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Do Children Learn to Save from Their Parents?

John Knowles and Andrew Postlewaite

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3718 Locust Walk • Philadelphia, PA 19104-6298 • Tel 215-898-6441 • Fax 215-898-2124

DO CHILDREN LEARN TO SAVE FROM THEIR PARENTS?*

PRELIMINARY AND INCOMPLETE

John Knowles
Department of Economics
University of Pennsylvania
3718 Locust Walk
Philadelphia, PA 19104-6297

Andrew Postlewaite
Department of Economics
University of Pennsylvania
3718 Locust Walk
Philadelphia, PA 19104-6297

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Abstract It is well-known that small differences in discount rates, persisting over generations, make it much easier to explain US wealth inequality across households as an equilibrium outcome. At the individual level, recent micro studies suggest that variations in preferences or in planning behavior are plausible candidates to explain inequality in pre-retirement savings among households in similar circumstances. In this paper, we argue that if such differences in behavior are really a function of an agent's basic personality, then we would expect parents and children to share such traits, and so parental savings behavior should predict both savings and other investment decisions of the children such as education. We formalize this argument using a simple life-cycle model and estimate family savings effects on household data in the PSID. In our model such family effects can be interpreted as arising from either patience or self control. We find that family effects are significant both statistically and economically; parental savings behavior explains both education and savings choices of childrens' households. We also find that these effects are linked to self reports about attitudes toward planning for the future, but not to reported willingness to defer consumption.

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1 Introduction

One of the central question in economics is what accounts for the heterogeneity in wealth. Standard explanations based on differential incomes and points in the life cycle do not do a very good job of explaining the variation. Venti and Wise (2000) argue that very little of the wealth variation among households with similar income can be accounted for by differences in portfolio choices or by chance events, and that the bulk of the wealth dispersion is due to differences in the income fraction that households choose to save. Bernheim, Skinner, and Weinberg (2001) also find that standard life cycle variables do not explain wealth variation. They argue that "rules of thumb" or other less than fully rational decision processes, including behavioral rules, are more consistent with their findings. There is some argument that heterogeneity in discount factors may be important in understanding differences in savings rates. Lusardi (2000) finds that households differ in the degree to which they have thought about retirement, and that those households that think more about retirement have substantially higher wealth than those that have given less thought. To the extent that discount rates might be related to the degree to which a household thinks about the future, this provides a link between heterogeneity in discount factors and heterogeneity in savings rates.

Amerks, Caplin, and Leahy (2002), however, suggest that this link is, at best, tenuous. They use survey information from TIAA-CREF participant households that includes questions intended to measure individual and household behavioral and psychological characteristics to construct a measure of "propensity to save." They show that differences in planning are related to this propensity to save, and are associated with different savings patterns. The survey Ameriks, *et al.* use for their analysis has questions aimed at uncovering discount rates, and they use the answers to these questions to construct a measure of individuals' discount rates. There is no positive correlation between their measure of propensity to save and the measure of the discount rate, from which Ameriks *et al.* argue that there is an "attitude" toward saving that is not captured by standard decision models, and that is important in understanding wealth accumulation.

One difficulty in the use of contemporaneous surveys to uncover attitudes toward the future is that a household's responses may be influenced by their realized savings behavior rather than actual attitudes. Those who have managed to save no money over their lifetime might be tempted to rationalize this by saying that current happiness is more important than future well-being, while those who have saved may emphasize planning. Confidence that measures of attitudes to the future predict *future* savings is necessary to infer causation from correlation.

PSID has responses to questions that reflect attitudes about the future that were asked over thirty years ago, along with subsequent savings behavior. This data allows us to examine whether attitudes toward the future have predictive power about the wealth a household accumulates for decades *after* the attitudes have been measured, allowing more confident interpretations of the relationship between attitudes and savings. We will show that a household's responses to the questions explain an important part of the household's accumulated wealth over the subsequent decades that is not explained by income and demographics.

Any demonstration that heterogeneity in attitudes twoard the future are an important determinant of heterogeneity in wealth leads naturally to the question of what explains the heterogeneity in attitudes? A very nice feature of the PSID is that it has tracked over the past decades the savings behavior not only of the initial households, but also of the households formed by the children of the initial participants. As Charles and Hurst (2002) have established, wealth is strongly correlated across generations, even after controlling for income. We examine the relationship between parental atttitudes and the children's saving rate.We find that for the oldest children, the parents' attitudes explain a third of the variance in savings rates that remains after controlling for income and demographics. Thus, is seems likely that intra-family transmission of these attitudes plays a significant role in generating heterogeneity in wealth.

An interesting feature of the attitude part of PSID is that the attitude questions were asked of both the head of household and, a few years later, of the spouse. There is substantial correlation between the head and the spouse's attitudes, but there is sufficient variability to determine which member's attitudes explain more of the unexplained variation in savings rates: heads' attitudes explain substantially of a household's savings rates than do spouses' attitudes. However, the roles are reversed in explaining their childrens' savings behavior; here, spouses' attitudes explain more.

Having established the importance of parents' attitudes in explaining childrens' savings behavior, we analyze in more detail the intergenerational correlation in savings behavior. We show that the corelation is not driven by the richest or poorest families – it holds across income levels. We also examine several alternatives explanations, including bequests, as robustness checks. Further, we decompose the intergenerational correlation in savings behavior by marital status and gender, finding that the transmission seems strongest among married females.

If parents, either genetically or socially, affect their childens' savings behavior it is likely that they affect their childrens' behavior in other spheres as well. If, for example, there is heterogeneity in discount factors, and if discount factors are intergenerationally correlated, the children of parents who are high savers should invest more than expected in education. This follows from the fact that high parental saving is correlated with high parental discount factor, which in turn will be correlated with high child discount factor, leading to high investment in education. The data are consistent with this: parental savings residual is statistically significant in explaining childrens' educational attainment, controlling for parental education, income and ability.

Following a brief summary of related work, we present our formal model, and our empirical analysis in the following section. In section 4 we analyze the relationship between parental attitudes and the savings behavior of both parents and children. Section 5 presents a more detailed analysis of the intergenerational correlation in savings behavior, andn we close with a discussion section.

1.1 Related Work

The degree to which savings behavior is determined within families is central to a number of important economic questions. Disparities in household wealth are much larger than standard economic theory predicts, and empirical work has shown that standard economic variables leave much of the variation in wealth unaccounted for. Castaneda, Diaz-Gimenez, and Rios-Rull (2001) summarize recent work in macroeconomics that attempts to account for the distribution of wealth through a variety of savings motives, shocks, and constraints. They argue that work by Aiyagari (1994), Castaneda, Diaz-Gimenez, and Rios-Rull (1998), and Quadrini (1999) shows that standard purely dynastic representative agent models that rely on uninsurable idiosyncratic risks to household earnings do not account well for the upper tail of the wealth distribution: calibrated models typically generate less concentration of wealth in the richest households than is observed in the data. Krusell and Smith (1998) depart from the assumption in these models that agents have identical preferences, and add shocks to the discount rate. The incorporation of discount-rate heterogeneity markedly decreases the gap between model predictions and the observed wealth distribution. As Krusell and Smith point out, a difficulty with this approach is that discount rates are not directly observable.

Understanding why households differ in wealth accumulation is essential to evaluate policies whose aim is to affect that distribution. Obviously, part of the difference in wealth accumulation is due to differences in households' income, both labor and non-labor income. But a household's wealth at any given point in time reflects not just its income, but also its willingness or ability to reserve part of that income for the future. Solon (1992), Zimmerman (1992) and Behrman and Taubman (1990) find intergenerational transmission of economic status, both in wages and income.[1]

2 Model[2]

Agents live for three periods and discount future utility at rate β. Agents differ in their ability, a, and their initial resources, A_1. We assume that in the first period agents choose an amount of human capital but do not work. The cost to an agent of ability a of acquiring education level e net of first-period earnings is given by $\phi(e;a) = e/a$. The education level e that is chosen affects the agent's wage in periods 2 and 3: $w_2 = w \cdot e$ and $w_3 = g \cdot w_2$, where g is the wage growth from the second period to the third. Periods 2 and 3 should be interpreted as that part of an agent's life following his entry into the workforce. Agents typically will work only part of period 3 and will be retired part of the period. Hence, w_3 may be less than w_2, and $g < 1$. Agents can borrow and lend freely at rate R between periods 2 and 3, but

[1] Grawe and Mulligan (2002) review theories of this linkage across generations.

[2] A more detailed description of the model is given in the appendix.

we assume that there is no first-period borrowing or saving. The agent's optimal decision rules solve the following problem:

$$\begin{aligned} & \max_{h,c_2,c_3} u(c_1) + \beta u(c_2) + \beta^2 u(c_3) \\ s.t. \quad c_1 &= A_1 - \frac{e}{a} \\ c_2 + \frac{1}{R} c_3 &\leq we + \frac{1}{R} weg. \end{aligned}$$

Individuals in our model work for the last two periods and can transfer a portion of their second period income into the last period. If we denote by A_3 an agent's wealth at the beginning of period 3, the proportion of his second period income that is saved is A_3/ew_2. Solving for the proportion saved, we get

$$\frac{A_3}{ew_2} = \frac{\beta}{1+\beta} R - \frac{g}{1+\beta}.$$

This implies that if rates of return do not vary across agents, and if growth rates of income are properly accounted for, then residual variation in the savings ratio reflects variation in discount factors.

The optimal education decision is given by

$$\ln e = \ln aA_1 + \ln \frac{\beta(1+\beta)}{1+\beta+\beta^2}.$$

Hence the optimal education choice is an increasing, separable function of initial resources and the discount factor. Note that to identify the effect of discount-factor variation on education, it is essential to account for both initial resources and ability.

2.1 Parents and the savings residuals

The results of the model suggest that the main difficulty with interpreting the results of regression equations based on the above decision rules is properly accounting for heterogeneity in income growth rates, rates of return, ability, initial resources and discount factors. Furthermore, measurement error is known to be a major problem with the wealth variables in survey data. In this section we develop conditions under which the effect of discount factor variation can be identified from the savings behavior of parents and children and the children's education.

For individual i of family j we write ability as:

$$\ln a_{ij} = \overline{a} + \overline{a}_j + \xi_j + \zeta_{ij}.$$

In this equation, the family component of ability contains an observed component $\overline{a_j}$, an unobserved family component ξ_j, and an individual idiosyncratic component ζ_{ij}. Initial resources A_1 may also be observed with error, so we write this as:

$$\ln A_{1ij} = \overline{A}_{1ij} + \chi_{ij}$$

where $\overline{A}_{1ij}$ represents the observed component, and χ_{ij} the residual.

We write the discount factor terms that appear in the decision rules as coefficients $\delta_h(\beta)$ [3]such that the decision rules for savings and education, respectively are:

$$\begin{aligned} \frac{A_{3ij}}{e_{ij}w_2} &= \delta_{1ij}R + g\delta_{2ij}. \\ \ln e_{ij} &= \ln aA_{1ij} + \ln \delta_{3ij} \end{aligned}$$

For coefficient h of individual i of family j, we assume that there is a society-wide component $\overline{\delta}_h$ and a family effect δ_{hj}, as well as an individual idiosyncratic component:

$$\delta_{hij} = \overline{\delta}_h + \delta_{hj} + \upsilon_{hij}.$$

We can now define the residuals $\left(u_{ij}^s, u_{ij}^e\right)$ for savings and education, respectively, using the decision rules from the model:

$$\frac{A_3}{ew_2} = \left[\overline{\delta}_1 + \overline{\delta}_2 g_{ij}\right] + u_{ij}^s \quad (1)$$

$$\ln e_{ij} = \left[\overline{a} + \overline{a_j} + \overline{\delta}_3 + \overline{A_{1ij}}\right] + u_{ij}^e. \quad (2)$$

Under our assumptions,

$$\begin{aligned} u_{ij}^s &= [\delta_{1j} + \delta_{2j}g_{ij}] + [\upsilon_{2ij}g_{ij} + \upsilon_{1ij} + \varepsilon_{ij}] \\ &\text{and} \\ u_{ij}^e &= \left[\xi_j + \delta_{3j}\right] + \left[\chi_{ij} + \zeta_{ij} + \upsilon_{3ij}\right]. \end{aligned}$$

We assume that $E\left[\chi_{ij}\varepsilon_{ij}\right] = E\left[\zeta_{ij}\varepsilon_{ij}\right] = 0$; in other words, the unobserved components of ability and initial resources are uncorrelated with the measurement error in the wealth-income ratio. Under this assumption, one can show[4] that, conditional on the growth rate of income, the covariance between education and the savings residual is driven by the covariance of both the family and the idiosyncratic components of the discount-factor terms in the decision rules:

$$cov\left(u_{ij}^e, u_{ij}^s\right) = \left(\sigma_{13} + \sigma_{13}^{\nu}\right) + \left(\sigma_{23} + \sigma_{23}^{\nu}\right) g_{ij},$$

where $\sigma_{hj} = cov\left(\delta_h, \delta_j\right)$ and $\sigma_{hj}^{\nu} = cov\left(\upsilon_h, \upsilon_j\right)$ for $h, j \in \{1, 2, 3\}, h \neq j$. This means that the covariance between the wealth-ratio residual and education indicates heterogeneity in discount factors.

We now make two additional assumptions: that measurement errors are uncorrelated across generations, and that they are uncorrelated with the idiosyncratic components of parental ability or discount factors. We can then write the covariances of the wealth-ratio residuals of the parent p with the savings and the education residuals of the child k of family j as:

[3] That is, $\delta_1(\beta) = \frac{\beta}{1+\beta}$, $\delta_2(\beta) = \frac{1}{1+\beta}$ and $\delta_3(\beta) = \frac{\beta(1+\beta)}{1+\beta+\beta^2}$.

[4] See appendix A1 for details.

$$\begin{aligned} cov\left[u^s_{jk}, u^s_{jp}\right] &= \sigma_1^2 + \sigma_{12}\left[g_{jp} + g_{jk}\right] + \sigma_2^2 g_{jk} g_{jp} \\ cov\left[u^e_{jk}, u^s_{jp}\right] &= \sigma_{13} + \sigma_{23} g_{jp}. \end{aligned}$$

Hence, correlation in the residuals is driven by correlation in the discount factors and correlation in growth rates of income.

To summarize, the model implies a simple and coherent interpretation of variation in wealth/income ratios and in education levels. Under plausible assumptions, evidence of discount factor heterogeneity follows from two statistics: the correlation between savings residuals and education residuals and the intergenerational correlations in savings residuals. An important corollary is that controlling for education when estimating savings equations will tend to mask the role of preference heterogeneity.

3 Estimation

The model described in the previous section links the wealth-income ratio to the growth rate of income in the future, and education to ability and parental resources. We first describe the sample and variables that we use to estimate this model for US households. We then estimate the model in two different ways; first as a standard OLS, in order to estimate the intergenerational correlation of savings rates, and then as least-squares dummy-variable model, in order to estimate the individual family effects on the savings rate. These family effects are then used to estimate the relationship between education and savings propensities.

The first specification we estimate can be written in two stages as:

$$\begin{aligned} \frac{A_{it}}{Y_{it}} &= \alpha_0 + \alpha_1 g_{ij} + \alpha_2 X_{ijt} + u^s_{ijt} \\ \frac{1}{n_{ik}} \sum_{t=1}^{n_{ik}} \widehat{u}^s_{ikt} &= \rho_0 + \rho_1 \left[\frac{1}{n_{ip}} \sum_{t=1}^{n_{ip}} \widehat{u}^s_{ipt}\right] + \rho_2 \left[W_i, X_{ik}\right] \left[\frac{1}{n_{ip}} \sum_{t=1}^{n_{ip}} \widehat{u}^s_{ipt}\right] + \rho_3 W_i + \varepsilon_i \end{aligned}$$

where the family is indexed by i, the individual by j, the year of the observation by t, and k and p refer to the child and parent, respectively. The first equation is estimated on all respondents for whom there is wealth information, while the second is estimated on the subsample of this sample that consists of parent-child pairs. In the second equation $\widehat{u}$ refers to the residual generated by estimating the first equation.

The variables in X_{ijt} include household-level variables that are not in the model but are empirically linked to savings. The variables in W_i and X_{ik} refer to family-level and child variables, respectively. Levels of X_{ik} are excluded from the second equation because they are included in the first specification as part of X_{ijt}. The estimated parent-child correlation of savings residuals is given by combining the estimated effects ρ_1 and ρ_2.

The second specification, which gives the relation between the family savings effect residuals and education, is also estimated in two stages: the first stage generates the family savings effects α_i, the second a probit specification of the relation between the estimated family effect $\widehat{\alpha_i}$ and education:

$$\begin{aligned} \frac{A_{it}}{Y_{it}} &= \alpha_i + \alpha_1 g_{ij} + \alpha_2 X_{ijt} + u^s_{ijt} \\ \Pr(e_{ik} = h) &= \delta_0 + \delta_1 \widehat{\alpha_i} + \delta_2 W_i + u^e_{ik}. \end{aligned}$$

The first equation is estimated on the pooled sample of parents and children, after adjusting the wealth-income ratio for age effects, and restricting the sample to families with more than 3 observations. The second equation is estimated on the children of this sample. In this specification, X_{ijt} only contains time-varying characteristics of the family, as constant characteristics are reflected in the family effect. The family characteristics do appear in the second equation via W_i, which includes family income and estimates of the unobserved ability of the parents. The coefficient of interest here is δ_1.

Since some of the variables that play a key role in the model, such as income in the future or the ability of the child, are not directly observable, we impute these using auxiliary regressions. The method and results for these auxiliary regressions are described in the appendices.

3.1 Data and Variables

The data is drawn from the Panel Study of Income Dynamics, from the first wave in 1968 to the 2001 wave. The wealth variables are taken from the PSID Wealth Supplement, which covers 1984, 1989, 1994, 1999 and 2001; this supplement consists of an additional set of questions asked of the entire sample for the years in question. We include in our samples both the representative cross-section and non-representative sections of the sample, such as the survey of economic opportunity and the Hispanic sample.[5]

Throughout the main analysis we use three different samples. The "Wealth" sample includes all household heads or spouses, for whom we have wealth, income and education variables for at least one wave after 1984. Our "Family" sample is a sub-sample of the wealth sample that consists of all parent-child pairs in which the child was born by 1967, listed as children in the 1968 wave, and were present as head or spouse in at least one wave of the wealth supplement, and for whom at least one parent was present in the wealth sample. The age restriction on children is chosen to ensure that the children, having reached at least age 32 by 2001, are more likely to have begun non-trivial accumulation of wealth by the time of the last observation. Finally, the "Wage" sample consists of all years for household heads or spouses where we can compute wages and have education and location data. The sample size is 44917 observations for men and 42154 for women.

The main wealth variable we use is household net worth, which includes real estate equity, business equity, financial assets and the value of automobiles, net of mortgages and other debt. As with most measures used in the previous literature, our measure excludes wealth in the form of pensions

[5] Since we are not restricting our sample to the cross-sectional survey sample, our sample over-represents the poor; to make the PSID representative of US families that satisfy these age criteria, we use the family or individual weights for each year.

and social security, which, according to Gustman, Mitchell, Samwick, and Steinmeier (1997) is as large on average as all other wealth combined. Since it is reasonable to expect that an increase in this type of wealth will reduce the marginal gain from savings for retirement, it may be important in our analysis to attempt to take into account pensions and social security wealth, an issue we deal with by predicting income in retirement.[6]

Under the assumption of positive optimal savings, wealth in our model reflects both income from previous years, and anticipated future income. To estimate our model, the ideal variable to represent period-2 income would be cumulative income to the date of wealth measurement, compounded at an interest rate equal to the rate of return on household savings. To approximate this variable, let y_t represent non-asset income in each year t and Y_t represent the asset value of income to date, from age t_1. Assuming a constant real interest rate over time, Y_t can be written as the present value of income from t_1 to the date t at which wealth is measured, compounded annually at interest rate r, which we set at 4%, to match the average rate of return on corporate equity[7]:

$$Y_t = \sum_{j=0}^{t-t_1} y_{t-j} \left(1+r\right)^{t-j} .$$

Income measurements are taken from the annual household money income variables.[8] [9] Two caveats should be noted: first, this measure omits income of the parents when younger, and second, the PSID income variables omit capital gains, whether realized or not.

The anticipated growth rate of income g_{ij} is taken to be the average non-asset income after age 55 divided by the average prior to that time. To make the specification more flexible, we divide this time period in two and compute two growth rates: growth rate 1 is average income over the period 55-70 divided by average income up to the time of measurement, and growth rate 2 is average income over the period 70-90 divided by average income up to the time of measurement. To estimate these growth rates we impute future income on the basis of observed income plus other variables, such as education, age and occupation. Our method is to use the entire wage sample to estimate the mean and variance of non-asset income for a given age interval as a function of variables observable earlier in the lifecycle, and then use the estimated coefficients to predict income for the younger members of the wealth sample for whom this age interval occurs later than the last year of data collection.

We use dummy variables for educational attainment, classifying people according to whether they completed high school, and whether they attended

[6] It is interesting to note, however, that empirical research finds very little, or no, effect of pension wealth on the type of wealth represented here. In fact, empirical studies (see Dynan, Skinner, and Zeldes (2000) for a recent example) tend to find participation in pension plans *raises* other retirement savings.

[7] Poterba (1998) finds that the average rate of return on corporate equity over the time period 1950-1990 is about 4% after taxes.

[8] These and other money quantities in our paper are deflated to 1997 values using the CPI.

[9] Appendix A4 provides a detailed description of the estimation of future income.

college or received a bachelor's degree. These variables are set to 1 for all education levels up to the highest attained by the individual, so that estimated coefficients will reflect marginal effects.

With these variables in hand, it is possible to estimate a literal version of our simple model. However, to deal with questions of robustness of our results, we include in our specification some additional variables that could plausibly be related to correlation across generations, such as family structure and business ownership.

The family structure variables we include include the number of years the person has been married, and whether the person is currently divorced, as well as the number of people in the family.

We define business ownership as holding an average direct stake of at least $10,000 over the period 1989-1999.Of course if it is wealth that causes families to buy or launch a business, then including this variable may bias downwards the role of unobservables such as family effects.

We classify respondents as married if they are listed as spouses or heads of a family with spouse present. Thus we make no distinction between legally married and domestic partners. We include in the specification the number of years the household head has been married. Other demographic variables we use include sex, race and family size in the current year.

The possibility that people differ in the extent to which they receive or anticipate bequests is another issue for our overall strategy. Fortunately, the PSID wealth survey includes inheritances received since the last wealth survey; we include total bequests received as a separate regressor, and deal with the possibility of anticipated bequests in the second stage by including controls for parental wealth, and for whether parents are alive.

Summary statistics for these variables for the Wealth and the Family samples and a more detailed discussion of the data are reported in Appendix A2.

3.2 Wealth/Income Residuals

Our interest is in that part of households' savings rates that is not accounted for by the demographics or the income profile of the household. Toward this end, we set out a standard econometric model that specifies the ratio of wealth to cumulative income as a function of income, age, marital status and other variables, including variance and rate of growth of income. Business-ownership and other variables that are not directly related to our theoretical model are included to capture the effects on savings of systematic differences in age-income profiles or uncertainty that are not explicitly modelled.[10]

This regression uses the wealth sample, which we partition into subsamples of parents and children, and then partition again by age tercile, and finally by sex. Because the regressions are estimated on people who are at similar points in their life cycles, the explanatory variables are more likely to have the same interpretation within a regression. For example, the role

[10] We could for consistency include such variables in the prediction of future income only; however our basic results do not change. The advantage of allowing this more flexible approach is that it emphasizes the robustness of the inter-generational links in savings.

of retirement income for people who are relatively young is quite different than for people actually at retirement ages. This partitioning results in 24 regression estimations for the parents and 24 for the children.

Since our aim is not to make inferences from the coefficient estimates, but rather to account for as much of the variation as possible with economic and demographic variables that, according to our model, would be expected to affect wealth accumulation, we ignore problems of multi-collinearity that may arise from including closely related variables.[11] We do not include education variables, as the model implies education does not enter the savings equation. This is not to say that education does not have an effect on wealth – it obviously does. However, we are interested in households' propensity to save; our regressions estimate how much wealth a household has accumulated *given* the past income and expected future income. The inclusion of education in these regressions would likely cause a serious bias if wealth variation were related to discount-factor heterogeneity. Indeed, our model suggests that wealth variation is likely to be related to discount-factor heterogeneity, since high discount factor individuals will acquire more education, and *ceteris paribus*, they will have higher incomes. We will, however, discuss below the relationship between education and savings behavior.

In this estimation, we assume that the effect of unobserved ability is summarized by the first-period income realization of the agent. That is, we assume that the shock process for income, conditional on initial realizations, is independent of ability. This implies that ability only affects wealth via initial labor income. We also assume that the conditional distribution of income shocks is independent across generations.

Tables A2.c-j in appendix 2 show the results of this basic wealth specification.[12] For mothers and fathers, the empirical model explains anywhere from 26% to 69% of the variance in wealth. For sons and daughters, the range is 15-44%. The most important variables, in the sense that they are more likely to be significant at the 0.05 level, are business ownership, cumulative income, the growth rate of income before retirement and some measure of marital status or family size. The coefficients for business ownership are in a class by themselves, as they are often significant at the 0.0001 level. Race variables are included but in general do not appear especially significant. Because of the problem of multi-collinearity, we do not take very seriously the significance of individual variables; the important feature is that the regressions reflect the standard variables that are usually taken to influence wealth accumulation. Our interest is in the deviations from the predicted wealth accumulation, as those deviations will reflect differences in discount rates or discipline in saving. If there is heterogeneity in discount rates, the residuals of these regressions will be correlated with the discount rate.

[11] For example, we include variables that represent whether the person has had multiple marriages, as well as whether the person is divorced and the number of years spent in marriage.

[12] Wealth and income are divided by 10,000 in the regression.

4 The Relationship between Attitudes and Savings Behavior

In the previous section we described how we calculated the part of a household's accumulated wealth that was not explained by "standard" variables such as demographics and income trajectory, that is the residuals of the wealth-income ratio regression. In this section we will argue that this "unexplained" part of a household's wealth accumulation, which we will refer to as the savings residual, is related to the household's attitudes toward the future. Our measures of attitudes come from the set of questions below concerning "efficacy and planning" that were asked of the household head in the PSID from 1968 through 1972.

1. Have you usually felt pretty sure your life would work out the way you want it to, or have there been more times when you haven't been very sure about it?

2. Are you the kind of person that plans his life ahead all the time, or do you live more from day to day?

3. When you make plans ahead, do you usually get to carry out things the way you expected, or do things usually come up to make you change your plans?

4. Would you say you nearly always finish things once you start them, or do you sometimes have to give up before they are finished?

5. Would you rather spend your money and enjoy life today, or save more for the future?

6. Do you think a lot about things that might happen in the future, or do you usually just take things as they come?

These questions were also asked of spouses in 1975 and 1976. The responses are coded as five-point Likert scales, which reflect degrees of agreement with one or the other of two alternatives. Most responses are at the extremes, one or five.

We classify the members of our wealth sample who were heads or spouses in 1968-76 according to the latest response available to these questions. We treat intermediate values as missing values, and so convert each response to a binary variable equal to one for strong agreement with the first option, and zero for agreement with the second.

The questions are an imperfect measure of an individual's attitudes toward the future for several reasons. Among other things, the interpretation of at least some of the questions is ambiguous. For example, a person who answered that they thought a lot about things that might happen in the future (Question 6) could be either a person who systematically plans for the future and saves a lot, or alternatively, a person who plans little and thinks about the future because they have no savings. However, most questions reflect intertemporal behavior, and we think it is safe to label as 'impatient' those people who report that they would prefer to spend now rather than save to consume more in the future. Similarly we are comfortable labelling as 'self-controlled' those who report that they always carry out the plans they make. People who say they 'plan ahead' or 'think a lot about the future', would seem to be future-oriented in a third, more general way, perhaps in the sense of a 'propensity to plan', as in Amerks, Caplin, and Leahy (2002). In any case, our aim is to demonstrate a link between the answers to these questions and savings residuals, and to the extent that the questions are ambiguous, our results understate the relationship.

Two important features of this data for our purposes are: 1) the data predates the first wealth report by 8-12 years, and 2) the reports for spouses are usually 4 years apart. The first feature means these attitudes are not shaped by the wealth accumulation experience of the household after 1976, and the second that we are more likely to have two independent signals of the attitudes of married couples, rather than a repetition of the same responses for each spouse.

The size of the subset of the wealth sample that reports attitudes is 1896 men and 2298 women. Men are much more likely than women to report that they plan ahead, that they finish things, that they carry out plans and that they think about the future. The gap ranges from "Thinks about the Future", where 41% of men agree strongly, compared to 34% of women, to "Plans Ahead", where 51% of men agree strongly, compared to 36% of women. "Prefers Spending" is distinguished by two features: the male and female rate of agreeing strongly are about equal (42-43%) and there is a large fraction (16% of men and 21% of women) who report that they neither agree nor disagree. About 82% of men believe they tend to finish things, 70% that they carry out their plans. However only 41% of men and 34% of women claim to think a lot about the future.

4.1 The Savings of Married Couples

In Table 1 we show the results of estimating the family savings effect as a function of the reported attitudes for married couples and other variables. We require that they be together in 1994, which implies their marriage lasted at least 19 years.[13] Note that we do not require them to be together until the last wealth measurement, which might increase the estimated effects at the price of a reduction in sample size. Model 1 consists of all the husband attitude variables, including squared terms, and model 2 of all the wife's variables, also including squared terms. Most of the terms are not significant, which is not surprising since we would expect substantial collinearity. Our interest is not to identify which of the variables is most important in predicting a couple's savings residual, but rather to show that the attitudes as a whole are related to savings behavior. The R-squared for the regression for the head is .13, and for the spouse it is .065. For the regression with the

[13] For the household to be in the attitude sample, the head must have been in the PSID as household head no later than 1975, and the spouse must have been in the PSID in 1976 at latest. The likelihood of both head and spouse being in the PSID before living together is nil.

attitudes of both, model 3, the R-squared is nearly .16. Education has been suggested as an important source of heterogeneity in savings rates. Model 4 which regresses the the family savings effect on education and income variables, and the R-squared is only slightly larger than that for the combined attitudes. In other words, the attitude variables are at least as important as education in explaining differential savings rates. In summary, we conclude from this that attitudes toward the future are important in understanding differences in wealth accumulation after taking into account demographics and income.

There are (at least) two candidate bases for heterogeneity in attitutudes toward the future: a conventional model with heterogeneous discounting and a less conventional model in which people have the same discount factor but differ in discipline, with some people less able to save as they would like than others. Table 1 doesn't allow such a comparison, but in Table 2 we investigate which of the two bases for differential savings behavior is more consistent with the data. Here we run two regressions, the first regressing savings residuals on the responses of the head and spouse to the question on planning ahead, and the second regressing savings residuals on the responses to spend-or-save. The response of the head is significant for the plan-ahead regression but not for the spend-or-save regression, while the spouse's response is marginally significant for both. More interesting is the fact that the R-squared is nearly three times as large for the plan-ahead regression as for the spend-or-save regression, suggesting (at least weakly) that heterogeneity in discipline may be more important than heterogeneity in discount factors in explaining variation in wealth.

Before moving to the effect of parental attitudes on childrens' savings we note that since we have separate responses of the husband and wife to the attitude questions, we can ask which member's attitudes have a greater impact on savings. The R-squared of the head regression is twice as large as that of the spouse regression. Since it is more likely that husbands are listed as head, husbands' attitudes toward savings are more important in predicting intra-family decision making about saving than wives' attitudes.

4.2 The Effect of Parental Attitudes on Childrens' Savings Behavior

We showed in the previous section that measurable attitudes towards the future have substantial predictive power about a couple's accumulated wealth decades later. Consequently, any true understanding of the distribution of wealth necessarily entails an understanding of the variation in attitudes toward the future. Why is that some couples care about the future more than others and are able to save significantly more than other couples? We will argue in this section that an important part of differences in couples' savings behavior comes from their parents, although we will not be able to distinguish whether this propensity to save (or not) is transmitted genetically or culturally (that is, learned from their parents).

An obvious experiment to consider is to look for correlations in attitudes toward the future. The problem is that the attitude questions were last asked for heads of household in 1972, and last asked for spouses in 1976. Consequently, there are relatively few families for which there are answers to the attitude questions for both parents and children. However, since we showed above that a couple's attitudes were linked to their savings residual, transmission of attitudes from parents to children should lead to a correlation between parents' attitudes and childrens' savings behavior; we examine this relationship next.

Table 3 shows the results of regressing the child's savings residual first on the savings residual of the parent, then on the parents' attitudes, and finally, on the combination. The regressions are broken down by age of the child in 1969 and by child's gender. We break the children down by age because the youngest of them are only 32 during the last round of wealth questions in 2001. These children have just begun the process of wealth accumulation, and consequently, predicting their savings behavior should be quite difficult. The oldest children were in their mid-fifties in 2001, and we would expect that, on average, their savings residual is a substantially better indicator of their long-term savings behavior since the magnitude of idiosyncratic shocks relative to accumulated wealth is likely to be smaller as people grow older.

We first note that parental attitudes are important in predicting childrens' savings residuals, especially for the older children. The combined parental attitudes explain approximately a third of the variance in the savings residuals for the oldest children, and over a sixth of the variance for the middle group. The combined attitudes nearly always explain much more of the variance in the childrens' savings residual that does the parental savings residual. Furthermore, adding the parental savings residual to the combined parental attitudes typically does not increase the R-squared much, if at all. We discuss this point in the last section.

A second thing to note in Table 3 is that mothers' attitudes are, with one exception, more important than the fathers' attitudes in predicting childrens' savings residuals. The R-squared's for the mothers' regressions are an average of 60% higher than the R-squared's for the fathers' regressions. Thus, it seems that while wives may play a smaller role than husbands in the savings decisions within the family, mothers play a greater role than fathers in shaping their childrens' future savings behavior. Furthermore, although genetic transmission of a propensity to save could favor one gender or another, the fact that mothers play a substantially more important role in predicting childrens' savings behavior would suggest cultural transmission.

The high R-squared's are even more surprising when it is recognized that the effect of parental attitudes on married childrens' savings behavior is attenuated by the fact that childrens' savings behavior is a family decision reflecting both husband and wife's attitudes toward saving. Thus, even parents' attitudes were *perfectly* transmitted to a child, that individual's attitudes will be expressed in family savings behavior only to the extent that the individual has a nontrivial voice in family bargaining over savings-consumption questions. This concatenation of the intrafamily decision process and attitudes toward saving that are passed from one generation to the next allows us to investigate both pieces at once.

In summary, parental attitudes are related to childrens' savings behavior. The relationship between parental attitudes and childrens' behavior is important in that it demonstrates that any similarity in the savings behavior of parents and children is related to attitudes that plausibly affect savings behavior.[14]

5 The Inter-generational Correlation of Savings Residuals

We demonstrated in the previous sections that parents' attitudes, as measured by their responses to the survey questions in the early 1970's, had substantial predictive power about that part of their childrens' savings behavior that was not explained by demographics and income profile. If parents' attitudes are related both to their own savings behavior and to their childrens' savings behavior, savings behavior will be intergenerationally correlated: families that save more than predicted by their income and demographics will, on average, have children that do likewise. In this section we examine the intergenerational correlation of savings residuals. We set out a standard econometric model that specifies childrens' savings residual as a function of parental savings residual and other variables.

Table 4 presents results of these regressions. Here, we restrict attention to the family sample, which consists of those children for whom we have both their own individual effect and that of their parents. Since there is a significant probability that the parents are no longer together, and children are far more likely to remain with their mother, we take the mother's household savings residual as the parental effect if the parents separate.[15] Model 1 includes only the parental savings residual. Similar to the results shown in table 3, the R-squared is not very large. However, while the parental savings residual doesn't explain a very large proportion of the variance in childrens' savings residual, the effect is large and highly significant. A one standard deviation in the parental savings residual is associated with over a one quarter standard deviation increase in the child's savings residual. The remaining models in this table explore the channels through which parental savings behavior is transmitted to the child.

Child's income

Children's income should be correlated with their savings residual according to our theoretical model. More patient children will invest more in education, which leads to higher income, and they will save a larger proportion of their income than less patient children. Model 2 includes the Child's Family Income, along with Parental Wealth Residual, to predict children's savings residual. The coefficient on Child's Family Income is, as the model predicts, positive, and it is highly significant. The addition of Child's Family

[14] In principle, there could be unobserved heterogeneity that is correlated across generations that might account for the family effects. However many examples of such unobserved heterogeneity would not likely result in family effects that are related to attitudes.

[15] All models include controls for the child's age, age squared and age cubed, which are not shown. There are no significant age effects.

Income to Parental Wealth Residual as regressors decreases only slightly the coefficient on Parental Wealth Residual.

Parental Wealth

Our model also predicts that there should be a relation between parental wealth and child's savings residual. If the parents' and childrens' discount factors are correlated, more patient parents will both save more and have more patient children, who in turn will save more. Model 3 gives the results of a regression of childrens' savings residuals and parental wealth. We include Parent's Wealth in 1984, the wealth squared and the wealth cubed. Including parental wealth in the regression substantially decreases the coefficient on parental savings residual, although this coefficient remains large and significant. The decrease in the coefficient on parental savings residual suggests this is an important channel in intergenerational correlation of savings residuals.

Model 4 investigates whether the correlation of parents' and childrens' savings residuals is due primarily to the very rich or very poor families. We do this by adding variables Parents in Top Wealth Quintile and Parents in Bottom Wealth Quintile, along with interaction terms. The magnitude of the coefficient on Parents in Bottom Wealth Quintile is large, but neither it nor Parents in Top Wealth Quintile and Parents in Bottom Wealth Quintile are significant. It is important to note that while the coefficient on Parental Wealth Residual in Model 4 is smaller than in Model 1, it is still large and significant, indicating that the correlation of parents' and childrens' savings residuals is *not* primarily driven by families in the tails of the income distribution.

Bequests

Our model does not include bequests or inter vivos gifts from parents to children. These might explain the intergenerational correlation of savings residuals for reasons unrelated to our theoretical model. The premise is that some parents have positive savings residuals, and when they die they leave larger than average bequests to their children. The children will then have higher than average savings residuals, giving rise to positive intergenerational correlation.

While bequests are outside the scope of our model we test for this as a robustness check in Model 5. We include a variable Both Parents Dead that we set equal to 1 if both parents have died by 1999, and an interaction term. As most bequests occur after the death of the second parent, if bequests were a dominant part of the intergenerational correlation of savings residuals, we would expect to see a large positive and significant coefficient on the interaction term, and a commensurate decrease in the the coefficient on Parental Wealth Residual. However, the coefficient of the interaction term is negative and insignificant, and the coefficient on Parental Wealth Residual in Model 5 is slightly larger than in Model 1, indicating that bequests are *not* the underlying cause of the positive intergenerational correlation of savings residuals.

Similarly, one might hypothesize that parents who are wealthier than average (controlling for income) might share part of the larger than average wealth with their children while the parents were still alive. If inter vivos gifts are given over the lifetime of the parents, the older a child is, the more he or she should have benefited from such gifts. We construct a variable Older Child set to 1 if the child is 15 or older in 1968, and include in Model 5 that variable interacted with Parental Wealth Residual. The coefficient on this term is positive, but small and not significant, indicating that inter vivos gifts are not driving the intergenerational correlation of savings residuals.

Education

Model 6 presents the results of a second robustness check. An implication of our theorectical model is that education and savings residual should be related. More patient individuals will invest more in education and will save a larger portion of their income. However, education might have affect wealth accumulation in a way not captured in our model. A concern might be that more educated individuals might be able get higher returns on their savings, and the savings residuals reflect differential returns rather than attitudes toward the future. Model 6 adds three measures of an individual's education: whether the child has a high school diploma, whether the child attended college and whether the child received a college degree. The coefficients on all three levels of education are small and insignificant; the coefficient on parental savings residual drops but remains large and highly significant. This suggests that the possibility that more educated individuals get higher returns on savings is not the primary source of savings residual variation.

5.1 Intrafamily decision making

Our theoretical model treats households as a single unit, but in married households there are two separate people with possibly different attitudes towards saving. In the discussion of Table 4 above, we have treated savings residual for the child's household as though it determined by the child's decisions alone. To the extent that the savings residual reflects compromises between the child and the child's spouse about savings decisions, the savings residual is a noisy measure of what the savings residual would have been absent those compromises. Consequently, the intergenerational correlation of savings residuals understates the intergenerational correlation of attitudes to the future.

It is beyond the scope of this paper to provide a model in sufficient detail to analyze precisely intrafamily decision making, but we will suggest how one can use our approach to provide some insight into the problem. Suppose that a husband and wife prefer different rates of wealth accummulation, and that they compromise on some rate between their personal optimum rates. This is essentially an assumption that bargaining between a husband and wife amounts to choosing a point on the Pareto frontier.[16] The particular point that is chosen will depend on the weights the two people have in the bargaining. Thus, if the husband has more say in the determination of wealth

[16] A richer model of intrafamily decision making would not necessarily lead to such an outcome. For example, it may be that because of disagreements about how much each of the individuals should save, neither saves anything.

accumulation, we should observe a savings residual for the couple that is more correlated with the savings residual of the husband's parents than with that of the wife's parents, and vice versa. Unfortunately, we don't have the savings residuals for both sets of parents. However, our sample does include both parent-daughter and parent-son combinations. If we assume that the husband-wife bargaining weights are the same for all couples, we can compare the intergenerational wealth correlations for married sons with those for married daughters. In this way a breakdown of the intergenerational savings residuals by gender and marital status gives some insight into intrafamily savings decisions. We turn next to such a breakdown.

Table 5 gives the estimated regression coefficients for different age groups. In all cases the dependent variable is the residual component of the wealth-income ratio. In addition to Parental Wealth Residual, all include an intercept and controls for the ages of parents and kids (not shown). Column 2 gives the coefficients for the regression for all children aged 1 to 25 in 1968. The coefficient for the interaction term for married men is .08 but not significant. The coefficient for the interaction term for married women is nearly three times as large and significant.

Columns 4, 6 and 8 break the children down by their age in 1968: ages 1 to 7, 8 to 15 and 16 to 25 respectively. The coefficients for the interacted terms for single women are not significant for any age group while for single sons they are large and significant for all age groups except 16 to 25. This suggests that it is not the case that daughters' attitudes more closely mirror parental attitudes than do sons' attitudes. For married daughters the coefficients are large for all age groups, and significant for the entire group and for the 1 to 7 group. In the discussion above about the effect of attitudes of husbands and wives in a household on that household's savings, we saw that husbands' attitudes explained more of a household's savings behavior than wives' attitudes. At first this seems at odds with the fact that parents' residuals explain more of married daughters' savings behavior than married sons' savings behavior, but the results are not necessarily inconsistent. If parents' attitudes are passed on more reliably to daughters than to sons, then even if wives have less influence on household savings behavior than husbands, parental savings residuals will have greater effect on daughters' savings than on sons' savings.

One interesting thing to note is that the coefficients on the interaction term for married daughters is substantially higher for the youngest age group than for other age groups. For married daughters, the younger they are the more highly correlated is their family's savings residual with her parents' savings residual. For the youngest group, those women who were age 1 to 7 in 1968, the correlation is nearly .7. This is consistent with a hypothesis that in more recently formed couples, women play a larger role in savings decisions.

5.2 Education

Our model predicts that parental savings residual and children's education should be correlated. More patient parents on average have more patient children and save more of their income. Their children, being more patient, acquire more education. In this section, we examine the determinants of the education of the child. As seen in our model, the family savings effect should be correlated with the educational attainment level, after controlling for ability and parental resources. We first construct measures of each of these three variables.

The average parental savings residual as measured in the previous section is not an ideal measure of the family savings effect because the model implies that it also reflects measurement error and the effects of luck.[17] Therefore we re-estimate the first-stage wealth regressions, this time including a dummy variable that identifies which 1968 family the respondent is associated with. Under our assumptions that luck and measurement error are uncorrelated across generations, the estimated coefficient on this dummy variable will be a much cleaner measure of the family's saving behavior.

The major difference between intergenerational effects in education and wealth is that education depends directly on ability: for a given level of investment, those who are more able will on average attain higher levels of education, and in addition, more able students will optimally invest more in education. If ability is transmitted across generations, then education correlations are likely to reflect such transmission, as well as the savings effects on education. To control for this ability transmission, we take from the labor economics literature a standard measure of unobserved ability, the residual from the Mincer equation, in which log wages are regressed on years of schooling and on experience. Our specification also includes controls for marital status and region. This regression, which we estimate on our Wage sample, is reported in Appendix A3. We then use the resulting wage residuals for the parents as a proxy for transmission of unobserved ability to the child.

We use the family savings effect to estimate three sets of regressions, the first for whether the child graduated from high school, the second for whether he or she had attended college, and the third for whether the child attained an undergraduate degree by 1999. Since the dependent variables are binary, we don't have residuals that can be related to parental saving residuals. Instead, we estimate these as probit models; this does not allow us to estimate unobservable parental effects, so we include the family wealth effect and the parental wage residuals, as estimated previously, directly in the models.[18]

Table 6 shows the results of estimating the probability of a child attaining different levels of education – finishing high school, attending college and receiving a BA. It is well known that parental education is a predictor of childrens' education, and in all models we include controls for whether each parent is a high school graduate or a college graduate. We also control for

[17] We assumed that luck and measurement error was uncorrelated across generations. This meant that the correlation we observed was an estimate of the correlation in savings tendencies across generations, biased downwards by the presence of these forms of noise.

[18] This strategy is less conservative than our approach in the previous exercises, in that explanatory power of variables that are correlated with the residuals will be shared rather than assigned exlcusively to the observable variables. We do this because residuals are not available in a probit model.

parental income: log income, log income squared and log income cubed are included. Lastly, all models include as controls each parent's age and age squared, gender of the child and whether the child is black.

Model 1 shows that the parental savings residual is large and significant for all three levels of education. Model 2 includes the wage residuals for the parents as proxies for unobserved ability. There is a slight drop in the marginal effect of parental savings residual on the probability of all three levels of eductional attainment, but the drop is less than 15% in even the most extreme case. Model 4 breaks down the effects of parental savings residual on educational attainment by gender and race. For all three levels of education, the effect is much larger for African Americans than for others, and for Finish High School and Attend College, the parental savings residual is minimal for women compared to the effect for men. Model 4 adds squared values of the parents' wage residuals that proxy for unobserved ability. The magnitudes of the effects of parental savings residual are changed little by their inclusion, indicating that unobserved ability is not likely driving the results.

These regressions provide strong support for the view that parents' future orientedness as captured by parental savings residual is an important predictor of childrens' eduacational attainment. The effect is relatively weak for women, but particularly strong for African Americans.

Model 1 estimates the probability that the child attends college as a function of the parental savings residual and the controls described above. The coeficient on the savings residual is large and highly significant. Model 2 aims at identifying the relationship between ability and savings residual. The savings residual is the difference between the proportion of cumulative income that a family has saved and the proportion saved by families in similar circumstances. We assumed that differences in individuals' abilities will result in differences in income, but not in differences in savings residual. If differences in ability affected not only income, but also the return on saving, parental savings residual and probability of attending college would be correlated if unobserved ability was correlated across generations. Model 2 estimates the probability of the child achieving each of the three education levels as a function of the parental savings residual and the parents' Mincer residuals. Comparing Models 1 and 2, we see that the coeficient on parental savings residual decreases some for all three levels of education, but remains large and significant even when unobserved parental ability is controlled for, suggesting that the correlation between parental savings residual and the child's probability of attending college is not solely a consequence of intergenerational correlation of unobserve ability. It is interesting to note that for both attending college and receiving a BA, uniformly across the models, the coefficients on mothers' wage residuals are larger (usually substantially so) than those on fathers' wage residuals, and are nearly always significant while those for fathers less often significant. This is consistent with the belief that mothers have more influence on children than fathers.

Model 3 separates the effect of the parental savings residual between sons and daughters. The effect of parental savings residual on finishing high school and attending college is almost entirely on the sons. The predicted correlation between parental savings residual and college attendance in our model stems from the expected income enhancement generated by human capital investment. If women expect to be in the labor market very little, or to take jobs for which human capital has low return, we would expect this. Model 3 also shows that the effect of parental savings residual on all levels of educational achievement is particularly large for African Americans, although it is only significant for finishing high school and receiving a BA.

Model 4 includes higher order terms for both parental wage residuals and for parental savings residual. The squared terms for both the fathers' wage residuals are insignificant, and with the exception of finishing high school, the squared terms for the mothers' wage residuals are as well. The quadratic and cubic terms for parental savings residual are not significant for attending college or achieving a BA, suggesting that nonlinearities are not important for these education levels.

We conclude from this table that the prediction of the model of a correlation between parental savings residual and child's human capital investment is borne out. Further, the relationship is not the consequence of intergenerational correlation of unobserved ability. There remains a question of whether the relationship identified in the table is quantitatively important. We use the results of the probits shown in the table to estimate the change in the percentage of children in our sample who would have attended college, and the proportion who would have attained a BA if the savings residual distribution was shifted by 1/2 standard deviation. In other words, we are estimating what the outcome would have been had each child's education decisions been those of a child whose parents had a savings residual 1/2 standard deviation higher than it actually was. To the extent that the savings residual reflects differences in future-orientness, the resulting outcome is an estimate of the consequences of increasing

The results of this exercise are in Table 7. In our sample, 86% finish high school, 56% of the children attended college, and 26% attained a BA. Under our hypothetical, those numbers increase to 90%, 61% and 27% respectively.

6 Summary and Discussion

We set out a simple model of education and savings decisions to explore the relations between discount-factor heterogeneity and observed behavior. The main predictions of the model were that 1) intergenerational correlations in wealth income ratios are related to intergenerational correlations in discount factors, and 2) that there should a positive correlation between unexplained variations in education attainment and the wealth-income ratio.

Using PSID wealth supplement data, we estimated a reduced-form version of this model on a sample of about 5,000 U.S. households in each of the 4 years for which the supplements were available after 1984. We found a significant positive correlation in wealth-income ratio residuals across generations, suggesting that unexplained variation in preferences rather than of income growth rates or other variables is responsible for a significant, albeit small, portion of the variation in discount factors.

To examine whether the unexplained component of savings is correlated with education, we estimated probit models of college attendance and college completion on the savings residual and other variables that are usually considered determinants of education, such as ability or parental resources. We found significant effects of the savings residual; according to our estimates, a half-standard deviation increase in the savings residual would increase college attendance by 20%. Thus the empirical results suggest that variations in the discount factor are indeed significant, although we are only able to measure what is almost certainly a relatively minor portion of such variation that is inherited and is independent of income.

This suggests that any transmission from one generation to the next in income is amplified by intergenerational transmission of preferences. When there are family effects that link parents' attitude to the future to that of their children, it is not only the childrens' savings behavior that is affected. Individuals with greater concern about the future will invest more in human capital. Economists have long been aware that parents affect children's well-being by investment in children's human capital.[19] Our results suggest that in addition to parents' direct investment, the intergenerational link in preferences is an important factor in children's acquisition of human capital.

We used the answers to attitude questions to aid in interpreting the savings residual. We found that some of the attitudes are indeed significantly correlated with the savings residual, and the effect of attitudes that seemed to self-control was as important as attitudes that reflect patience.

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[19] See, e.g., Becker and Tomes (1979) and Loury (1981).

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Appendix A1: Model of Family Savings Effects

We discuss in greater detail the model presented above and to formalize our understanding of two types of relations in the data, the correlation in savings between parents and children, and the correlation between education and parental savings. The main issues we want to clarify are how ability affects the savings residual, and to what extent parents' savings decisions are informative about children's choices. We first present the theoretical model, then discuss the interpretation of the data.

Our model allows for correlations in ability and patience across generations. We analyze first individuals' savings decisions, and then explore how they are related to those of their parents.

Basic Framework

Agents live for three periods. At the beginning of the first period, they differ in their ability, a, their initial resources, A_1, and their discount factor β. In the first period, agents acquire education e; in the second and third periods, they receive non-asset income $y_t = w_t e$. The cost to an agent of ability α of acquiring education level e net of first-period earnings is given by $\phi(e;\alpha) = e/\alpha$.

Agents in the second period can borrow and lend freely at rate R, but we assume that in the first period, agents consume all of their resources, so there are no first-period savings. The utility of the agent in each period is given by a concave function of current consumption, $u(c_t)$. Preferences over consumption streams $\{c_1, c_2, c_3\}$ are given by the sum of each period's utility, discounted by the agent's discount factor β.

Decisions

We can write non-asset income in period 3 as a fraction g of that of period 2. Since there is no uncertainty in the model, the agent's problem can be characterized as the choice in period 1 of education e and consumption $\{c_2, c_3\}$ in the future periods:

$$\max_{e,c_2,c_3} u(c_1) + \beta u(c_2) + \beta^2 u(c_3)$$

$$\begin{aligned} s.t. \quad c_1 &= A_1 - \frac{e}{a} \\ c_2 + \frac{1}{R}c_3 &\leq w \cdot e + \frac{1}{R} w \cdot e \cdot g \end{aligned}$$

It is easy to show that savings in the second period, if positive, are given by

$$A_3 = \frac{\beta}{1+\beta}\left(A_2 + ew_2\right)R - \frac{1}{1+\beta}ew_3.$$

Hence, the amount saved in period two is a linear function of human capital

(earnings) and initial wealth. Note that ability, conditional on income and the growth rate g, plays no role in the savings-rate decision.

We can then write indirect utility as:

$$\begin{aligned} V_2(e, A_1) &= \ln\left(A_1 + we - \frac{D_1(\beta) A_2 + ewf(\beta, g)}{R}\right) \\ &\quad + \beta \ln\left(we + a(\beta) A + b(\beta) e\right). \end{aligned}$$

We can think of the resources available at in the first period of life, A_1, as an allowance from the parents to pay for consumption and education. The optimal level of education is the solution to

$$\max_e \left\{ u\left(A_1 - e\right) + \beta V_2\left(A_2, e\right) \right\}.$$

If there are no first-period savings, the education decision is given by

$$\ln e = \ln aA_1 + \ln \frac{\beta\left(1+\beta\right)}{1+\beta+\beta^2}.$$

Hence the optimal education choice is an increasing, separable function of both initial resources and the discount factor. It is easy to generalize this to the case where education affects the growth rate of income.[1]

Discount Factors and the Savings Residual

Define the following functions of the discount factor:

$$\begin{aligned} \frac{\beta}{1+\beta} &= D_1\left(Z_i, \delta_{1i}\right); \\ \frac{-1}{1+\beta} &= D_2\left(Z_i, \delta_{2i}\right); \\ \frac{\beta\left(1+\beta\right)}{1+\beta+\beta^2} &= D_3\left(Z_i, \delta_{3i}\right). \end{aligned}$$

For example, let $D_j\left(Z_i, \delta_{ji}\right) = \alpha_j Z_i + \delta_{ji}, \quad j = \{1,2\}$, and $\ln D_3\left(Z_i, \delta_{3i}\right) = \alpha_j Z_i + \delta_{3i}$. Assuming that $A_2 = 0$ and that R is a constant, and that $w_3 = gw_2$, the optimal rules for wealth and education can be written in terms of these functions:

$$\begin{aligned} A_{3i} &= D_1\left(Z_i, \delta_{1i}\right) ew_2 + D_2\left(Z_i, \delta_{1i}\right) egw_2 \\ \ln e_i &= \ln aA_1 + D_3\left(Z_i, \delta_{3i}\right). \end{aligned}$$

As in **?**, we can interpret the effects of the $Z_i's$, as influencing discount factors directly, or as affecting the marginal utility of consumption.

Let the variance of β be denoted by σ_β^2. The covariances in large samples are given by

$$cov\left(\delta_j, \delta_h\right) = E\left[\varepsilon_h \varepsilon_j\right] = \frac{\partial D_h}{\partial \beta}\frac{\partial D_j}{\partial \beta}\sigma_\beta^2,\ j \in \{1,2,3\}$$

and the derivatives are given by:

$$\frac{\partial D_i}{\partial \beta} = \begin{cases} \frac{1}{(1+\beta)^2} > 0 & i = 1 \\ \frac{1}{(1+\beta)^2} > 0 & i = 2 \\ \frac{1+2\beta}{\left(1+\beta+\beta^2\right)^2} > 0 & i = 3 \end{cases}. \tag{1}$$

[1] It is easy to generalize to cases for which the growth rate is a funciton of educaiton. For example, suppose that $g\left(e\right) = e^\gamma$. Then

$$\ln e = \ln\left(\frac{\left(1+\beta\right)\left(1+\gamma\right)}{1+\left(1+\beta\right)\left(1+\gamma\right)}\right) + \ln \alpha + \ln A_1.$$

Ability is still separable in the education decision.

Consequently, the covariances of all the error terms are positive; positive correlations between the wealth and education shocks are implied by the model, because both are monotonic in the discount factor. Since the D's are monotonic in β, an increase in β will give rise to an increase in the savings ratio for two reasons: the positive effect in the interest-rate term is larger, and the negative effect in the growth term is smaller.

Savings and Family Effects

When initial wealth (after education expenses) is zero, the wealth equation can be written as:

$$\ln A_3 = \ln \frac{\beta R - g}{1+\beta} + \ln ew_2.$$

Note that it is impossible to cleanly disentangle the effect of the income growth rate from preferences, even when controlling for current income. However if the wealth equation is instead written in terms of the wealth income ratio, then this problem dissappears:

$$\frac{A_3}{ew} = \frac{\beta}{1+\beta} R - \frac{g}{1+\beta}. \tag{2}$$

Thus an implication of the theory is that if the wealth variable is specified as a fraction of income to date, the effect of income growth is separable from that of preferences, as represented by the discount factor.

Variation in savings and education across individuals can generally be attributed to differences in ability, discount factors, initial wealth or measurement error. With respect to the wealth equation, we are particularly concerned with measurement error, as the model implies ability plays no role, and wealth variables in the PSID are commonly thought to be imprecisely measured. With respect to the education equation on the other hand, we are especially concerned about the role of ability.

We model these sources of heterogeneity as random variation around some society-wide average that is the same across generations. Ability is assumed to contain a family component. For individual i of family j we write ability as:

$$\ln a_{ij} = \overline{a} + \overline{a_j} + \xi_j + \zeta_{ij}.$$

In this equation, the family component of ability contains an observed component $\overline{a_j}$ and an unobserved component ξ_j.Finally there is an idoscyncratic component ζ_{ij}. Initial resources A_1 may also be observed with error, so we write this as :

$$\ln A_1 = \overline{A_1} + \chi_{ij}$$

where $\overline{A_1}$ represents the observed component, and χ_{ij} the residual. With respect to the discount factor, we assume that the functions $D_h(\beta)$ defined above can be written so that for coefficient h of individual i of family j, we can write:

$$\delta_{hij} = \overline{\delta}_h + \delta_{hj} + \upsilon_{hij}.$$

It is likely that wealth measurements in the PSID contain substantial measurement error; we include this as a new term ε that appears in equation

(2). Since we assume everyone faces the same constant interest rate, we drop the term R from the equation. We can now rewrite this equation as.

$$\begin{aligned}
\frac{A_3}{ew} &= \delta_{1ij} + \delta_{2ij} g_{ij} + \varepsilon_{ij} \\
&= \left[\overline{\delta}_1 + \overline{\delta}_2 g_{ij}\right] + \left[\delta_{1j} + \delta_{2j} g_{ij}\right] + \left[\upsilon_{2ij} g_{ij} + \upsilon_{1ij} + \varepsilon_{ij}\right] \quad (3) \\
& \left[\overline{\delta}_1 + \overline{\delta}_2 g_{ij}\right] + u^s_{ij}. \quad (4)
\end{aligned}$$

The first bracket contains those terms that are predictable in a regression equation; the rest the residual terms. The second bracket contains the component of the residual that is due to the family effect, and the final term the component that is idiosyncratic.

In a similar spirit, the education decision rule can be rewritten as:

$$\begin{aligned}
\ln e_{ij} &= \ln a_{ij} + \ln A_{1ij} + \ln \delta_{3ij}. \\
&= \left[\overline{a} + \overline{a_j} + \overline{\delta}_3 + \overline{A_{1ij}}\right] + \left[\xi_j + \delta_{3j}\right] + \left[\chi_{ij} + \zeta_{ij} + \upsilon_{3ij}\right] \quad (5) \\
&= \left[\overline{a} + \overline{a_j} + \overline{\delta}_3 + \overline{A_{1ij}}\right] + u^e_{ij}. \quad (6)
\end{aligned}$$

Again, the first term represents the predictable portion of the variation, including the observable components of ability and family resources, the second term the family component of the residual, and the third the idiosyncratic component.

The residuals of these equations are therefore:

$$\begin{aligned}
u^s_{ij} &= \left[\delta_{1j} + \delta_{2j} g_{ij}\right] + \left[\upsilon_{2ij} g_{ij} + \upsilon_{1ij} + \varepsilon_{ij}\right] \\
u^e_{ij} &= \left[\xi_j + \delta_{3j}\right] + \left[\chi_{ij} + \zeta_{ij} + \upsilon_{3ij}\right]
\end{aligned}$$

In the previous section we showed that education and wealth residuals would be correlated because they were both functions of the discount factor. We now ask what assumptions must be made for such correlation to be interpreted as arising from discount factor variation. Combining the two equations, (3) and (5), we can solve for the covariance:

$$cov\left(u^e_{ij}, u^s_{ij}\right) = E\left[\left(\left[\xi_j + \delta_{3j}\right] + \left[\chi_{ij} + \zeta_{ij} + \upsilon_{3ij}\right]\right)\left(\left[\delta_{1j} + \delta_{2j} g_{ij}\right] + \left[\upsilon_{2ij} g_{ij} + \upsilon_{1ij} + \varepsilon_{ij}\right]\right)\right].$$

Our concern is with terms unrelated to discount factor variation that are non-zero. Thus we need to assume that $E\left[\chi_{ij}\varepsilon_{ij}\right] = E\left[\zeta_{ij}\varepsilon_{ij}\right] = 0$; in other words, the unobserved components of ability and initial resources are uncorrelated with the measurement error in the wealth-income ratio. Under this assumption, covariance between the wealth-ratio residual and the education residual indicate heterogeneity in discount factors.

Define $\sigma^2_h = var\left(\delta_h\right), h = 1, 2, 3,$ and $\sigma_{hj} = cov\left(\delta_{hj}\right), h, j = 1, 2, 3, h \neq j$. Let σ^ν_{hj} indicate the covariance between the idiosyncratic components. Explicit expressions for both types of covariance can be derived from equation (1) above. If the discount factor is defined so as to be orthogonal to ability, then under the above assumptions, since the individual discount-factor components ν_{hij} are uncorrelated with the family effects δ_{hj}, the covariance between education and own wealth residual is given by:

$$cov\left(u^e_{ij}, u^s_{ij}\right) = E\left[\left(\delta_{3j}\right)\left(\left[\delta_{1j} + \delta_{2j} g_{ij}\right]\right)\right] = \left(\sigma_{13} + \sigma^\nu_{13}\right) + \left(\sigma_{23} + \sigma^\nu_{23}\right) g_{ij}.$$

A direct implication of this equation is that education will predict savings. Hence it is important not to control for education when constructing measures of the wealth residual.

Identifying Parent-Child Correlation in Discount Factors

Since the error terms in equations (3) and (5) are likely to be significant relative to the effect of variations in β, it would be naive to interpret all variation in the above wealth or education residuals as due to variations in β and g. However, if the measurement error ε is uncorrelated across generations, we can take advantage of the presence of parents in the data to identify the portion of the residual that is due to the family component of the discount factor. Since this method fails to distinguish idiosyncratic discount-factor variation from noise, the variation identified here is a lower bound on the actual discount-factor heterogeneity.

Note that by definition of the family effects δ_{hj}, the following restriction holds for child k and parent p of family j:

$$E\left[\upsilon_{hjk}\ \upsilon_{hjp}\right] = 0 \quad h \in \{1, 2, 3\}.$$

To interpret correlation of the residuals of the wealth correlation as an indicator of preference correlation, we need to assume that measurement error is uncorrelated across generations, and uncorrelated with the idiosyncratic component of preferences. The identifying restrictions we impose are:

$$\begin{aligned} E\left[\varepsilon_{jk}\varepsilon_{jp}\right] &= 0 \\ E\left[\delta_{hj}\varepsilon_{ji}\right] &= 0 \quad h, j = 1, 2, 3, i \in \{k, p\} \\ E\left[\upsilon_{hji}\delta_{fj}\right] &= 0 \quad h, f = 1, 2, 3, i \in \{k, p\}. \end{aligned}$$

The first restriction says that measurement errors are uncorrelated across generations. The second that measurement errors are uncorrelated with the family effects δ, and the third that they are uncorrelated with the idiosyncratic components of the discount factor.The latter two restrictions are necessary to ensure that the residuals are monotonic in the discount factor.

The covariance of the wealth-ratio residuals of the parent p and the child k of family j is given by:

$$\begin{aligned} cov\left[u^s_{jk}, u^s_{jp}\right] &= E\left\{\left[(\delta_{1j} + \upsilon_{1jk}) + (\delta_{2j} + \upsilon_{2jk})\, g_{jk} + \varepsilon_{jk}\right] \right. \\ &\quad \left. \times \left[(\delta_{1j} + \upsilon_{1jp}) + (\delta_{2j} + \upsilon_{2jp})\, g_{jp} + \varepsilon_{jp}\right]\right\} \\ &= \sigma_1^2 + \sigma_{12}\left[g_{jp} + g_{jk}\right] + \sigma_2^2 g_{jk} g_{jp}. \end{aligned}$$

Hence correlation in the residuals is driven by correlation in the discount factors and correlation in growth rates of income.

To the extent that discount factors enter the residual, the parent's savings residual should also play a role in explaining the child's educational choice. We assume that the unobserved portion of child's ability is uncorrelated with the family effects or idiosyncratic components of the discount factor functions δ. The covariance with the parent's wealth residual is then given by

$$\begin{aligned} cov\left[u^e_{jk}, u^s_{jp}\right] &= E\left\{\left[\xi_j + \delta_{3j}\right] + \left[\chi_{ij} + \zeta_{ij} + \upsilon_{3ij}\right]\right. \\ &\quad \left. \times \left[\left(\delta_{1j} + \upsilon_{1jp}\right) + \left(\delta_{2j} + \upsilon_{2jp}\right) g_{jp} + \varepsilon_{jp}\right]\right\} \\ &= \sigma_{13} + \sigma_{23} g_{jp}. \end{aligned}$$

Parent's wealth is less strongly related to children's education than the child's own wealth residual, but the covariance is still positive. Hence parental wealth residuals will predict children's education.

Appendix A2: Data and Variables

Table A2 shows the means and medians for each year of the variables used in the first-stage estimations of the wealth-income ratio specifications. The table has two parts, one for men, one for women, each subdivided in turn into those who were classed as household head or spouse in 1968, and those who were classed as children of a household head or spouse. The wealth-income ratio has a mean of 0.32 for fathers in 1989, but the median is much lower, about 0.23. In the other years, both mean and median are substantially lower, around 0.2 and 0.14, respectively. For the children, the ratio is also higher in 1989, 0.28 on average, but drops to an average of about 0.2 and a median of 0.1. Overall, it appears that while most children appear to have savings rates lower than those of most parents, the two generations are, on average, remarkably similar.

About 82-85% of the father's sample is married at any point in time, while in the son's sample, the married fraction grows from 0.75 to 0.82. For women, the fraction of married mothers declines slightly over time, from 0.64 to 0.61, while the fraction of daughters married remains level at 0.74. Marriage is here taken to include cohabitation without legal marriage.

The value of cumulative household income, compounded at 4% per year, is reported in units of 100,000 1997 dollars. As should be expected, this variable is much higher for parents than children, as the children's income only begins during the survey period, while the adults all report income from the beginning of the period. Thus in 1989, the value of cumulative income for fathers is $876,000, $753,000 for mothers, $406,000 for sons and $407,000 for daughters. By 2001, these numbers have risen respectively to approximately $2.4 million, $2.1 million, $1.4 million and $1.4 million. Non-asset income is predicted to grow quite strongly until retirement; about 30% higher than average family income for the median parents in 1989, and more than double for the median son's household, while the growth rates are more modest for the women's households. Retirement income (also measured in units of 100,000 1997 dollars) is also predicted to be much higher for men ($32,000 for the average father, compared to $23,000 for the average woman in 2001). Women's lower income, whether expressed in levels or growth rates, reflects both the economic success of single male households relative to single female households, and the lower fraction of married among the women.

About 21% of the mothers and 30% of the fathers attended college, but these fractions rise with attrition of the less educated as the sample ages. The fraction of the children that attended college is about 55-60%, and does not appear to differ significantly by sex.[2]

Table A2 breaks out related statistics for the family sample, which is partitioned by sex of the child and according to whether the child was older than 15 years in 1968. An important statistic that we use is the standard

[2] The disparities in the parental patterns of business ownership between sons and daughters suggests that attrition from the family sample may be non-random. The alternative hypothesis, that the business ownership decisions depends on the sex-mix of one's children, seems far less plausible.

deviation of the wealth residual, which is on the order of 0.15 for both the parents and the children. The fraction of children who were married in both 1994 and 1999 is 0.62 and 0.69 for the sons, and 0.50 and 0.59 for the daughters; this is lower than the averages of 0.77 and 0.74 reported for 1994 in Table 1, reflecting the instability of marriages in the US.

Business ownership rates were between 10% and 20% for the mothers, 5% for the younger kids and 7-8% for the older kids. About 5-6% of the sons were African-American, compared to about 16% of the daughters, suggesting that the attrition rate by race differs strongly across sexes. The mothers were about 36 years old on average in 1968 in the case of the younger children and about 44 years old in the case of the older children; the children were age 9 and 18 years on average, respectively. About 90% of the mothers were married continuously over the period 1984-1994, compared to only about 60% of the children over the period 1989-2001.

Mean wealth for mothers is much higher for the sons than for the daughters in the sample. Assuming that the population sex ratios are independent of parental wealth, this suggests that attrition among males is more closely associated with poor parents than is the case for women. Mean wealth of the parents of younger sons in the sample is $273,219, compared to $210,992 for daughters. Median wealth of the parents in 1984 is of course much lower; $32,510 for the younger sons, and $19,351 for the younger daughters.

The parent's marriage variable in Table ?? **Table number to be added** is set equal to 1 if the parents of the child were still head and spouse of the household the year before the child ceased to be listed as a child in the PSID, i.e. the year before the child left home. The motivation is that the effect of parents on child behavior may be weakened if the family splits up before the child leaves home. Table **to be added** shows that 86% to 92% of the children in the sample left home while their parents were married and living together.

Since the conditions for appearing in this sample are quite stringent, it is useful to know in which ways this sample differs with respect to those statistics reported in Table 1. It is reassuring to see that the fraction of college educated is about the same in both tables, and that the business ownership rates of the mother's household average to the same rate as observed in Table **to be added**.

The sample size shrinks over time, from a total of 2905 in 1989 to 1907 in 2001; the size of the parents sample in 2001 is only 53% of the original sample size, while that of the children is 76%. If this shrinkage were due to people opting out of the survey, then we would be concerned that the attrition was systematically related to the variables that play a key role in our analysis. However most of the attrition of parents does not involve choices by the householders or other selection on model variables. Approximately 300 fathers and 200 mothers have died, and many families were dropped when the PSID discontinued over-sampling of the Hispanic population. Finally, we also report whether the parents are dead by the end of the survey period. Fathers of about 15% of the younger children have died, and 36% of the fathers of older children are dead, compared to only 10% and 20% of mothers respectively. What matters most for tracking the flow of unmeasured bequests is knowing whether both parents are dead, as bequests typically only reach the child after the second parent, usually the mother, has died. Of the younger children, only 6% have both parents dead, compared to 11% of the older children.

In Appendix 3, we explore the issue of sample attrition over the period 1968-2001. It is well-known that there has been substantial attrition, and for our family sample, we find attrition rates around 50% for both parents and children. While the most important source of attrition is the decision by the survey administrators to drop the Hispanic sample in 1997, other sources of attrition are death of the parents and the PSID losing track of children who move out from their parent's households. These latter two sources are cause for concern because they may be related to the degree to which parents influence their children's behavior. When we test for the effects of sample attrition on our main result, however, we find the attrition effect to be insignificant.

Table A2.a: Men's Wealth Regression Samples

Year	Variable	Fathers Mean	Fathers Std. Dev.	Fathers Median	Sons Mean	Sons Std. Dev.	Sons Median
1989	Wealth Ratio	0.32	(2.30)	0.23	0.28	(2.87)	0.15
	Wealth Level ($100,000)	3.55	(51.81)	1.7	1.15	(20.27)	0.43
	Family Size	2.5	(6.09)	2	3.07	(7.89)	3
	Married	0.85	(1.99)	1	0.75	(2.26)	1
	Cumulative Value of Previous Income	8.76	(33.61)	7.75	4.06	(16.09)	3.54
	Growth Rate of Pre-Retirement Income	0.57	(5.36)	0.31	1.35	(5.45)	1.16
	Growth Rate of Post-Retirement Income	-0.05	(5.76)	-0.24	0.13	(3.33)	-0.01
	Owns Business	0.18	(2.15)	0	0.13	(1.79)	0
	Average Annual Retirement Income	0.26	(1.82)	0.18	0.31	(1.33)	0.26
	Age	60.53	(65.28)	60	33.99	(30.51)	34
	Attended College	0.32	(2.59)	0	0.56	(2.60)	1
	Black	0.07	(1.40)	0	0.08	(1.42)	0
	N	1337	1337	1337	1448	1448	1448
1994	Wealth Ratio	0.21	(1.19)	0.15	0.23	(2.52)	0.12
	Wealth Level ($100,000)	3.76	(42.48)	1.85	1.55	(18.24)	0.69
	Family Size	2.28	(5.00)	2	3.17	(7.83)	3
	Married	0.84	(1.94)	1	0.77	(2.21)	1
	Cumulative Value of Previous Income	14.28	(50.62)	12.31	7.4	(29.53)	6.4
	Growth Rate of Pre-Retirement Income	0.45	(3.93)	0.32	0.77	(2.89)	0.69
	Growth Rate of Post-Retirement Income	-0.13	(5.02)	-0.29	-0.17	(1.66)	-0.22
	Owns Business	0.17	(1.97)	0	0.15	(1.87)	0
	Average Annual Retirement Income	0.29	(1.83)	0.2	0.32	(1.43)	0.26
	Age	62.79	(53.68)	63	38.07	(32.16)	38
	Attended College	0.38	(2.55)	0	0.61	(2.57)	1
	Black	0.06	(1.21)	0	0.08	(1.41)	0
	N	1172	1172	1172	1541	1541	1541
1999	Wealth Ratio	0.22	(2.33)	0.13	0.18	(2.07)	0.1
	Wealth Level ($100,000)	5.34	(87.47)	2.19	2.55	(43.65)	1.01
	Family Size	2.08	(3.74)	2	3.07	(7.81)	3
	Married	0.83	(1.98)	1	0.8	(2.18)	1
	Cumulative Value of Previous Income	20.77	(77.57)	17.91	12.45	(49.68)	11.08
	Growth Rate of Pre-Retirement Income	0.36	(3.02)	0.3	0.49	(2.17)	0.45
	Growth Rate of Post-Retirement Income	-0.22	(3.52)	-0.35	-0.3	(1.11)	-0.32
	Owns Business	0.14	(1.85)	0	0.15	(1.97)	0
	Average Annual Retirement Income	0.32	(2.07)	0.22	0.34	(1.50)	0.28
	Age	66.19	(48.35)	66	43.84	(33.89)	44
	Attended College	0.41	(2.58)	0	0.63	(2.64)	1
	Black	0.05	(1.12)	0	0.08	(1.49)	0
	N	729	729	729	921	921	921
2001	Wealth Ratio	0.22	(1.75)	0.12	0.2	(3.19)	0.11
	Wealth Level ($100,000)	6.15	(90.98)	2.48	3.01	(80.56)	1.27
	Family Size	2.07	(3.77)	2	3.09	(7.79)	3
	Married	0.83	(1.96)	1	0.82	(2.12)	1
	Cumulative Value of Previous Income	23.89	(92.43)	20.78	13.84	(55.16)	12.05
	Growth Rate of Pre-Retirement Income	0.35	(2.78)	0.32	0.43	(2.12)	0.4
	Growth Rate of Post-Retirement Income	-0.27	(2.79)	-0.4	-0.32	(1.06)	-0.35
	Owns Business	0.16	(1.91)	0	0.14	(1.89)	0
	Average Annual Retirement Income	0.32	(2.03)	0.23	0.35	(1.56)	0.28
	Age	66.84	(44.24)	67	45.1	(34.62)	45
	Attended College	0.44	(2.57)	0	0.64	(2.65)	1
	Black	0.05	(1.11)	0	0.08	(1.48)	0
	N	692	692	692	1051	1051	1051

Table A2.b: Women's Wealth Regression Samples

Year	Variable	Mothers Mean	Mothers Std. Dev.	Mothers Median	Daughters Mean	Daughters Std. Dev.	Daughters Median
1989	Wealth Ratio	0.3	(2.18)	0.21	0.28	(2.42)	0.14
	Wealth Level ($100,000)	2.86	(44.79)	1.24	1.22	(13.05)	0.41
	Family Size	2.26	(6.35)	2	3.21	(6.92)	3
	Married	0.64	(2.62)	1	0.73	(2.26)	1
	Cumulative Value of Previous Income	7.53	(31.49)	6.62	4.07	(15.66)	3.35
	Growth Rate of Pre-Retirement Income	0.49	(5.12)	0.29	0.94	(4.65)	0.74
	Growth Rate of Post-Retirement Income	-0.1	(4.07)	-0.27	-0.04	(2.63)	-0.15
	Owns Business	0.14	(1.90)	0	0.16	(1.84)	0
	Average Annual Retirement Income	0.2	(1.14)	0.14	0.26	(1.18)	0.21
	Age	60.61	(70.68)	60	32.79	(27.55)	33
	Attended College	0.21	(2.21)	0	0.54	(2.53)	1
	Black	0.09	(1.56)	0	0.12	(1.63)	0
	N	1914	1914	1914	1530	1530	1530
1994	Wealth Ratio	0.2	(1.23)	0.14	0.25	(6.61)	0.1
	Wealth Level ($100,000)	3.01	(37.06)	1.39	1.58	(22.89)	0.58
	Family Size	2.02	(5.05)	2	3.3	(6.97)	3
	Married	0.61	(2.58)	1	0.74	(2.24)	1
	Cumulative Value of Previous Income	12.34	(50.15)	10.71	7.44	(28.22)	6.16
	Growth Rate of Pre-Retirement Income	0.35	(4.04)	0.22	0.48	(2.47)	0.4
	Growth Rate of Post-Retirement Income	-0.18	(3.64)	-0.35	-0.27	(1.37)	-0.3
	Owns Business	0.13	(1.78)	0	0.15	(1.82)	0
	Average Annual Retirement Income	0.21	(1.18)	0.16	0.26	(1.20)	0.21
	Age	63.44	(61.43)	63	37.21	(28.97)	37
	Attended College	0.25	(2.28)	0	0.57	(2.52)	1
	Black	0.08	(1.47)	0	0.12	(1.63)	0
	N	1678	1678	1678	1718	1718	1718
1999	Wealth Ratio	0.2	(2.62)	0.11	0.16	(1.59)	0.09
	Wealth Level ($100,000)	4.26	(81.89)	1.71	2.15	(21.60)	0.85
	Family Size	1.82	(3.99)	2	3.15	(7.28)	3
	Married	0.61	(2.67)	1	0.74	(2.27)	1
	Cumulative Value of Previous Income	18.06	(72.30)	15.6	12.59	(48.93)	10.42
	Growth Rate of Pre-Retirement Income	0.26	(3.36)	0.18	0.28	(1.78)	0.23
	Growth Rate of Post-Retirement Income	-0.27	(2.66)	-0.4	-0.37	(0.87)	-0.4
	Owns Business	0.11	(1.73)	0	0.14	(1.79)	0
	Average Annual Retirement Income	0.23	(1.27)	0.17	0.28	(1.30)	0.22
	Age	66.77	(56.53)	67	42.59	(29.06)	43
	Attended College	0.26	(2.40)	0	0.62	(2.52)	1
	Black	0.07	(1.40)	0	0.11	(1.64)	0
	N	1013	1013	1013	1006	1006	1006
2001	Wealth Ratio	0.19	(1.52)	0.11	0.19	(2.42)	0.09
	Wealth Level ($100,000)	4.39	(49.13)	1.91	2.71	(38.97)	0.98
	Family Size	1.84	(4.26)	2	3.2	(7.57)	3
	Married	0.61	(2.62)	1	0.74	(2.31)	1
	Cumulative Value of Previous Income	20.91	(85.04)	17.78	13.74	(54.30)	11.38
	Growth Rate of Pre-Retirement Income	0.24	(3.01)	0.18	0.22	(1.62)	0.19
	Growth Rate of Post-Retirement Income	-0.31	(2.50)	-0.44	-0.4	(0.84)	-0.41
	Owns Business	0.11	(1.66)	0	0.13	(1.79)	0
	Average Annual Retirement Income	0.23	(1.31)	0.17	0.27	(1.26)	0.21
	Age	67.54	(53.32)	67	44.01	(29.97)	44
	Attended College	0.27	(2.37)	0	0.62	(2.56)	1
	Black	0.08	(1.42)	0	0.11	(1.65)	0
	N	954	954	954	1165	1165	1165

Appendix A3: Measuring Unobserved Ability

Our proxy variable for unobserved ability is the residual of a standard wage equation, estimated by least-squares. The equation we estimate is

$$\log(w_{it}) = \alpha_0 + \alpha_1 X_{it} + \sum_{j=1}^{N_e} \alpha_{2j} E_{ij} + \alpha_3 T_t + \varepsilon_{it}.$$

We include in X_{it} the years of potential experience, which we set equal to age minus years of education minus six. The variable E_i refers to the education level of person, which we represent a set of dummy variables for high-school diploma and beyond. The N_e education variables are set to one for each level the respondent has completed, thus the interpretation of the coefficient α_2 is the additional wage for completing this level, given completion of previous levels. Other variables are controls for region, race, rural or urban status, and marital status. We also included dummy variable for the year of the observation.

This differs from a standard Mincer wage equation only in that we do not model education as number of years. This is appropriate because we are not interested in estimating rate of return of education but rather in measuring the component of wages that is orthogonal to education.

The urban location is categorized by the size of the largest city in the MSA; if the population exceeds 500,000 the respondent is then classed as living in a large city. People are assigned to regions according to the state in which they live:

NORTHEAST	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont
NORTH CENTRAL	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
SOUTH	Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina Oklahoma, South Carolina, Tennessee,Texas,Virginia, Washington DC, West Virginia
WEST:	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

We run the regressions separately for men and women. The sample includes everyone in the PSID for each year they are between 25 and 65 years old and report earnings and hours that result in an hourly wage between \$5 and \$100 per hour. This results in 44,917 observation for men and 42,154 for women.

The results are reported in Table A3.1. All of the variables discussed above turn out to have effects on predicted wages that are statistically significant, usually at the 0.0001 level, although the effects are often quite different for men than for women. Wages are 12-13% higher for high-school graduates, 8-9% higher for people who attended college,26-28% higher for college graduates. In addition, women's wages are 18% higher than those of college grads if they complete a master degree, and an additional 25% higher if they have a professional degree. For men these latter two effects are much smaller. Being black results in a wage penalty for men of 16%, twice as high as for women, while being married raises men's wages and lowers those of women. People in the northeast have wages that are 8-9% higher than in the North-Central region, while in the South, wages are 2-4% lower. Living in a rural area is associated with wages 11-13% lower than in small to medium towns, while living in a big city raises men's wages by 9% but women's by only 6%.

The residual is defined as the reported wage minus the predicted wage. Since the estimates on which it is based seem generally consistent with known patterns of inequality, we think of this as a non-controversial measure of unobservable heterogeneity, though not all researchers will agree on what it measures. Nevertheless the interpretation of unobserved ability is quite standard.

Table A3.1: Mincer Regression Estimates

Variable	Statistic	Men	Women
Years of Potential Experience	Parameter Estimate	0.0392 ***	0.0422 ***
	Standard Error	(0.003)	(0.003)
Experience Squared	Parameter Estimate	-0.0007 ***	-0.0015 ***
	Standard Error	(0.000)	(0.000)
Experience Cubed	Parameter Estimate	0 *	0 ***
	Standard Error	(0.000)	(0.000)
High-School Graduate	Parameter Estimate	0.1226 ***	0.1277 ***
	Standard Error	(0.006)	(0.006)
Attended College	Parameter Estimate	0.0897 ***	0.0818 ***
	Standard Error	(0.006)	(0.007)
College Graduate	Parameter Estimate	0.2766 ***	0.2578 ***
	Standard Error	(0.007)	(0.009)
Master's Degree	Parameter Estimate	0.0198	0.1801 ***
	Standard Error	(0.013)	(0.015)
Professional degree or Doctorate	Parameter Estimate	0.1166 ***	0.2541 ***
	Standard Error	(0.021)	(0.033)
Black	Parameter Estimate	-0.1587 ***	-0.0847 ***
	Standard Error	(0.012)	(0.012)
White	Parameter Estimate	-0.014	0.0082
	Standard Error	(0.010)	(0.011)
Married	Parameter Estimate	0.1121 ***	-0.0387 ***
	Standard Error	(0.006)	(0.005)
Lives in North East	Parameter Estimate	0.0758 ***	0.0905 ***
	Standard Error	(0.007)	(0.007)
Lives in South	Parameter Estimate	-0.0391 ***	-0.022 ***
	Standard Error	(0.006)	(0.007)
Lives in West	Parameter Estimate	0.0326 ***	0.0435 ***
	Standard Error	(0.007)	(0.008)
Lives in Rural Area	Parameter Estimate	-0.1209 ***	-0.1076 ***
	Standard Error	(0.005)	(0.006)
Lives in Big City	Parameter Estimate	0.0913 ***	0.0572 ***
	Standard Error	(0.007)	(0.007)

Appendix A4: Prediction of Income

Income in the future is imputed on the basis of observed income plus other variables, such as education, age and occupation. For this purpose we partition later life into two periods: 56-70 and 71-90, and estimate non-asset income equations separately by sex and age interval on the wage sample. Since the sample also includes some children who were aged 1 in 1968 and hence 33 in 2001, we also predict income for ages 45-55 on the basis of age 30-44 information.

The data set for the income estimation consists of all members of the PSID sample who were household head or spouse and reported receiving income during the age intervals required for each estimation. An observation is an individual in a given year. The total number of observations is 10,111.

We estimate 6 income-prediction equations for each late-life non-asset income variable:

Model	Dependent Age Interval	Explanatory Age Interval
1	45-55	30-44
2	56-70	46-55
3	70-90	56-70
4	55-70	30-44
5	70-90	30-44
6	70-90	46-55

The dependent variables are the means and variances of non-asset household income over the age interval.

In addition to income, the explanatory variables include the occupation and industry of the household head at the start of the explanatory age interval. Occupation and industry were initially reported in the PSID in a variety of formats, from 1 to 3 digits. In the regression they are aggregated to one-digit codes 0 - 9. The regression excludes two categories; one because it is too rare, and causes some zero cells, the other as an intercept term.

The regressions are estimated by sex of the respondent. The variances are transformed into coefficients of variation, the means into logs, in order to minimize heteroscedasticity.

Descriptive statistics of these variables are given in Table A4.1. The estimation results for the means are given in Table A4.2. The predictive power of the equations is quite good; the R-squared ranging from 25% to 57%. Current income has a positive effect on future income, though this is hard to see from the table because the specification is quadratic.

Table A4.1 Income Prediction Variables

Variable	N	Mean	Std Dev
ind1	12032	0.055	0.228
ind2	12032	0.025	0.155
ind3	12032	0.131	0.337
ind4	12032	0.072	0.258
ind5	12032	0.069	0.253
ind6	12032	0.139	0.346
ind7	12032	0.061	0.239
ind8	12032	0.084	0.277
ind9	12032	0.199	0.399
ind10	12032	0.007	0.086
occ1	12032	0.116	0.320
occ2	12032	0.134	0.341
occ3	12032	0.052	0.221
occ4	12032	0.093	0.291
occ5	12032	0.144	0.351
occ6	12032	0.108	0.310
occ7	12032	0.104	0.305
occ8	12032	0.049	0.217
occ9	12032	0.035	0.184
occ10	12032	0.011	0.103
inc0	12023	9.937	0.834
inc0_sqr	12023	99.432	16.456
cv_inc0	11760	950.643	1375.790
cv_inc0_sqr	11760	2796370.870	30051701.400
hours0	12018	1461.090	878.056
hours0_sqr	12018	2905702.970	2478394.930
cv_hours0	10823	0.557	0.708
cv_hours0_sqr	10823	0.811	1.980
hs_grad	11908	0.604	0.489
coll	11908	0.280	0.449
coll_ba	11908	0.144	0.351
AGE68	11477	33.281	10.468

Table A4.2: Estimated Coefficients for Prediction of Future Income

		Men						Women					
		1	2	3	4	5	6	1	2	3	4	5	6
Intercept		-0.367	-2.231	4.311	-5.800	7.780	0.027	0.573	7.882	6.268	4.695	-50.435	1.295
Industry:	1	-0.076	0.026	0.180	-0.086	0.103	-0.630	0.055	-0.205	-0.035	0.322	0.338	-0.374
	3	0.069	-0.113	-0.024	0.036	0.533	-0.106	0.013	-0.096	0.256	0.297	0.553	0.033
	4	-0.040	0.032	-0.015	0.063	0.378	-0.485	0.029	0.133	-0.057	0.208	0.221	-0.051
	5	-0.182	-0.105	0.152	0.055	0.635	-0.255	0.130	-0.026	0.104	0.297	0.432	-0.046
	6	-0.096	-0.093	0.064	0.071	0.479	-0.113	0.043	-0.017	0.107	0.394	0.417	-0.084
	7	0.060	-0.048	-0.018	-0.079	-0.244	-0.623	-0.159	-0.059	0.082	0.264	0.377	0.028
	8	-0.063	-0.216	0.318	0.149	0.165	-0.365	0.003	-0.004	0.045	0.321	0.242	0.040
	9	0.055	0.005	0.143	0.036	0.503	-0.116	0.102	0.151	0.170	0.394	0.478	0.043
Occupation	1	0.141	0.170	0.022	-0.115	-0.642	0.183	0.137	0.082	0.067	0.121	0.067	0.155
	2	0.157	0.089	0.183	-0.150	-0.797	-0.016	0.140	0.154	0.041	-0.074	0.234	-0.091
	3	0.116	0.148	0.086	-0.321	-0.188	0.169	0.059	-0.172	0.242	-0.210	0.152	-0.131
	4	0.090	0.087	-0.127	-0.161	-0.352	0.089	0.202	-0.037	0.074	-0.172	-0.042	-0.110
	5	0.091	0.096	-0.105	-0.239	-0.426	-0.131	0.104	-0.112	-0.099	-0.300	-0.153	-0.094
	6	0.033	0.000	0.012	-0.219	-0.455	-0.055	0.093	-0.091	-0.224	-0.283	0.239	-0.273
	7	0.002	0.002	-0.363	-0.325	-0.708	-0.179	0.036	-0.103	0.016	-0.248	0.210	-0.049
	8	0.001	0.022	-0.042	-0.050	-0.307	0.286	0.077	-0.044	-0.265	-0.243	-0.069	0.272
Household Income		1.425	1.649	0.026	2.439	-2.005	-0.266	0.973	-0.382	-0.478	-0.129	-0.754	-0.812
Household Income Squared		-0.030	-0.046	0.036	-0.095	0.146	0.052	-0.003	0.056	0.058	0.044	0.072	0.076
CV of Income		0.653	-0.204	-0.269	0.823	-0.843	1.818	0.499	-0.512	-0.710	0.214	-1.661	-0.330
CV of Income Squared		-0.673	-0.074	-0.097	-0.555	0.639	-3.162	-0.387	0.173	0.421	-0.444	1.227	0.076
Hours		-0.001	0.000	-0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Hours Squared		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CV of Hours		-1.085	-0.047	0.157	-0.299	0.047	0.255	-0.143	-0.310	-0.219	0.009	-0.266	-0.200
CV of Hours Squared		0.259	-0.017	-0.108	0.024	0.220	-0.136	0.002	0.095	0.048	0.003	0.118	0.062
High-School Graduate		0.033	0.096	-0.017	0.181	-0.144	-0.053	0.120	0.086	-0.050	0.134	0.119	0.034
College		-0.023	0.159	-0.127	0.129	0.018	-0.024	0.093	-0.056	0.091	-0.084	-0.278	0.078
Bach. Degree		0.117	0.134	0.349	0.222	0.884	0.319	0.133	-0.012	0.073	0.044	0.476	0.095
Age in 1968		0.003	0.030	0.074	0.089	0.323	0.301	0.024	0.041	0.104	0.154	3.025	0.406
Age Squared		0.001	0.000	0.000	-0.001	-0.003	-0.003	0.000	-0.001	-0.001	-0.002	-0.038	-0.004
R-Squared		0.485	0.489	0.456	0.429	0.361	0.414	0.574	0.553	0.422	0.442	0.251	0.339

A5. Attrition from the PSID

In this appendix, we document the extent of sample attrition, and for those who drop out after 1989, its relation to household wealth in 1984 and 1989.[3]

The PSID was designed as a representative survey with additional sample supplements to cover minorities of special interest, such as the poor or Hispanics. The theoretical sample in any given year consists of all people who were members of the original 1968 sample households, and those who joined households formed by those members over time. As is well-known however, there has been considerable attrition over time. To cope with this and other issues, the PSID supplies each year a set of weighting variables that ensure that the re-weighted sample is representative of the US population originally surveyed in 1968. These weights are used to compute all the results in the paper. Nevertheless, if there is significant sample attrition and if this is related to the unobservable savings tendencies that are the subject of our paper, the possibility of strong biases would remain.

Our "Family" subsample of the PSID consists of those survey respondents who were classified in 1968 as heads, spouse or children in 1968, and satisfy minimum age requirement: over 20 years old and less than 75 years for parents, and over 1 year old and less than 25 for children.

Table A5.1 shows that of the 10,244 people this sample theoretically included, 5855 dropped out by 2001. The rates of attrition by 2001 were 62% for fathers, 58% for mothers, 60% for sons and 51% for daughters. This could be a concern for us if the attrition were related to the phenomena we are trying to measure, especially the similarity in savings behavior between parents and children. Since the decision to participate in the PSID was made by the parents, it may be that those children who drop out of the survey are less like their parents than those who remain. More generally, it may be that whether parents or children, those who drop out have less stable families such that parental values are less likely to be transmitted to the children.

Table A5.1 also shows the average net worth of households in 1984, according to whether they subsequently dropped out of the survey. While the average wealth levels for parents appear independent of whether they remained in the survey; that is not the case for children. Sons who remained in the survey had an average net worth of $84,300 by 1984, compared to $41,255 for those who had left by 2001. Daughters who remained had $60,737, compared to $47,434 for those who left.

[3] 1984 is the first year in which wealth is measured.

Table A5.1 Attrition Rates by Relationship

Relation to 1968 Family Sample	Number in Original Survey	Attrition Rate	Number of Dropouts	Wealth in 1984*	
				Stayed	Left
Father	1637	0.62309	1020	$318,158	$318,078
Son	3259	0.59865	1951	$84,300	$41,255
Daughter	3148	0.51429	1619	$60,737	$47,434
Mother	2200	0.575	1265	$264,829	$262,050
Sum	10244		5855		

Averaged over those who remained in survey in 1984.

Table A5.2 shows that the attrition rates are not concentrated in any particular period. For all categories – fathers, mothers, sons and daughters, the attrition rates are higher in the 1994-2001 period than in earlier periods, but this is because of the decision of the PSID to drop the Latino sub-sample.

Table A5.2: Share of Attrition by Time Interval

relationship in 1968 family	Year	Attrition by Year	
		Count	Percent
Father	1968-83	256	26.89
	1984-93	265	27.84
	1994-2001	431	45.27
Mother	1968-83	181	17.59
	1984-93	191	18.56
	1994-2001	657	63.85
Son	1968-83	447	25.53
	1984-93	477	27.24
	1994-2001	827	47.23
Daughter	1968-83	281	20.14
	1984-93	293	21.00
	1994-2001	821	58.85

A small number of observations could not be assigned attrition dates, due to intermittent appearance in the survey

Table A5.3 shows that before 1993 that the main reason for attrition is death in the case of parents, and moving out or non-response in the case of the children. Since 1993 the main reason non-response has been the decision of the PSID to drop the Latino sub-sample; this accounts for about 40% of the sample attrition of women, 30% of sons and 20% of fathers. This rule is unrelated to unobservables, so we need be concerned only about the attrition that is due to drop-outs and death. Furthermore, if young Hispanics accumulate less wealth when young, this may explain the higher wealth of children who remained in the PSID.

Table A5.3: Reasons for Attrition

Relation to 1968 Family Sample	Before 1984		1984-1993		After 1993			Total
	Died	Moved Out/Non Response	Died	Moved Out/Non Response	Died	Moved Out/Non Response	Latino	
Father	0.30	0.07	0.30	0.07	0.19	0.04	0.20	1.18
Son	0.05	0.21	0.05	0.22	0.02	0.12	0.29	0.96
Daughter	0.02	0.22	0.03	0.22	0.01	0.15	0.39	1.04
Mother	0.29	0.03	0.29	0.03	0.18	0.08	0.37	1.25

To ensure that attrition is not biasing upwards the residual savings correlations between parents and children, we need to compare these correlations for stayers and leavers. Table A5.4 compares wealth residual correlations between parents and children , according to whether the child became non-response between 1989 and 2001. To ensure that the same measure of the savings residuals are used for movers vs. stayers, the residual is computed over 1984-89 only, not 1989-2001 as in the main body of the paper. This results in a more noisy measure of savings tendencies for two reasons: most of the children are too young to have accumulated significant savings, or even to have started households, and there are fewer observations of any given household. Nevertheless, Table A5.4 shows that as in the main body of the paper, there is a strongly significant correlation in wealth residuals between parents and children; the OLS coefficient on parent's wealth residual is 0.08, which is significant at the 0.002 level.

Table A5.4 Child's Wealth Residual and Attrition

Variable*	Model 1	2	3	4	5
momwlthresid	0.080** 3.068	0.080** 3.014	**0.351**** 3.859	**0.080**** 3.014	**0.149**** 3.427
Left survey by 2001		0.010 1.037	0.012 1.323	0.010 1.037	
Left x Parental Wealth Residual		0.001 0.361	0.001 0.227	0.001 0.361	
R-Squared	0.0136	0.0154	0.031	0.0154	0.0215

Intercept and Age variables included but not reported. Dependent variable is Children's wealth residual.
T-statistics are in parentheses.
** indicates means are statistically significant at the 5% level.
* indicates means are statistically significant at the 10% level.

The variable 'Left' indicates whether a child left the survey by 2001. Specification 2 shows that neither this variable, nor its interaction with the parental wealth enter significantly into the model of children's wealth ratio residual. In fact, the coefficient on the parental wealth residual is unchanged by adding these two variables.

These results show that

1. There is substantial attrition from our sample, over 50% to 2001;

2. The attrition is distributed fairly evenly throughout the sample period;

3. Overall the most important single source of attrition is the decision to cut the Latino sample in 1997;

4. For parents, particularly fathers, the other main source of attrition is death;

5. For children, the main source of attrition is moving out followed by non-response;

6. There is no significant difference in wealth residual correlation with parents, computed over 1984-89, between children who became non-response after 1989 and those who stayed to 2001.

Table 1

		Model 1	Model 2	Model 3	Model 4	Model 5
Head	Plans Ahead	-0.014	.	-0.021	.	-0.005
		(0.021)	.	(0.022)	.	(0.021)
	Plans Ahead squared	0.000	.	0.002	.	0.000
		(0.004)	.	(0.004)	.	(0.004)
	Carries out Plans	-0.024	.	-0.025	.	-0.021
		(0.021)	.	(0.022)	.	(0.022)
	Carries out Plans squared	0.003	.	0.003	.	0.003
		(0.004)	.	(0.004)	.	(0.004)
	Prefers Spending to Saving	0.001	.	0.003	.	-0.006
		(0.025)	.	(0.025)	.	(0.025)
	Prefers Spending to Saving squared	-0.001	.	-0.001	.	0.001
		(0.004)	.	(0.004)	.	(0.004)
	Finishes Things	-0.026	.	-0.014	.	-0.033
		(0.025)	.	(0.027)	.	(0.026)
	Finishes Things squared	0.004	.	0.002	.	0.005
		(0.005)	.	(0.005)	.	(0.005)
Spouse	Plans Ahead	.	0.007	0.027	.	0.027
		.	(0.061)	(0.062)	.	(0.060)
	Plans Ahead squared	.	-0.002	-0.004	.	-0.004
		.	(0.010)	(0.010)	.	(0.010)
	Carries out Plans	.	-0.023	-0.017	.	-0.022
		.	(0.073)	(0.074)	.	(0.072)
	Carries out Plans squared	.	0.003	0.003	.	0.004
		.	(0.012)	(0.012)	.	(0.012)
	Prefers Spending to Saving	.	0.017	0.024	.	0.024
		.	(0.023)	(0.023)	.	(0.022)
	Prefers Spending to Saving squared	.	-0.002	-0.004	.	-0.004
		.	(0.004)	(0.004)	.	(0.004)
	Finishes Things	.	-0.078	-0.034	.	-0.020
		.	(0.041)	(0.044)	.	(0.042)
	Finishes Things squared	.	0.012	0.005	.	0.003
		.	(0.007)	(0.007)	.	(0.007)
	Income	.	.	.	-0.966	-0.833
		.	.	.	(0.318)	(0.341)
	Income Squared	.	.	.	0.048	0.041
		.	.	.	(0.015)	(0.016)
	Spouse College	.	.	.	-0.007	-0.007
		.	.	.	(0.013)	(0.014)
	Spouse H.S. Graduate	.	.	.	0.010	0.011
		.	.	.	(0.019)	(0.020)
	Head College	.	.	.	-0.014	-0.020
		.	.	.	(0.015)	(0.015)
	Head H.S. Graduate	.	.	.	-0.007	-0.012
		.	.	.	(0.017)	(0.018)
	R-Squared	0.13	0.065	0.158	0.164	0.268
	N	162	162	162	162	162

standard errors in parentheses . .

Table 2

		Model 1		Model 2
Head	Plans Ahead	0.037	.	
		(2.99)	.	
	Prefers Spending to Saving	.		0.004
		.		(0.33)
Spouse	Plans Ahead	0.023	.	
		(1.85)	.	
	Prefers Spending to Saving	.		-0.024
		.		-(1.93)
	R-Squared	0.11		0.04
	N	160		160

t-statistics in parentheses
controls for age, age squared and age cube not shown

Table 3: Kid's Wealth Residual as function of Parent's Attitudes

Group	Variable	Stat	Sons					Daughters				
			Residual Only	Dad's Attitudes	Mom's Attitudes	Both Parents	Attitudes and residual	Residual Only	Dad's Attitudes	Mom's Attitudes	Both Parents	Attitudes and residual
Age 1-7	Parental Wealth Residual	Estimate	0.198	.	.	.	0.212	0.429	.	.	.	0.416
		StdErr	0.072	.	.	.	0.078	0.105	.	.	.	0.113
		tValue	2.764	.	.	.	2.724	4.078	.	.	.	3.670
		Probt	0.006	.	.	.	0.007	0.000	.	.	.	0.000
	R-Squared		0.04	0.03	0.06	0.10	0.13	0.08	0.03	0.05	0.08	0.15
	N		206	206	206	206	206	196	196	196	196	196
Age 8-15	Parental Wealth Residual	Estimate	0.369	.	.	.	0.209	0.302	.	.	.	0.064
		StdErr	0.117	.	.	.	0.133	0.154	.	.	.	0.176
		tValue	3.155	.	.	.	1.574	1.958	.	.	.	0.363
		Probt	0.002	.	.	.	0.118	0.052	.	.	.	0.718
	R-Squared		0.07	0.06	0.15	0.18	0.20	0.03	0.10	0.13	0.17	0.17
	N		127	127	127	127	127	126	126	126	126	126
Age 16-25	Parental Wealth Residual	Estimate	0.340	.	.	.	0.075	-0.027	.	.	.	-0.133
		StdErr	0.193	.	.	.	0.268	0.127	.	.	.	0.173
		tValue	1.762	.	.	.	0.281	-0.212	.	.	.	-0.767
		Probt	0.084	.	.	.	0.780	0.833	.	.	.	0.450
	R-Squared		0.06	0.19	0.27	0.35	0.35	0.00	0.20	0.18	0.32	0.33
	N		53	53	53	53	53	45	45	45	45	45

Table 4

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Parental Wealth Residual	0.283	0.229	0.144	0.180	0.301	0.195
	(0.039)	(0.039)	(0.047)	(0.078)	(0.043)	(0.058)
Child's Family Income	.	0.044	.	.	.	.
	.	(0.007)	.	.	.	.
Parent's Wealth in 1984	.	.	0.005	.	.	.
(per 100K$)	.	.	(0.002)	.	.	.
Parent's Wealth Squared	.	.	-1.24E-06	.	.	.
(per 100K$^2)	.	.	3.73E-05	.	.	.
Parent's Wealth Cubed	.	.	-2.34E-07	.	.	.
(per 100K$^3)	.	.	1.90E-07	.	.	.
Parents in Top Wealth Quintile	.	.	.	0.028	.	.
	.	.	.	(0.008)	.	.
Parents in Bottom Wealth Quintile	.	.	.	0.001	.	.
	.	.	.	(0.036)	.	.
Parents in Top Wealth Quintile x	.	.	.	-0.069	.	.
Parental Wealth Residual	.	.	.	(0.098)	.	.
Parents in Bottom Wealth Quintile x	.	.	.	0.300	.	.
Parental Wealth Residual	.	.	.	(0.318)	.	.
Both Parents Dead by 1999	.	.	.	.	-0.005	.
	.	.	.	.	(0.009)	.
DeadParents x Parental Residual	.	.	.	.	-0.145	.
	.	.	.	.	(0.132)	.
Older Child x Parental Wealth	.	.	.	.	-0.029	.
Residual	.	.	.	.	(0.109)	.
Child has College Degree		.				0.011
		.				(0.009)
Child Attended College		.				-0.001
		.				(0.008)
Child has High-School Diploma		.				0.003
		.				(0.012)
R-Squared	0.038	0.069	0.080	0.046	0.039	0.094
N	1347	1347	1160	1276	1347	1347

Table 5

	1984-2001							
	Ages				Ages			
	1 to 25		1 to 7		8 TO 15		16 to 25	
Parental Wealth Residual	0.283	0.248	0.307	0.167	0.356	0.388	0.212	0.226
	(0.039)	(0.058)	(0.059)	(0.081)	(0.066)	(0.101)	(0.081)	(0.170)
Woman	.	0.026	.	0.033	.	0.022	.	0.039
	.	(0.008)	.	(0.011)	.	(0.015)	.	(0.019)
Married Woman	.	0.000	.	0.020	.	-0.006	.	-0.010
	.	(0.010)	.	(0.016)	.	(0.016)	.	(0.020)
Married Man	.	-0.007	.	-0.009	.	-0.026	.	0.013
	.	(0.010)	.	(0.021)	.	(0.015)	.	(0.017)
Woman x Parental Wealth Residual	.	-0.037	.	0.216	.	-0.144	.	-0.129
	.	(0.097)	.	(0.129)	.	(0.196)	.	(0.232)
Married Daughter x Parental Wealth Residual	.	0.266	.	0.515	.	0.192	.	0.203
	.	(0.118)	.	(0.200)	.	(0.219)	.	(0.227)
Married Son x Parental Wealth Residual	.	0.085	.	0.273	.	-0.014	.	-0.031
	.	(0.124)	.	(0.317)	.	(0.177)	.	(0.243)
R-Squared	0.038	0.057	0.049	0.097	0.050	0.071	0.027	0.052
N	1347	1347	536	536	559	559	252	252

Standard errors in parentheses

Table 6

		Model 1			Model 2			Model 3			Model 4		
		Finish High School	Attend College	Attain BA	Finish High School	Attend College	Attain BA	Finish High School	Attend College	Attain BA	Finish High School	Attend College	Attain BA
Parental Wealth Residual	marginal	0.187	0.574	0.284	0.179	0.488	0.259	0.306	0.769	0.127	0.281	0.898	0.123
	ProbCh	0.062	0.001	0.018	0.077	0.004	0.030	0.030	0.002	0.462	0.134	0.006	0.595
Parental Wealth Residual Squared	marginal	.	.	.	.	.	.	.	.	.	-3.732	-2.037	-1.589
	ProbCh	.	.	.	.	.	.	.	.	.	0.004	0.382	0.350
Parental Wealth Residual Cubed	marginal	.	.	.	.	.	.	.	.	.	11.041	-1.345	4.922
	ProbCh	.	.	.	.	.	.	.	.	.	0.160	0.926	0.628
Father's Wage Residual	marginal	.	.	.	-0.011	0.103	0.016	-0.013	0.100	0.014	-0.026	0.094	0.010
	ProbCh	.	.	.	0.703	0.026	0.633	0.643	0.031	0.686	0.371	0.047	0.763
Mother's Wage Residual	marginal	.	.	.	0.029	0.186	0.108	0.024	0.184	0.108	0.039	0.181	0.106
	ProbCh	.	.	.	0.303	0.000	0.001	0.375	0.000	0.001	0.193	0.000	0.001
Father's Wage Residual Squared	marginal	.	.	.	.	.	.	.	.	.	0.007	0.119	0.020
	ProbCh	.	.	.	.	.	.	.	.	.	0.876	0.156	0.716
Mother's Wage Residual Squared	marginal	.	.	.	.	.	.	.	.	.	0.112	0.061	-0.023
	ProbCh	.	.	.	.	.	.	.	.	.	0.043	0.513	0.732
Woman x Parental Wealth Residual	marginal	.	.	.	.	.	.	-0.457	-0.669	0.041	-0.449	-0.666	0.026
	ProbCh	.	.	.	.	.	.	0.015	0.039	0.858	0.012	0.040	0.910
African American x Parental Wealth Residual	marginal	.	.	.	.	.	.	1.344	1.165	1.254	0.872	0.936	1.160
	ProbCh	.	.	.	.	.	.	0.026	0.167	0.039	0.127	0.275	0.061
Age Dummy x Parental Wealth Residual	marginal	.	.	.	.	.	.	0.251	0.042	0.291	0.213	0.009	0.295
	ProbCh	.	.	.	.	.	.	0.366	0.920	0.321	0.412	0.984	0.319

Also included in all regressions but not shown: log income, log income squared, log income cubed, mother's age, father's age, mother's age squared, father's age squared, and dummy variables for gender, African American, age, mother a high school graduate, father a high school graduate, mother a college graduate, and father a college graduate.

Table 7 Effect on education of replacing all WR's more than 1/2 s.d. less than 0 with 0

Probability of Attainment	N	College Degree	College Attended	High-School Graduate
Shift WR by 1SD	1245	0.27	0.61	0.90
Data	1245	0.26	0.56	0.86
Change in Probability	1245	0.02	0.05	0.04