

Using the Envelope Theorem we have $V_{a_c'}^{j_k} : (1+r)\lambda' = u'(c_c')(1+r)$. Then the children have the standard Euler Equation , which implies that future parent decisions do not distort their saving.

Parent Problem:

In the last period, the parents decide on how much to transfer during this period and how much to leave as a bequest. Then, they solve the following optimization problem:

$$V_J^{coh}(a_p, a_c, e_c, e_p, \theta, z) = \max_{c_p, b_p, t_p} u(c_p) + \eta u(c_c^*(a_p, a_c, e_c, e_p, \theta, z, t_p, b_p))$$
$$+\eta_d \beta E\left[V_{j_k+1}^{coh+1}(b_p + a_c^{'*}(a_p, a_c, e_c, e_p, \theta, z, t_p, b_p)), 0, e_c^{coh+1}, e_c, \theta^{coh+1}, 0)|\theta^j\right]$$
$$\text{s.t: } c_p + b_p = \text{S.S.}(e_c) - t_p + (1+r)a_p$$
$$t_p, b_p, c_p \geq 0$$

Then the F.O.C. are:

$$c_p : u'(c_p) - \lambda = 0$$
$$b_p : \eta u'(c_c)\frac{\partial c_c^*}{\partial b_p} + \eta_d \beta E[V_{b_p}^{coh, j_k+1}(1 + \frac{\partial a_c^{'*}}{\partial b_p})] - \lambda = 0$$
$$t_p : \eta u'(c_c^*)\frac{\partial c_c^*}{\partial t_p} + \eta_d \beta E[V_{b_p}^{coh, j_k+1}\frac{\partial a_c^{*'}}{\partial t_p}] - \lambda = 0$$

Using the envelope theorem we get $V_{b_p}^{coh, j_k+1} : (1+r)\lambda' = u'(c_c^{'})(1+r)$, then we have the following equation system:

$$u'(c_p) = \eta u'(c_c^*)\frac{\partial c_c^*}{\partial b_p} + \eta_d \beta E[u'(c_c')(1+r)(1 + \frac{\partial a_c'}{\partial b_p})] \tag{4}$$
$$u'(c_p) = \eta u'(c_p)\frac{\partial c_c^*}{\partial t_p} + \eta_d \beta (1+r) E[u'(c_c')\frac{\partial a_c^{'*}}{\partial t_p}] \tag{5}$$

Equation 4 shows the trade-off that faces parents to leave a bequest. The first term on the right side is the increase in utility through higher children consumption today given a higher bequest. The second represents the trade-off between higher tomorrow consumption, given the bequest received, and lower tomorrow consumption as the child decreases saving. The equation 5 represents the trade-off that the parent face when he transfers the last period. Again, the first term on the right side is the higher utility today through child consumption, and the second term is the decreased utility through lower consumption tomorrow because of the decrease in child savings.

D Education, Consumption and Transfer

D.1 Education and Consumption

Table 15. Transfer and Education

	(1)	(2)	(3)
	Parent Consumption	Parent Consumption	Parent Consumption
Child High School	1138	142	
	(0.75)	(0.09)	
Child College DropOut	2061	747	
	(1.41)	(0.50)	
Child College	4044**	1728	
	(2.34)	(1.00)	
Child More Than College	5693***	3406*	
	(2.86)	(1.74)	
Child 3 Quartile Below		-1439	-1969
		(-0.63)	(-0.86)
Child 2 Quartile Below		-1136	-1387
		(-1.00)	(-1.23)
Child 1 Quartile Below		-1306*	-1446**
		(-1.84)	(-2.04)
Child Same Quartile		78	91
		(0.12)	(0.14)
Child 1 Quartile Above		1242**	1371**
		(2.07)	(2.25)
Child 2 Quartile Above		2174***	2414***
		(3.28)	(3.60)
Child 3 Quartile Above		2949**	3393***
		(2.58)	(2.93)
Observations	7173	7083	7083

t statistics in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

D.2 Income Transition and Education

Table 16. Income Transition and Education

	(1)	(2)
	Dif Decile Parent-Kids Rich	Dif Decile Parent-Kids Poor
Child High School	0.08	0.36***
	(0.29)	(4.20)
Child College DropOut	0.50**	0.64***
	(1.98)	(6.89)
Child College	0.80***	1.18***
	(3.08)	(9.46)
Child More Than College	0.94***	1.26***
	(3.60)	(9.24)
Observations	1604	1723

t statistics in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

D.3 Education and Transfers

Table 17. Transfer and Education

	(1)	(2)	(3)	(4)	(5)	(6)
	Tot. Kids to Parts $	Tot. Kids to Parts $	Tot. Kids to Parts $	Tot. Parts to Kids $	Tot. Parts to Kids $	Tot. Parts to Kids $
Child 3 Quartile Below	-25**		-32***	497***		498***
	(-2.08)		(-2.72)	(5.99)		(6.09)
Child 2 Quartile Below	-21***		-25***	311***		313***
	(-4.24)		(-5.24)	(7.92)		(8.04)
Child 1 Quartile Below	-15***		-18***	88***		90***
	(-3.65)		(-4.23)	(2.87)		(2.93)
Child 1 Quartile Above	13***		15***	-92***		-92***
	(4.11)		(4.60)	(-6.26)		(-6.41)
Child 2 Quartile Above	46***		50***	-130***		-132***
	(6.45)		(7.03)	(-7.51)		(-8.02)
Child 3 Quartile Above	99***		105***	-168***		-173***
	(6.04)		(6.40)	(-8.06)		(-8.70)
High School	2	7***		-18	-45**	
	(0.65)	(2.87)		(-0.75)	(-1.98)	
College DropOut	7**	16***		29	-22	
	(2.06)	(4.66)		(1.18)	(-0.90)	
College	17***	31***		-51	-138***	
	(3.88)	(7.47)		(-1.47)	(-4.25)	
More Than College	34***	49***		21	-76**	
	(5.46)	(8.01)		(0.54)	(-2.00)	
Observations	76374	76374	76374	79136	79136	79136

t statistics in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$