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Joseph G. Altonji* Ernesto Villanueva†

*Yale University, joseph.altonji@yale.edu

†Bank of Spain, ernesto.villanueva@bde.es

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Abstract

We use mortality rates and age specific estimates of the response of transfers and wealth to lifetime resources to estimate how much of an extra dollar of parental lifetime resources will ultimately be passed on to adult children in the form of inter vivos transfers and bequests. We find that parents pass on between 2 and 3 cents of an extra dollar of expected lifetime resources in bequests and about 3 cents in transfers, which together amount to about one fifth of our rough estimate of the marginal propensity to spend on children under 18 and on college. The value of .4 relating earnings of the child to earnings of the parent rises to about .46 when the effect of parental earnings on bequests and transfers is added on, although the estimate is lower for nonwhites and varies with assumptions about the intergenerational earnings correlation and the number of children.

KEYWORDS: intervivos transfers, bequests, income and wealth

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1 Introduction

Some of the most important questions in the theory of income distribution and in public finance hinge on the economic relationship between parents and children. Parental resources may influence the resources of adult children through two main channels. The first is through intergenerational transmission of human capital. Solon's (1999) survey of the literature on the intergenerational correlation in earnings suggests that an extra dollar of permanent earnings of the parent is associated with an increase of about .3 or .4 dollars in the child's earnings.[1] Much less is known about the second channel, the influence of parental resources on inter vivos transfers and bequests. The marginal propensity of parents to spend on adult children (MPS) is the key to assessing how income shocks affecting particular persons or cohorts are shared across generations. The MPS is also a key to studying the incidence of taxes and transfers across generations, with broad implications for the effects of fiscal policy on aggregate demand, generational equity, and the design of transfer programs aimed at particular demographic groups. In this paper we provide the first empirical answer to the question, "How much of an extra dollar of lifetime resources do parents pass on to their adult children?" Work by Kotlikoff and Summers (1981) and Modigliani (1988) represent two sides of a long-standing debate assessing the relative importance of intergenerational transfers and life cycle savings in contributing to the U.S. capital stock. In contrast, we provide the first comprehensive study, using nationally representative samples, of the magnitude of transfers relative to the total lifetime resources of the donor generation.

Our research on inter vivos transfers builds on several studies of the responsiveness of inter vivos gifts to parental income, holding the child's earnings constant. These studies generally show that the incidence and the amount of parental transfers rise with the income of the parent and, more tentatively, fall with the income of the child.[2] The focus of this literature, however, is on the response of transfers at a point in time to permanent income or to current income controlling for permanent income. In contrast, we estimate the expected present discounted value of the marginal propensity of parental spending out of lifetime resources on inter vivos gifts. Doing so involves measuring lifetime resources, accounting for the effects of age and the mortality of each parent on the response of transfers to parental resources, and aggregating over children. We simplify the analysis of both transfers and bequests by focussing on variation in lifetime resources, initial wealth, earnings prior to retirement, and retirement income that is associated with variation in panel data estimates of the permanent component of annual earnings of parents, holding the permanent earnings component of children constant. Consequently, we do not

[1] Less is known about the causal effect of an increase in parental earnings on the child's earnings.

[2] Laferrère and Wolff (2002) summarize the evidence from a large number of studies. Examples based on U.S. data include Cox (1987), Dunn (1992), Cox and Rank (1992), McGarry and Schoeni (1995, 1997), Altonji, Hayashi and Kotlikoff (1997, 2000), and Villanueva (2002). Other relevant studies include Rosenzweig and Wolpin (1993, 1994), who also study parental aid through co-residence, which we ignore here.

investigate how the size of the effect of parental resource shocks on transfers and bequests depends on when the shocks occur.

In contrast to the rich recent literature on transfers, relatively little is known about the effects of parental and child resources on bequests, in part because of a lack of data.[3][4] One needs information on parental wealth and/or bequests as well as on income over the life cycle for both the parents and children. Data sets containing information about bequests typically lack information about the income of the parents and often lack data on the incomes of the children, which must be controlled for. The U.S. tax records exclude cases of 0 bequests as well as the overwhelming majority of positive bequests, which fall below the threshold for filing an estate tax return. Below we discuss the important work of Menchik and David (1983), who match income tax returns of decedents to probate records for the state of Wisconsin but lack data on the income of children.

These data limitations leads us to adopt a strategy based on estimating the age profile of the response of bequeathable wealth of the parents to lifetime resources of the parents. In conjunction with estimates of mortality rates as a function of age, gender and permanent earnings, we are then able to infer the response of the expected present discounted value of the eventual bequest to the lifetime resources of the parents, assuming that the entire bequest goes to the children. The details are complicated, but the basic steps are as follows. First, we measure the permanent component y of annual earnings of parents using panel data. We do the same for the children. Second, we estimate the derivatives of the link between y and initial wealth and between y and retirement nonasset income. Third, we use these derivatives, an interest rate assumption, and mortality rates to convert y into units of expected discounted lifetime resources. Fourth, we use multivariate regression to estimate the age

[3] Wilhelm (1996), and McGarry (1999) are relatively recent contributions to an interesting literature that shows that bequests in the U.S. are typically evenly divided among children and are not very responsive to the relative incomes of children. Several studies examine the role of bequests in the wealth stock, including the influential paper by Kotlikoff and Summers (1981). Laferrère and Wolff (2002), Arrondel and Masson (2002), and Laitner (1997) survey the theoretical and empirical literature on intergenerational and interhousehold links and discuss the empirical evidence on the nature of bequests and transfers.

[4] Adams (1980) investigates the relationship between parental income and wealth but does not have income data on the parents. Kotlikoff (1989) uses information on the present value of lifetime earnings and the expected bequest in the event of death at the time of the survey to estimate the response of bequests to parental earnings. He shows that under certain assumptions the expected bequest at each point in the parent's life is equal to the sum of bequeathable wealth plus the benefit from life insurance. He lacked data on the circumstances of children. His empirical strategy is quite different from ours, and would be worth revisiting with more recent data. In an interesting paper Laitner and Ohlsson (2001) exploit information in the 1984 Wave of the PSID asking respondents if they have received an inheritance. They estimate that among children who report having already received a bequest, a dollar increase in parental lifetime resources increases the inheritance received by 5 cents. Hurd and Smith (2002) use the sharp run-up in stock prices during the 1990s to estimate the elasticity of bequests to wealth. They compute the ratio between the increase of a measure of anticipated bequests and the average increase in household wealth between AHEAD waves 1 and 3. They find an elasticity of 1.3. See also Behrman and Rosenzweig (2002) for evidence based on the Minnesota Twins survey.

profile of the derivatives of inter vivos transfers and of wealth with respect to lifetime resources. Finally, we weight up the age specific derivatives using mortality rates to obtain our estimate of the effect of an extra dollar of lifetime resources on the expected present discount value of transfers and bequests.

We have two main findings. First, at the mean of permanent earnings, parents pass on about 2.5 cents of every extra dollar of lifetime resources to their children through a bequest. This estimate increases with income and decreases with the assumed interest rate. Second, parents spend about 2.8 cents of an extra dollar of lifetime resources on inter vivos transfers, and this effect also increases with income. Adding together the bequest and transfer estimates, we find that parents spend about 5.3 cents out of an extra dollar of parental resources on adult children. Our estimate suggests two conclusions. The first is that parents only pass a small fraction of an increase in their lifetime income through monetary transfers to their children. Our results are thus inconsistent with the notion that intergenerational transfers substantially crowd out public programs that increase the lifetime resources of a generation through increases in their permanent income. Second, using our estimate of MPS in combination with consensus estimates of the intergenerational correlation in income, we find that about 87 percent of the link between parental resources and the resources that the child enjoys as an adult is through intergenerational links in human capital and about 13 percent is through the effect of parental resources on gifts and bequests. These estimates refer to white parents with three children, and depend on assumptions about the intergenerational earnings correlation. The corresponding estimates for nonwhites suggest a slightly smaller role for the bequest and inter vivos transfer channel. Our results suggest that to obtain an estimate of the overall link from parental earnings to the resources that the child enjoys as an adult, one should add about .06 to Solon's consensus estimate of .4 for the intergenerational earnings correlation.

We also compare our estimates of the MPS on adult children to crude estimates of the marginal propensity to spend on children under age 18 and on college education. We construct the latter estimates from studies of the "cost of children" and studies of the effect of parental education on college attendance. We find that the MPS through bequests and transfers is about a fifth of the MPS on younger children.

The paper is organized as follows. In section 2 we provide a simple model of transfers and bequests and define the parameters of interest. In section 3 we discuss the data from the PSID and AHEAD employed in the paper and the methods used to estimate permanent earnings. In section 4 we present estimates of the effect of parental lifetime resources on wealth late in life. In section 5 we present estimates of the effect of an extra dollar of lifetime resources on the expected bequest and the present discounted value of transfers. We also explore some of the implications of our estimates. In section 6 we discuss some evidence on whether the bequests we measure are intended, and in Section 7 we summarize the paper and provide a research agenda.

2 The Derivative of Expected Transfers and Bequests with Respect to Expected Lifetime Resources

2.1 Theoretical Background and Key Assumptions

The main purpose of our paper is to measure the MPS. Our empirical analysis is not closely tied to a particular structural model of parental behavior. We choose not to work with a structural model because existing models of child investment, consumption, inter vivos transfers, and bequests are largely simple analytic models that isolate particular features of the parent's problem while assuming away other parts. They do not yield closed form solutions or even clear cut comparative statics for our variables of interest when there is uncertainty about preferences, income, and/or longevity. Attempting to estimate a structural model using a simulation based method would be a worthwhile enterprise, but it would require major extensions to the models of savings that are currently on the research frontier (eg., Gourinchas and Parker (2002), Scholz et al (2006)). In this section and the following ones we provide enough theoretical background to be clear about our parameters of interest and about the simplifying assumptions that our estimation strategy requires.

Our preferred model of the determination of MPS would blend elements of models of parental trade-offs between consumption, investments in the human capital of children, and monetary transfers to adult children. Parents form their own households at age a_1 in year $t(a_1)$. At that time they receive an initial stock of wealth W_1 from their parents and other sources. They receive an exogenous, uncertain stream of earnings y_a from a_1 to retirement age a_r. After retirement they receive a flow of social security income, pension income, and labor earnings, which we call y_a^r. The flow of post-retirement income is a stochastic function of earnings over their careers but is not subject to choice. The flow depends on the marital status of the parents and terminates when both parents are dead. The date of death is uncertain, and we assume that there is no market for annuities.

Each period from age a_1 on, the parents choose how much to spend from income and wealth and how much to save, at an after tax real interest rate r. We treat fertility as exogenous. Parents maximize expected lifetime utility, which depends on their own consumption, the utility of their children, and perhaps directly on transfers or a bequest through a "warm glow" motive. Parents choose spending on food, clothing, medical care, education investments, etc. in the years before the child leaves the home as well as on consumption and transfers after the child leaves. These choices and the flow of income determine wealth late in life and ultimately the bequest.

We assume parents' consumption and transfer decisions depend on age a, a vector Z of observed characteristics of parents and the child, and the vector D_a of dummy variables (D_{ma}, D_{fa}) indicating if the mother and the father are still alive (respectively) at a. Models of consumption and inter vivos transfers in the presence of uncertainty about future income and consumption needs and models of consumption and savings that stress precautionary motives imply that the age when information about income is obtained matters.[5] Intuitively, unanticipated shocks to income received late in life have a stronger influence on wealth than early shocks even when the effect of the shock on expected lifetime income is the same. The reason is older individuals have less time in which to consume. In this paper, we do not attempt to estimate the effects of shocks at various points in the life cycle. Instead we focus on the effects of differences in expected lifetime resources Y^* discounted to age 70 that are associated with the permanent component of earnings, y. The variable y can be accurately estimated for most members of the sample and, under realistic assumptions about the income process, explains much of the variance across households in lifetime earnings. (See footnote 34). Furthermore, because much uncertainty about y is resolved well before retirement, it is more reasonable to abstract from the effects of timing of income when using variation in after-tax lifetime resources Y^* that stems from differences in y to estimate MPS. We define Y^* as

$$\begin{aligned} Y^* &= W_1(1+r)^{70-24} + (1-\tau)\sum_{j=24}^{a_r}(1+r)^{70-j}y_j \\ &\quad +(1-\tau)E_D\sum_{j=a_r}^{100}(1+r)^{70-j}y_j^r(Z,D_j,j) \end{aligned} \tag{1}$$

where the expectation operator E_D in the last term is over the joint distribution of the survival dummies D_j conditional on Z and earnings and we assume that both parents die before reaching 101 years of age. The tax parameter τ is the average tax rate on annual earnings and post-retirement income, which we assume below is 0.20. We assume that initial wealth is not taxed.[6] We define $\bar{Y}^*$ to be the conditional expectation of Y^* given y and some additional controls Z.

The link between wealth W_a at age a late in life and $\bar{Y}^*$ can be approximated as

$$W_a = W_a(\bar{Y}^*; a, Z, D_a) \ + u_a \tag{2}$$

[5] See Browning and Lusardi (1996) for a survey of the consumption and savings literature, footnote 2 for references to the literature on transfers, and Becker and Tomes (1986), Behrman, Pollak and Taubman (1982), Mulligan (1997), Behrman and Stacey (1997) and Haveman and Wolfe (1995) for research on human capital investments in children. An earlier version of this paper included a formal model of parental transfers and bequests under uncertainty about both income and longetivity that builds on Altonji, Hayashi and Kotlikoff's (1997) model of the timing of transfers. However, our model has few implications beyond the informal discussion we offer and so we omit it.

[6] One would like to impute rates for different income levels and the years that earnings accrue, many of which are prior to our sample. In the end, we decided to use a constant rate of .20, a choice partly based on results from the generational accounts literature, and partly based on the statistics provided by the US Treasury. The value is probably on the low side.

where u_a is an error term that captures the effects of heterogeneity in life-cycle preferences for parental consumption, consumption of children and investments in children as well as the effects of a vector of income shocks occurring at various ages and of randomness in the return on capital. Similarly, inter vivos transfers at a given age are

$$R_a = R_a(\bar{Y}^*; a, Z, D_a) + v_a \tag{3}$$

where v_a is an error term.

2.2 Measuring the Expected Value of Lifetime Resources Given Permanent Earnings

To estimate (2) and (3) we need to measure $\bar{Y}^*$. Using (1), $\bar{Y}^*$ is

$$\begin{aligned}\bar{Y}^* &= E(W_1|y,Z)(1+r)^{70-24} + (1-\tau)\sum_{j=24}^{a_r}(1+r)^{70-j}E(y_j|y,Z) \\ &\quad +(1-\tau)E_D\sum_{j=a_r}^{100}(1+r)^{70-j}E(y_j^r|y,Z,D_j,j)\ .\end{aligned}$$

We estimate $E(W_1|y,Z)$ and $E(y_j^r|y,Z,D_j,j)$ using OLS regressions. The specification for y_a^r allows the relationship between retirement income y_a^r and y to depend on the survival of the husband and the wife. After estimating $E(W_1|y,Z)$ and $E(y_j^r|y,Z,D_j,j)$, we compute $\frac{\partial\bar{Y}^*}{\partial y}$ as

$$\begin{aligned}\frac{\partial\bar{Y}^*}{\partial y} &= \frac{\partial E(W_1|y,Z)}{\partial y}(1+r)^{46} + (1-\tau)\{\sum_{j=24}^{a_r}(1+r)^{70-j} \\ &\quad +E_D\sum_{j=a_r}^{100}(1+r)^{70-j}\frac{\partial y_j^r(y,Z,D_j,j)}{\partial y}\}\end{aligned} \tag{4}$$

Because the link from y to W_1 and to y_a^r varies little with Z and y, when estimating (2) and (3) we replace $\bar{Y}^*$ with $\frac{\partial\bar{Y}^*}{\partial y} * y$ after evaluating $\frac{\partial\bar{Y}^*}{\partial y}$ at the mean of y for whites rather than actually calculating $\bar{Y}^*$ for each sample member.

2.2.1 The Derivative of Expected Bequests and Transfers with Respect to Lifetime Resources

In this subsection we define the parameter of interest in terms of the derivatives of W_a and R_a with respect to $\bar{Y}^*$ at various ages and mortality probabilities.

In much of the analysis we assume that the bequest B is equal to W_a measured in the year when the second parent dies. In some instances health and nursing home care expenditures shortly before death are undoubtedly large, but our assumption is consistent with Hurd and Smith's (1999, 2002) evidence that there are only small wealth changes right around the death of the last member of the household.[7] Hurd and Smith (1999, 2002) use AHEAD to compare the distributions of estates of decedents to their last report of wealth and find that they are similar for single decedents. However, Hurd and Smith (2002) suggest that in some cases part of the bequest follows the death of the first parent, and we consider this possibility in Section 5.1.[8] They also find that single decedents with children leave 91.7% of their estates to their children, which supports our assumption that what wealth remains at death goes to the children.

For simplicity consider the case in which the husband and wife are the same age and suppose that conditional on having had children the husband and wife survive to age 60 with probability 1. Let S_{ma} be the probability that a man who is age 60 survives to age a. Let H_{ma} be the probability that the man dies at a conditional on survival to age $a-1$. Let S_{fa} and H_{fa} be the corresponding probabilities for the woman. Then the probability that the bequest occurs at age a is

$$\begin{aligned} P_{ba} &= (1 - S_{fa-1}) * S_{ma-1} * H_{ma} + (1 - S_{ma-1}) * S_{fa-1} * H_{fa} \\ &\quad + S_{fa-1} * S_{ma-1} * H_{ma} H_{fa} \end{aligned}$$

The first term is the probability that the wife dies prior to age $a-1$ and the husband dies at age a. The second term is the probability that the husband dies prior to age a and the wife dies at age a. The third term is the probability that the husband and wife both die at age a.

Assume that H_{ma} and H_{fa} are 1 at age 100. Then $EB_{\bar{Y}^*}$, the expected value of the response of the bequest to a dollar increase in $\bar{Y}^*$ discounted to the year in which the parent is 70, is

$$EB_{\bar{Y}^*} = E \sum_{a=60}^{100} (1+r)^{70-a} [dW_a(\bar{Y}^*, Z, D_a, a)/d\bar{Y}^*] P_{ba} \tag{5}$$

We use a similar approach to calculate the derivative of expected inter vivos transfers. Then $ER_{\bar{Y}^*}$, the effect of $\bar{Y}^*$ on expected transfers with mortality accounted for, is

[7] Hurd and Smith (1999) suggests that uninsured health costs amount to about 3% of the estate of the decedent. Employing a logic similar to ours, Kopczuk and Saez (2004) use bequests from estate records to proxy wealth held by the elderly who had been in the top percentiles of the wealth distribution.

[8] Zick and Smith (1991) find a fall in income from dividends, rents and interest in the year of the death of one of the spouses, which is also consistent with an early bequest happening after the death of the first spouse.

$$\begin{aligned} ER_{\bar{Y}^*} \;=\; & \sum_{a=45}^{100}(1+r)^{70-a}\{(dR(\bar{Y}^*,a,Z,1,1)/d\bar{Y}^*)(S_{ma}*S_{fa}) \\ & +(dR(\bar{Y}^*,a,Z,1,0)/d\bar{Y}^*)[(S_{ma}*(1-S_{fa})] \\ & +(dR(\bar{Y}^*,a,Z,0,1)/d\bar{Y}^*)[(S_{fa}*(1-S_{ma})]\} \end{aligned} \tag{6}$$

where in the empirical work we take 45 as the age at which the parents start giving transfers to adult children. MPS is $ER_{\bar{Y}^*} + EB_{\bar{Y}^*}$.

We wish to emphasize that we only provide evidence on how much parents pass on out of variation in Y^* that is associated with y. The R^2 of our wealth models are about 0.32, and a substantial fraction of this reflects the contribution of age and other demographic variables. Consequently, the variation in Y^* associated with y explains only a fraction of measured wealth. The fact that for the vast majority of married couples the stock of bequeathable wealth at age 70 is small compared to the value of the husband and wife's earnings over a career discounted to age 70 implies that our focus on MPS out of variation in lifetime resources associated with y should be informative about the average response of bequests to parental lifetime resources. But since our use of wealth to estimate bequests basically assumes that a large fraction of the wealth held by parents late in their lives is passed on, our results are perfectly consistent with a world in which $EB_{\bar{Y}^*}$ is small, but the MPS out of income or wealth shocks late in life is large. Note also that the work of Hurst and Lusardi (2004) and others indicates that entrepreneurs hold a substantial fraction of the wealth stock in the US.[9] The extraordinary success of a William Gates or a Michael Dell would be missed by our $\bar{Y}^*$ measure. The residuals to our wealth model reflect some of these components, as well as variation in inheritances that is not related to $\bar{Y}^*$. We do not provide evidence on the fraction of these components of parental resources that would be passed on.

2.3 Sources of Bias in the Estimates of $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$

The variation in $\bar{Y}^*$ that identifies the average derivatives $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$ is driven by permanent earnings y, which means that we can abstract from the effects of unobserved variation in preferences and in opportunities to invest in the human capital of children that is unrelated to y. Our framework is fully compatible with a causal effect of $\bar{Y}^*$ on human capital investments in children and with spending on young children. Furthermore, random variation across households in the division of gifts between B and R such as that which might arise from random variation in the age profile of consumption needs of children or parents is not a problem. Furthermore, transitory variation in y_{ia} that is correlated with transitory variation in consumption preferences or with the

[9] Parents whose main assets are in a family business may have little ability to take cash out of the business without destroying it. They might choose to transfer a substantial share of their assets to their children so that the business remains viable.

age profile of preferences should have little relationship to y and will not bias the estimates of $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$. Bias will arise if y is in fact correlated with unobserved heterogeneity in parental preferences for own consumption and/or parental preferences over the consumption of their children before and/or after they leave home. In this case, y and our measure of $\bar{Y}^*$ will be correlated with the error terms u_a and v_a in the W and R models. We consider a few possibilities here.

First, suppose there is heterogeneity in the rate of time preference. Impatient parents will accumulate less wealth. If time is an input in human capital production, they will also tend to devote less time to investment in their own human capital early in life and more to leisure. The variable y will be lower and estimates of the effect of $\bar{Y}^*$ will be biased upward. On the other hand, variation in y associated with the wife's labor force participation decision will be influenced by variation in consumption preferences and in opportunities to invest in children. Consequently, families with stronger preferences for consumption will have higher $\bar{Y}^*$ but lower wealth and transfers. This would bias the estimates of $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$ downward. In future work it would be useful to explore the sensitivity of the results to the use of particular sources of variation in $\bar{Y}^*$, such as the permanent component of the hourly wage rate of the husband.

Note that the values of $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$ will also be influenced by the nature of parental preferences for children. For example the amount and distribution across children of investments in human capital relative to R and B will depend on whether parental behavior is better described by a Becker and Tomes (1986) type of model or by Behrman, Pollak and Taubman's (1982) Separable-Earnings Transfer model. This will in part determine the values of the average derivatives $ER_{\bar{Y}^*}$ and $EB_{\bar{Y}^*}$ but is not a problem per se. However, heterogeneity in these preferences will lead to a link between the u_a and v_a and the mean and dispersion of the earnings of children conditional on $\bar{Y}^*$. This is likely to lead to a negative bias in the coefficient on the sibling mean $\bar{Y}_k^*$ of children's lifetime resources. The negative bias will spill over into an overestimate of the effect of $\bar{Y}^*$ on $ER_{\bar{Y}^*}$ and $EB_{\bar{Y}^*}$ because $\bar{Y}^*$ and $\bar{Y}_k^*$ are positively correlated. On the other hand, random variation in W associated with initial wealth, inheritances received by the parents, or the return on capital may influence parental investments in children. This would lead to a positive bias in the coefficient on $\bar{Y}_k^*$ and spill over into a negative bias in $ER_{\bar{Y}^*}$ and $EB_{\bar{Y}^*}$. We suspect that the biases in $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$ introduced by correlation between parental preferences for children and the mean and the dispersion of the income of the children are minor. The results do not change much when we exclude income of the children from the regression.

Finally, if the number of children is linked to parental altruism, it is endogenous in the wealth and transfer models. We follow virtually all empirical papers on inter vivos transfers by treating fertility as exogenous. Overall, it is difficult to sign the bias in $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$ arising from endogeneity of the measures of our measures of $\bar{Y}^*$ and $\bar{Y}_k^*$.

3 Data

We estimate wealth models using two different data sets. The first is the PSID. The second is AHEAD. The AHEAD data are used in combination with imputations for parental and child income based on regressions from the PSID.

3.1 The PSID Sample

The PSID started in 1968 with more than 5,000 U.S. households. The households have been surveyed annually through 1997, and again in 1999. Wealth data was collected in 1984, 1989, 1994, and 1999. We selected two parent and single parent households from the 1968 base year if at least one parent reached the age of 60 or died between 1984 and 1999. The children born into the PSID sample households are interviewed separately after they form independent households. We matched the records of the parents to the records of household heads or spouses who were sons/daughters or stepsons/stepdaughters in the 1968 PSID sample or who were born into PSID households between 1969 and 1974. We sometimes refer to this sample as the "matched" PSID sample.[10] If the parents have more than one child who becomes a head or spouse, we average the permanent income data across the children. We control for the number of children who are either heads or spouses and also experiment with a control for the variance in permanent income across children.

If the mother and father are married and respond to the 1984, 1989, 1994, and 1999 surveys, then they contribute 4 wealth observations to our analysis. If the father and mother are both PSID sample members and are divorced or separated at the time of a wealth survey, then each contributes a wealth observation. If they divorced prior to 1984, they may contribute up to 8 observations depending on whether both are in the sample in 1984, 1989, 1994 and 1999.[11] Appendix B provides details of how the sample was selected.

3.1.1 Calculation of the permanent earnings component y:

To account for the fact that our series on labor earnings of the head and spouse (if present) cover only years of the survey, we use regression to adjust earnings in a particular year for the effects of age and family demographics (such as marital status and number of children) prior to constructing an average. We use the coefficients on year dummies estimated using the PSID and aggregate

[10] In an earlier draft we experimented with an "extended PSID sample" that combined the matched PSID sample with an additional 435 households containing older parents whose children had all left home prior to 1968. We imputed the permanent incomes of these children, who are not PSID sample members, from a regression based on the sample of parents for whom we have data on the children. The estimates were quite similar to those for the matched sample.

[11] The number of 1968 households who contribute one wealth observation is 78, two observations is 123, three observations is 384, four observations is 582, five observations is 13, six observations is 28, seven observations is 12, and eight observations is 32.

time series data on labor quality and wages for earlier years to account for the effects of secular changes in the price of labor when computing the permanent earnings component y_i, where i indexes individual. Basically, y_i is an average of adjusted earnings for years between the ages of 20 and 61 that we observe. The median number of observations per individual used to construct y_i is 17 for parents and 15 for kids. The fact that these measures are averaged from many years of data suggests that transitory income and measurement error have only a minor effect on them, and the attenuation bias from noise in the measures is likely to be minor.[12] Our results are not very sensitive to constructing y using only annual earnings observations y_{it} collected prior to the year of a particular wealth observation. Details concerning the construction of y are in the appendix. Below we use y_{kih} to denote y of a kid h of parent i, use $\bar{y}_{ki}$ to denote the average of y_{kih} over independent children of i and use $\bar{Y}^*_{ki}$ to denote the average of $E(Y^*_{kih}|y_{kih}, Z_{kih})$ over siblings. We typically suppress the i subscripts and h subscripts. (In Table 8 below we add a p subscript to make clear that we are referring to parents.)

Note that the value of y_{it} is identical for a man and a woman who were husband and wife in year t. Consequently, we are assuming that married couples pool income, and that if a divorce or death of a spouse occurs the influence on future wealth of the stream of earnings during the years the individuals were married does not depend on who earned the money. Our results do not change much when we add controls for number of years since death of a spouse and for its interaction $\bar{Y}^*$ to the wealth equation. This finding suggests that the assumption is not critical to our results.

3.2 Definition of Wealth and Treatment of Outliers

Wealth includes the value of real estate (including own home), cars, trucks and motor homes, business owned, shares of stock or investment trusts (including IRAs), checking and savings accounts, rights in trusts or estates, and the cash value of life insurance policies and pensions from previous jobs. Debts (including home mortgages) are subtracted from the former, as well as student loans or bills of any members of the household. Juster et al (1999) compare the Survey of Consumer Finances (SCF) and the PSID and find that the differences in net worth are most important in the top two percentiles. They document that the richest one percent of PSID households have less than one-tenth the wealth of the richest one percent of SCF households. This is major problem for studies of the wealth distribution given that such a large fraction of total wealth is held by those at the top of the distribution. In Section 5.1.1, we present evidence suggesting that bias in our estimates of the income-wealth derivatives is probably minor at the mean of $\bar{Y}^*$ but is more serious at the high end of the $\bar{Y}^*$ distribution.

The wealth distribution is heavily skewed to the right, with several very

[12] For parents, the range is 1 to 30. The 5th and 95th percentiles are 3 and 29. The corresponding numbers for kids are 3 and 27. Eliminating cases in which 3 or fewer observations were used to estimate y_i makes little difference.

large outliers. In most of our analysis we exclude extreme values of the wealth distribution as follows. First, we estimate a median regression model relating the wealth level to the level of permanent income, a quartic in age, dummies for 1989, 1994, and 1999, and a set of demographic variables, including race.[13] We then eliminate the cases corresponding to the bottom 0.5% and top 0.5% of the residuals from the median regression. Eliminating the outliers leads to a dramatic reduction in the standard errors of our wealth model parameters. It leads to a reduction in point estimates of the effect of $\bar{Y}^*$ on wealth through most of the $\bar{Y}^*$ distribution but an increase at the high end.

Table 1 provides variable definitions and summary statistics for the sample used to estimate the wealth model. This sample contains 4,377 observations on 1,356 parent households from 1,254 1968 parent households. We have matching data on 3,789 children. The number of child observations matched to a parent observation ranges from 1 to 12, with an average of 3.05.

3.3 The Response of Lifetime Resources to Permanent Income

In appendix tables A1 and B1 (respectively) we report OLS estimates of the regression functions $E(W_1|y, Z)$ and $E(y_j^r|y, Z, D)$. We use the estimate of these functions and (4) to estimate $d\bar{Y}^*/dy$ assuming an after tax real interest rate of 4%. At the sample mean, the derivative of initial wealth W_1 with respect to y is 0.14 dollars (Table A1, model 3). After discounting to age 70 this derivative is \$1.52. The derivative of the pre-tax discounted expected present value of retirement income depends on expected mortality and is \$7.28 for a white household with average income. After our adjustment for taxes, the derivative of the expected discounted present value of retirement income with respect to permanent income is $\$7.28 * .8 = \$5.82$. Combining the derivatives for W_1, earnings, and retirement income using (1) we find that at the sample mean $d\bar{Y}^*/dy$ is \$106.353. This estimate does not vary much over the distribution of permanent annual earnings, given that the quadratic and cubic income terms in tables A1 and B1 are small in magnitude. Hence, in the rest of the analysis, we assume that $d\bar{Y}^*/dy$ is constant over the income distribution.[14]

[13] We include the same set of demographics that we use in our wealth regressions. See Table 3.1

[14] In Altonji and Villanueva (2003), we relax the assumption, with no noticeable impact on our results. Using coefficients on the interaction between nonwhite and y in Table A1 and B1 to evaluate dW_1/dy and dy_{ra}/dy and using mortality rates for nonwhites, we obtain an estimate of $d\bar{Y}^*/dy$ equal to 105.737 for nonwhites, so our use of 106.353 for both whites and nonwhites makes little difference.

Table 1: Summary Statistics for the Matched PSID Sample.

Variable	Mean	S.D.	Min.	Max.
Wealth holding, all years	184.811	296.95	-195.07	3010.5
Wealth holding in 1984	153.917	278.018	-15.372	2,733.05
Wealth holding in 1989	178.522	288.489	-36.857	2,827.27
Wealth holding in 1994	187.899	300.706	-195.07	3,010.5
Wealth holding in 1999	243.304	326.67	-25.544	2997.2
Perm. earnings of husb. and wife; father	43.558	27.234	1.010	308.07
# observations of earnings, father	15.57	7.44	1	30
Perm. earnings of husb. and wife; mother	42.948	27.234	1.015	362.66
# observations of earnings, mother	17	7.99	1	30
Nonwhite	.31	.462	0	1
Education of the father (years)	11.44	3.66	0	20
Education of the mother (years)	11.68	2.65	0	18
Only father present in 1968 hh	.01	.10	0	1
Only mother present in 1968 hh	.11	.31	0	1
Father and mother present in 1968	.88	.32	0	1
Age of the father	63.08	8.09	37	89
Age of the mother	61.28	8.66	35	86
Number of children	3.05	1.935	1	12
Parents married	.50	.50	0	1
Parents divorced	.24	.43	0	1
Parents divorced, mother	.06	.24	0	1
Parents divorced, father remarried	.07	.25	0	1
Parents divorced, mother remarried	.05	.22	0	1
Father is a widower	.06	.24	0	1
Mother is a widow	.19	.39	0	1
Parent widow, father remarried	.02	.14	0	1
Parent widow, mother remarried	.02	.14	0	1
Perm. earnings of children, sibling average	53.919	21.102	5.548	173.715
Number of children who are females	1.489	1.29	0	9
Number of children who are female heads	.503	.844	0	7

Sample size: 4,377, all statistics are unweighted. Wealth outliers trimmed. Notes to Table 1. All income and wealth measures are in thousands of 1993 dollars. The sample is an unbalanced panel of 1356 households from 1,254 1968 parent households matched to 3789 splitoffs. Divorced couples contribute up to two observations in a given year. Each of the original 1968 parent households contributes between 1 and 8 wealth observations to the matched sample. Wealth includes value of real estate (including own home), cars, trucks and motor homes, trucks motor home, business owned, shares of stock, or investment trusts (including IRAs), checking and savings accounts, rights in trusts or estates, life insurance policies and pensions from previous jobs. Debts, student loans and bills of any members of the household are subtracted from the former. Wealth observations corresponding to the top and bottom 0.5 percentiles of the prediction errors from a median regression of wealth on parental income and demographics were dropped from the analysis and are excluded from the table. Note that the averages across siblings are used as the controls for child characteristics in the wealth and transfers regressions reported in Table 3.1 and D1.

Table 2: Summary Statistics of the Sample of Parents in AHEAD.

Variable	Mean	S.D.	Min.	Max.
Wealth holdings of the parent	192.366	258.819	-42	2,476
Parental permanent earnings of husband and wife (imputed)	44.888	15.629	7.523	129.362
Nonwhite	.08	.27	0	1
Education of the father (years)	11.68	3.23	0	17
Education of the mother (years)	11.89	2.52	6	17
Age of the father	76.84	5.27	48	98
Age of the mother	75.71	6.55	43	101
Number of children	2.95	1.77	1	14
Father is a widow	.10	.3	0	1
Mother is a widow	.43	.50	0	1
Father and mother are alive and together	.42	.49	0	1
No father found	.01	.10	0	1
Parent alone, divorced	.03	.17	0	1
Parent alone, married	.01	.10	0	1
Parent alone, single	.001	.03	0	1
Parental Occupation				
Managers and professionals	.29	.46	0	1
Clerical	.05	.22	0	1
Sales	.06	.24	0	1
Craftsmen	.27	.44	0	1
Operatives	.19	.39	0	1
Laborers	.05	.22	0	1
Service	.03	.17	0	1
Farmers	.03	.17	0	1
Permanent earnings of children, sibling averages	53.847	18.927	12.230	122.297
Fraction children who are single males	.11	.31	0	1
Fraction children who are single females	.15	.34	0	1

Sample size: 4588, unweighted statistics. Notes to Table 2: All Income and Wealth Variables are in thousands of 1993 dollars. "Father" and "Mother" are defined as the current married male (female) respondent in a two person household or the late spouse of a respondent who is widowed or the ex-spouse of a divorced male (female) respondent.

3.4 The AHEAD Sample

The PSID matched sample contains only 470 wealth observations on parents who are over age 75.[15] This hinders estimation of the effect of $\bar{Y}^*$ on wealth late in life. Consequently, we also use the first two waves of the AHEAD cohort of the Health and Retirement Study (Institute for Social Research, University of Michigan). This cohort consists of men and women who were born prior to 1924 and their spouses, if married, regardless of age. This group was aged 70 or older in 1993. AHEAD also includes a supplemental sample of respondents aged 80 or over who were drawn from the Medicare Master enrollment file. It also contains information about deceased spouses. There is only one respondent per household, but information is collected about both the husband and wife if both are present. In the case of sample members who are widowed or divorced/separated, information is collected about the late spouse or about ex-spouses. We construct the parent record by combining the information on the respondent and his or her spouse or ex spouse. The details of sample selection are in Appendix C.

The wealth measure in AHEAD is net of household debt and includes the value of the house, other real estate, business or farms, IRA accounts, stocks and bonds, checking and savings accounts, CDs, transportation, other assets, and the value of trusts. AHEAD also contains information on demographic variables and health as well as some limited amount of information on past earnings and labor market history. In addition, each respondent is asked about his/her descendents and the spouses of their descendents and provides information on education, family income, and labor market participation. We impute y_i and y_{kih} using AHEAD variables that were also collected or could be constructed for the PSID sample. The imputations are based on regressions for y_i and y_{kih} using the PSID. We convert them to $\bar{Y}^*$ and $\bar{Y}_k^*$ using the PSID estimate of $d\bar{Y}^*/dy$. We relegate the details to a footnote.[16]

[15] Of the 4,377 observations used in the wealth regression, 1,060 are observations on households in which the oldest member is between 65 and 70 years of age and 646 are observations on households in which the oldest member is between 70 and 75. The corresponding numbers for households between 75 and 80, 80 and 85, 85 and 100 years of age are 321, 115, 34, respectively.

[16] AHEAD and the PSID contain a common set of variables for the parents and descendents. The common parental variables are education of the father and mother and the occupation in the longest held job. The common variables of descendents include family income (in four income brackets), age of the head of the household, education of head and spouse, and labor market status of the head and spouse (whether they work full time, part time or are not employed). We use these variables to impute y_i for the parents and y_{ki} for the descendents as follows. We separately regressed the logarithm of the permanent earnings components for parents and for children on dummies for the education of the father and the mother, occupation indicators, dummies for educational attainment of the head and spouse in the kid household, dummies for income brackets and interactions with age and, finally, labor market status dummies and interactions with age. We also included an additional set of demographic variables that appear in the wealth regressions. To account for secular growth in wages, we include a third order polynomial in birth year of the parent. The imputation regressions also include dummies for whether we have information about the father and the mother. Our measures of y_i and y_{kih} are constructed by evaluating the regressions using the data for the members of the AHEAD sample. We use our PSID estimate of 106.353 for

Variable definitions and summary statistics for the wealth measure, parental and child income measures, and key control variables used in the AHEAD wealth regressions are in Table 2.

4 Estimates of the Wealth Response to Parental Income

4.1 PSID Results

We begin by estimating variants of the model

$$\begin{aligned} W_{it} &= a_0 + a_1\bar{Y}_i^* + a_2\bar{Y}_i^{*2} + a_3\bar{Y}_i^{*3} + a_4\bar{Y}_i^*(age_{it} - 70) + a_5\bar{Y}_i^{*2}(age_{it} - 70) + \\ (7) \qquad & +a_6\overline{Y^*}_{ki} + f(age_{it} - 70) + b'X_{it} + e_{it}, \end{aligned}$$

where i is the subscript for a parent household and t is a particular year (1984, 1989, 1994 and 1999). In most of what follows we suppress the subscripts.

The function $f(.)$ of $age - 70$ is a 4th degree polynomial. The vector X_{it} consists of dummies for whether the parent household corresponds to a divorced parent, a divorced mother, a father who is divorced and remarried, a mother who is divorced and remarried, a father who is widowed and remarried, or a mother is widowed and remarried. It also contains interactions between $age - 70$ and parental lifetime resources, the inverse of the number of siblings, race, the number of children who are female and the number of children who are female heads. Throughout the paper we normalize $\bar{Y}_i^*$ so that the coefficient a_1 on the linear term $\bar{Y}_i^*$ is the derivative of wealth at age 70, W_{70}, with respect to $\bar{Y}^*$ evaluated at the unweighted sample mean of y.

As we noted above, $\overline{Y^*}_{ki}$ is the average of observations of the $\bar{Y}_{kih}^*$ of the independent children of parent i for whom we have data. The variable age_{it} is the maximum of the ages of the husband and wife when both are present[17] or the age of the individual for persons who are widowed or divorced. The standard errors allow for arbitrary correlation and heteroskedasticity among the error terms for observations on parents from the same 1968 household. They do not account for the fact that $\bar{Y}^*$ and $\overline{Y^*}_k$ are estimated.[18]

The results are in Table 3.1. Model I excludes the quadratic and cubic terms in $\bar{Y}^*$. The coefficient (standard error) on $\bar{Y}^*$ is .049 (.004). This says that a one dollar increase in lifetime resources leads to a $.049 increase in wealth at age 70. The interaction term a_3 is small and positive: .00022

$d\bar{Y}^*/dy$ to rescale y_i in the AHEAD wealth regressions. The sample size and the adjusted R^2 of the model for y_i are 16,200 and 0.42. The corresponding values of the model for y_{kih} are 16,742 and 0.50. The imputation regressions are available upon request.

[17]We obtain very similar results if we replace this variable with the minimum of the ages of a husband or wife.

[18]In Altonji and Villanueva (2003) the adjustment for our use of generated regressors made little difference.

(.00034). The derivative with respect to $\bar{Y}^*$ is .047 (.004) at age 60, .051 (.006) at age 80, and .052 (.008) at age 85. We relegate discussion of the coefficients on $\overline{Y_k^*}$, the inverse of the number of siblings, and the standard deviation of Y_{kih}^* among siblings to a footnote.[19]

In Model IV in Table 3.1, we add interactions between $\bar{Y}^*$ and dummies for widowed parent and for divorced/separated. (All models include widowed and divorced/separated dummies.) At the mean, $dW_{70}/d\bar{Y}^*$ is .053. The effect is .030 at the 10th percentile of income and .073 at the 90th percentile. Divorce status also has a substantial negative, precisely estimated effect on the income derivative. The sensitivity of wealth to $\bar{Y}^*$ is much lower for widows. The coefficient on the interaction term is -.020 (.007), and the average derivative at age 70 for widows is .033 (evaluated at the sample mean of $\bar{Y}^*$). As we note below, one explanation is that part of the bequest occurs when the first parent dies, although we doubt if this is the whole story. It is also possible that the premature death of a spouse alters the relationship between our measure of permanent income and the present discounted value of lifetime resources. We have estimated a specification containing a dummy for widow/er status, the number of years the parent has been a widow/er, and the product of $\bar{Y}^*$, the widow/er status dummy, and the number of years the parent has been a widow/er. The coefficient of the interaction between $\bar{Y}^*$ and the dummy for a widowed parent is -.019 in the new specification.

[19] In the PSID the coefficient on $\overline{Y}_k^*$ varies a bit across specifications but is always small and positive in sign. In AHEAD we also obtain a small, positive, and statistically insignificant coefficient. (Table 3.2). Thus, there is little evidence that parents respond to $\overline{Y_k^*}$ by saving less for a bequest, although our discussion of possible biases should be kept in mind. We include the standard deviation of the income of the descendents in the model II of Table 3.1 (not shown). If parents are constrained to divide bequests equally, then greater dispersion of their incomes might reduce the parents' incentive to provide a bequest, since part of it will be "wasted" on rich children who do not need it. On the other hand, this implicit tax on bequests could work in the opposite direction, leading parents to leave a larger total bequest than they would choose if they could channel the entire bequest to their more needy children. The coefficient (standard error) is .0023 (.0046), positive, but not statistically different from zero. All the PSID regressions control for 1/(number of children), the inverse of the number of descendants. If an altruism based bequest motive plays a role in the accumulation of wealth, the coefficient on this variable should be negative. In contrast, we find that it is positive with a t-value of about 1. The point estimate suggests that the total bequest is reduced by $16,273 as the number of children rises from 1 to 3. The reduction could reflect a negative relationship between initial parental wealth and fertility, the fact that parents with more kids have more child related expenses, leading to lower savings and wealth, or a positive effect of number of children on total inter vivos transfers to adult children.

Table 3.1: Wealth Model Estimates, Matched PSID Sample of Parents.

Dependent variable: wealth holdings of a household (1,000s of 1993 $)	Model I	Model II	Model III	Model IV	Model V
$\overline{Y}^*$	.049 (.004)	.0404 (.0044)	.0412 (.0041)	.0527 (.0055)	.0566 (.0058)
$\overline{Y}^{*2}$		.0047 (.0008)	.0043 (.0010)	.0038 (.0010)	.0034 (.0010)
$\overline{Y}^{*3}$		−.0018 (.00037)	−.0016 (.00047)	−.0016 (.00047)	−.0014 (.00042)
$\overline{Y}^*$x (Age - 70) /100	.022 (.034)	.0041 (.0035)	.0621 (.0322)	.0612 (.0336)	.0593 (.0330)
$\overline{Y}^{*2}$x (Age - 70)/10^5			−.0053 (.0078)	−.0043 (.0080)	−.0042 (.0071)
$\overline{Y}^*$x (Widowed)				−.0198 (.0070)	−.0182 (.0066)
$\overline{Y}^*$x(Divorced/Sep)				−.0234 (.0084)	−.0211 (.0086)
$\overline{Y}^*$x Nonwhite					−.0194 (.0065)
$\overline{Y}^*$(sibling average)	.0015 (.0032)	.0027 (.0031)	.0029 (.0031)	.0025 (.0031)	.0026 (.0031)
Control Variables in All Models: (Coefficients displayed for Model V only)					
1/(# of children)					24.41 (22.35)
Mother not present in 1968 hh					−3.30 (34.59)
Father not present in 1968 hh					−25.65 (14.86)
Age minus 70					−.282 (1.29)
Age minus 70 squared					−.186 (.067)
Age minus 70 cubic					−.0016 (.0041)
Age minus 70 quartic /100					.0067 (.0013)
Parents divorced, father rem.					9.61 (41.28)
Parents divorced, mother rem.					34.26 (27.98)
Parents divorced					−92.63 (17.00)
Mother divorced					−38.96 (26.64)
Widower					−10.23 (23.58)
Widow					−68.85 (14.30)
Widower, remarried					−57.12 (55.75)
Widow, remarried					66.06 (55.43)

Table 3.1 Results of the Matched Sample (PSID) -cont.

Dependent variable: wealth holdings of a household (1,000s of 1993 $)					
	Model I	Model II	Model III	Model IV	Model V
Nonwhite					−110.52 (13.69)
#daughters					−1.15 (5.59)
# kids who are female HH heads					−.77 (5.51)
Wave 84					−24.73 (11.26)
Wave 89					−7.23 (8.35)
Wave 99					19.28 (9.81)
Constant					239.00 (20.69)

Notes: Sample size: 4,377. Wealth outliers trimmed—see text. Standard errors in parentheses account for unbalanced panel structure and heteroskedasticity. $\bar{Y}^*$ is the deviation from the unweighted sample mean. $\overline{Y^*}_k$ is the mean of $\overline{Y^*}_{kih}$ across siblings. TheR^2 for models I, II, III, IV, and V are 0.3, 0.32, 0.32, 0.32 and 0.33 respectively.

4.1.1 Results for Nonwhites

A striking fact about the wealth distribution in the United States is that on a per household basis African American households possess only about 1/5 of the wealth of white households.[20] The race gap in wealth is much larger than the corresponding gap in income. In Table 3.1, Model V, we interact $\bar{Y}^*$ with a race indicator that equals 1 for nonwhites, 91% of whom are African-American. The model assumes that the quadratic and cubic term and the age interactions are the same for whites and nonwhites.[21] The coefficient on the interaction term is -.019 (.007), and the point estimate of $dW_{70}/d\bar{Y}^*$ at the mean of income for the full sample is .037. When the interaction between $\bar{Y}^*$ and widowed is taken into account, the estimates imply that $dW_{70}/d\bar{Y}^*$ is only .019 for nonwhite widows and widowers. The large race difference in the income sensitivity of wealth is consistent with the findings of other studies that compare the wealth functions of whites and nonwhites for broad age groups.

[20] See for example, Avery and Rendall (1997), Altonji and Doraszelski (2005), and Barsky et al (2002). Scholz and Levine (2002) provide a literature survey.

[21] Recall that the race indicator is included as a separate control in all of the models in the table. Thus estimates of the permanent component of earnings reflect race differences in the distribution of income.

Table 3.2 Wealth Model Estimates: AHEAD sample of parents.

Dependent variable: Wealth holdings of a household (1,000s of 1993$)	Model I	Model II	Model III	Model IV
$\overline{Y}^*$	.0634 (.0062)	.0497 (.0075)	.0571 (.0075)	.0584 (.0075)
$\overline{Y}^{*2}/1000$		.0046 (.0020)	.0045 (.0020)	.0042 (.0020)
$\overline{Y}^*$x (Age - 70)	−.0011 (.0004)	−.0004 (.0005)	−.0002 (.0005)	−.0003 (.0005)
$\overline{Y}^{*2}$x (Age - 70)/1000		−.0002 (.0001)	−.0002 (.0001)	−.0002 (.0001)
$\overline{Y}^*$x (Widowed)			−.0161 (.0062)	−.0161 (.0062)
$\overline{Y}^*$x (Divorced/Sep)			−.0298 (.0149)	−.0298 (.0149)
$\overline{Y}^*$x Nonwhite				−.0124 (.0075)
$\overline{Y}^*$Average , kids	.0025 (.0025)	.0037 (.0025)	.0037 (.0025)	.0037 (.0025)
Control Variables in All Models: (Estimates displayed for Model IV only)				
1/(number of children)				23.537 (14.127)
Father not found				107.439 (85.067)
Age minus 70				−2.033 (3.192)
Age minus 70 squared				.025 (.298)
Age minus 70 cubic				−.013 (.025)
Parents divorced				1.778 (28.385)
Widower				−54.713 (13.965)
Widow				−64.008 (8.483)
Nonwhite				−41.554 (13.279)
# kids who are married females				−2.931 (12.897)
# kids who are single females				−5.612 (17.090)
Wave 93				−59.556 (5.399)
Constant				240.510 (17.390)
R2	.18	.18	.18	.19

Sample size: 4,588 Wealth outliers trimmed—see text. Standard errors in parentheses account for unbalanced panel structure and heteroscedasticity, but not for the fact that $\overline{Y}^*$is estimated Parental lifetime resources is the deviation from the unweighted sample mean for the PSID sample Income measured in 1,000s of 1993 $

4.2 AHEAD Results

In Table 3.2 we report estimates of variants of (7) using the AHEAD sample. We report robust panel standard errors that are probably understated because we do not correct them for the fact that lifetime resources are imputed based on regressions from the PSID. For the linear specification we obtain a coefficient of .063 (.006) on $\bar{Y}^*$ and a coefficient of -.0011 on $\bar{Y}^* \cdot (age - 70)$. In column 2 we add $\bar{Y}^{*2}$ and $\bar{Y}^{*2} \cdot (age - 70)$. We again normalize $\bar{Y}^*$ so that the coefficient of 050 on the linear term is $dW_{70}/d\bar{Y}^*$ at the PSID mean. This estimate is above the value of .04 we obtained using the PSID sample. The interaction terms show a modest decline in the income derivative with age. The Model I estimates imply that at the mean of Y the derivative declines by 1.1 cents over 10 years.

In keeping with the PSID results, the income derivative is substantially lower for widows. Being widowed reduces the derivative by -0.016 (.006) in the AHEAD sample, which is a bit smaller than the PSID value of -.018.[22] Overall, the PSID and AHEAD results are remarkably close given sampling error and the differences in the data sets. This is very reassuring.

5 Estimates of the Response of Expected Bequests and Transfers to Expected Lifetime Resources

5.1 Bequests.

We now use (5) and estimates of $dW_a/d\bar{Y}^*$ from Table 3.1, Model V to calculate $EB_{\bar{Y}^*}$, the derivative of expected bequests with respect to expected lifetime income. The calculations are for a husband and wife who are the same age and survive to age 60. We use data from the U.S. life tables for 1998 to construct race specific estimates of S_{fa}, H_{fa}, S_{ma}, and H_{ma} and adjust them by $\bar{Y}^*$.[23] We assume that H_{ma} and H_{fa} are 1 at age 100. We compute $dW_a/d\bar{Y}^*$ by setting the age term in the interactions that appear in Model V to the age of

[22] Note that the regressions used to impute permanent earnings of AHEAD respondents contain separate dummy variables for widows, widowers, and for divorced individuals.

[23] We adjusted the probability of death at a given age by y as follows. First, we use a sample of all PSID members above 50 years of age to run logit regressions of the event of death on y of the head of the household, the race and gender specific mortality probabilities contained in the U.S. life tables for 1998 and race and gender intercepts. We then treat the U.S. lifetable values as the path for the median person alive at each point in time. Up to until age 80, for a given income level we adjust the mortality rate by multiplying the U.S lifetable value by the ratio of the PSID prediction for the given income level to the PSID prediction for the median income level. After age 80, we use the U.S. life table value for all persons, and do not adjust for income. We stop at age 80 because the PSID sample is relatively young, and does not contain enough observations on individuals above 80 to be able to forecast their mortality.

the surviving spouse in the year of his or her death. (In our example, both husband and wife are the same age.) If both spouses die in the same year we set $widowed{*}\bar{Y}^*$ to 0. Panel A in Table 4 displays values of $S_{fa}, S_{ma}, H_{ma}, H_{fa}, P_{ba}$, and $dW_a/d\bar{Y}^*$ for whites. The values of $dW_a/d\bar{Y}^*$ are evaluated at the mean of y for the combined sample of whites and nonwhites.[24] As one can see in the sixth and seventh columns of the table, $dW_a/d\bar{Y}^*$ increases slowly with age. $EB_{\bar{Y}*}$ is the sum of the derivatives $dW_a/d\bar{Y}^*$ for each value of a weighted by the probability that the second parent dies at age a. We use an interest rate of 4 percent to discount the bequests to when the parents are 70 years old. In Table 4 panel B, we report that $EB_{\bar{Y}*}$ is 0.016, 0.025, and 0.031 dollars respectively when evaluated at the (population weighted) 10th percentile, mean, and 90th percentile value of income.[25]

When we use the AHEAD parameter values in Table 3.2, Model IV, the estimates of $EB_{\bar{Y}*}$ at the 10th percentile, mean, and 90th percentile values of $\bar{Y}^*$ are .019 (.005), .021 (.0025) and .025 (.0037), respectively, in the case of whites. For nonwhites the PSID based estimates of $EB_{\bar{Y}*}$ are 0.004, .0157, and .023 at the 10th percentile, mean, and 90th percentile of the income distribution. (Table 5 panel B). The AHEAD estimates for nonwhites are .01 (.007), .017 (.005) and .021 (.006).

The PSID estimates are virtually unchanged when we use nonasset income rather than earnings as the basis for creating $\bar{Y}^*$ and $\bar{Y}_k^*$(not reported.) They are also fairly robust to functional forms assumptions. In particular, we replaced the cubic in $\bar{Y}^*$ that appears in (7) with a nonparametric specification while retaining the linear index specification for the other variables and interaction terms in (7). This leads to a model of the form

$$W = f(\bar{Y}^*) + Z\beta + u \ ,$$

where $f(\bar{Y}^*)$ is nonparametric and Z contains the other variables in (7), including the interaction terms involving $\bar{Y}^*$. We estimated the model using a variant of Robinson's (1988) partial regression approach involving local linear regression to estimate $f(\bar{Y}^*)$ after first adjusting W for $Z\beta$.

The estimates in rows 5 and 6 of Table 6 (Panel B) are quite close to the estimates based on the global polynomial specification. We also experimented with alternative parametric specifications for the terms involving $\bar{Y}^*$, the interaction between $\bar{Y}^*$ and age-70, and the interaction between $\bar{Y}^*$ and widowed, including cubic interactions between $\bar{Y}^*$ and the linear age term and a quadratic interaction between $\bar{Y}^*$ and widow status, and the use of a spline with different slopes for each quintile of the income distribution. The results are similar to those we report.

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[24] These values use the individual weights for 1989.

[25] Sample weights are used when computing evaluation points for income. As a robustness check we have also estimated a model of the conditional median of wealth corresponding to the specification in Table 3.1, Model V. Using the conditional median estimates in place of the mean regression parameters we obtain estimates of EB_{Y^*} of .010 (.001), .020 (.0007) , and .030 (.0008) at the 10th percentile, mean and 90th percentile of the income distribution. Median regression standard errors do not account for the panel structure of the data.

Table 4 The Response of Expected Bequests to Lifetime Resources.

Panel A: Bequest probabilities and responses of Wealth to Y*, by age

White couple, both of age 60, average permanent income (PSID estimates)

Age	S_{ma}	S_{fa}	H_{ma}	H_{fa}	$\frac{dW(a)}{dY*}$	$\frac{dW(a)}{dY*}$widow	P_{ba}	P_{ba}widow
60	1	1			.052		0	
61	.986	.992	.015	.008	.052	.031	.000	.000
62	.972	.984	.016	.009	.053	.032	.000	.000
63	.956	.975	.018	.010	.053	.032	.000	.001
64	.938	.965	.019	.011	.054	.033	.000	.001
65	.920	.955	.021	.012	.055	.033	.000	.001
66	.901	.944	.023	.013	.055	.034	.000	.002
67	.880	.932	.025	.014	.056	.035	.000	.003
68	.858	.919	.027	.015	.056	.035	.000	.003
69	.835	.905	.029	.016	.057	.036	.000	.004
70	.811	.890	.032	.018	.058	.037	.000	.005
71	.785	.874	.035	.020	.058	.037	.000	.006
72	.757	.857	.038	.022	.059	.038	.001	.008
73	.728	.838	.042	.024	.059	.038	.001	.010
74	.697	.818	.046	.026	.060	.039	.001	.011
75	.665	.797	.050	.029	.060	.040	.001	.013
76	.632	.774	.054	.031	.061	.040	.001	.016
77	.598	.750	.059	.034	.062	.041	.001	.018
78	.563	.725	.064	.037	.062	.042	.001	.021
79	.527	.698	.069	.041	.063	.042	.001	.024
80	.490	.669	.075	.045	.063	.043	.001	.027
81	.453	.639	.082	.051	.064	.043	.001	.031
82	.416	.607	.090	.056	.064	.044	.001	.034
83	.378	.573	.099	.062	.065	.045	.002	.038
84	.341	.537	.107	.069	.066	.045	.002	.042
85	.304	.500	.115	.076	.066	.046	.002	.045
86	.269	.462	.124	.084	.067	.047	.002	.048
87	.236	.423	.135	.094	.067	.047	.002	.051
88	.204	.383	.147	.104	.068	.048	.002	.054
89	.174	.343	.159	.115	.069	.048	.001	.055
90	.146	.304	.172	.127	.069	.049	.001	.056
91	.121	.265	.186	.140	.070	050	.001	.055
92	.099	.228	.202	.155	.070	.050	.001	.054
93	.079	.193	.218	.171	.071	.051	.001	.052
94	.062	.160	.234	.186	.071	.052	.001	.048
95	.047	.130	.249	.201	.072	.052	.000	.043
96	.035	.104	.263	.217	.073	.053	.000	.038
97	.026	.081	.279	.234	.073	.053	.000	.032
98	.019	.062	.294	.251	.074	.054	.000	.027
99	.013	.047	.309	.267	.074	.055	.000	.022
100	0	0	1	1	.075	.055	.001	.059

Notes: See Table 4, Panel B

Table 4 (cont.) The Response of Expected Bequests to Lifetime Resources, Whites (PSID).

Panel B: Estimates of $EB_{\bar{Y}*}$			
White couple, both of age 60			
	Parent Permanent Earnings Level Used to Evaluate $\bar{Y}^*$		
	10th percentile	Average	90th percentile
Expected derivative	.0161	.0250	.031
(standard error)	(.0073)	(.0042)	(.0063)

Notes: Pba: Probability of observing a bequest at age a if both members are alive in the previous period.
Pba- wid: Probability of observing a bequest in period t if only one member of the couple was alive after a-1. A bequest occurs once both members are dead.
dW(a)/d$\bar{\text{Y}}$* : Effect of lifetime resources $\bar{\text{Y}}$* on wealth holdings of a couple at age a
dW(a)/d$\bar{\text{Y}}$* widow : Effect of lifetime resources on wealth holdings of a widow(er) at age a
Expected derivative: sum of dW(a)/d$\bar{\text{Y}}$* weighted by the probability of observing the bequest at age a and discounted to age 70 of the parent.
Standard errors in Panel B are derived using the delta method. The population weighted 10th, average, and 90th percentiles values of y are 18,640, 44,260 and 76,030.

The previous estimates assume that the bequest to children happens after the death of the last member of the couple. As we have already discussed, there may exist an early bequest following the death of the first parent. To explore this possibility, we entertain the alternative, probably extreme assumption that the entire difference in the wealth-income derivative between intact couples and widows is the derivative of an early bequest with respect to income. We add this difference (after appropriate discounting and treatment of mortality) to our previous estimates, which are based on the assumption that the entire bequest occurs after the death of the second spouse. The PSID results are in Panel C of Table 6. The PSID estimate of $EB_{\bar{Y}*}$ increases by about .016. The estimates for whites become .031 (.008), .040 (.006) and .045 (.008) at the 10th, average and 90th percentiles of the income distribution. The corresponding estimates in the AHEAD sample are in row 9 of Table 6 (Panel D): .029 (.006), .031 (.005), and .033 (.006). However, these are almost certainly overestimates of the marginal propensity to bequeath, because the evidence in Hurd and Smith (2002) suggests that only about 11% of the bequeathable wealth of a household is passed on to children upon the death of the first spouse.[26]

[26] We obtain the 11% figure based on the fact that Hurd and Smith report that 22.6% of the estate, excluding the house, goes to children and that housing is about half of bequeathable wealth.

Table 5 Response of Expected Bequests to Lifetime Resources.

Panel A: Bequest probabilities and responses of Wealth to Y*, by age

Nonwhite couple, both of age 60, average income (PSID estimates)

Age	S_{ma}	S_{fa}	H_{ma}	H_{fa}	$\frac{dW}{dy}$	$\frac{dW}{dy}$ widow	P_{beq}	P_{beq} widow
60	1	1			.032		0	
61	.976	.987	.024	.013	.033	.015	.000	.000
62	.951	.972	.025	.014	.033	.015	.000	.001
63	.925	.957	.027	.016	.034	.016	.000	.001
64	.898	.941	.029	.017	.035	.016	.000	.002
65	.870	.924	.032	.018	.035	.017	.000	.003
66	.840	.906	.034	.020	.036	.017	.001	.005
67	.810	.887	.036	.021	.036	.018	.001	.006
68	.779	.867	.038	.022	.037	.019	.001	.007
69	.747	.846	.041	.024	.037	.019	.001	.009
70	.714	.824	.044	.026	.038	.020	.001	.011
71	.680	.801	.047	.028	.039	.020	.001	.012
72	.646	.777	.051	.030	.039	.021	.001	.015
73	.611	.752	.054	.032	.040	.022	.001	.017
74	.575	.726	.058	.035	.040	.022	.001	.019
75	.540	.699	.061	.037	.041	.023	.001	.021
76	.506	.671	.064	.040	.042	.023	.001	.023
77	.471	.643	.068	.043	.042	.024	.001	.025
78	.437	.613	.072	.046	.043	.025	.001	.028
79	.403	.582	.078	.050	.043	.025	.001	.030
80	.368	.550	.086	.056	.044	.026	.001	.034
81	.334	.515	.094	.062	.045	.026	.001	.037
82	.300	.480	.101	.068	.045	.027	.001	.040
83	.268	.445	.107	.074	.046	.027	.001	.042
84	.238	.410	.113	.079	.046	.028	.001	.042
85	.210	.375	.118	.085	.047	.029	.001	.043
86	.183	.341	.125	.091	.047	.029	.001	.043
87	.159	.308	.133	.098	.048	.030	.001	.043
88	.136	.275	.143	.107	.049	.030	.001	.043
89	.115	.243	.156	.116	.049	.031	.001	.043
90	.095	.212	.170	.128	.050	.032	.001	.042
91	.078	.182	.185	.140	.050	.032	.001	.041
92	.062	.155	.200	.152	.051	.033	.000	.038
93	.049	.129	.212	.163	.051	.033	.000	.035
94	.038	.107	.221	.172	.052	.034	.000	.031
95	.029	.087	.229	.183	.052	.035	.000	.027
96	.022	.070	.240	.197	.053	.035	.000	.023
97	.017	.055	.253	.211	.054	.036	.000	.020
98	.012	.043	.265	.226	.055	.036	.000	.016
99	.009	.033	.278	.239	.055	.037	.000	.013
100	.000	.000	1.000	1.000	.056	.037	.000	.041

Notes: See Table 4, Panel B.

Table 5 (cont.) The Response of Expected Bequests to Lifetime Resources, Nonwhites (PSID).

Panel B: Estimates of $EB_{\bar{Y}*}$			
Nonwhite couple, aged 60			
	Parent Permanent Earnings Level Used to Evaluate Y*		
	10th percentile	Average	90th percentile
Expected derivative	.0036	.0157	.0227
(standard error)	(.0070)	(.0037)	(.0068)

Notes: See Table 4, Panel B.

5.1.1 Bias from Undersampling of the Very Wealthy

In this section we assess the bias from undersampling in the PSID of the top 2 percent of the wealth distribution. The effect of undersampling might be compounded by the fact that we eliminate 0.5% observations that have the largest residuals based on median regression. Menchik and David (1983) use Wisconsin probate records to estimate the marginal propensity to bequeath and to make inter vivos tranfers, conditional on a positive bequest and inter vivos transfers. Some records include long histories of transfers, but the law only requires reporting of inter vivos transfers in the previous three years. Their sample includes the cohorts born between 1880 and 1924. An advantage of their data relative to Federal estate tax records is that the threshold in Wisconsin for filing a return was only $3,000 prior to 1973 and $10,000 after 1973. These values are far below the threshold for a federal return, even after adjusting for inflation. They merge the income tax returns of decedents with probate records from county courthouses. Presumably, their sample includes the very rich in the state of Wisconsin.

Menchik and David regress bequests on a linear spline in the permanent component of lifetime income of decedents. The kink in the spline is at the 80th percentile of the distribution of lifetime income. They report that the marginal propensity to spend out of lifetime resources on adult children (among those who give) is about 0.25 for parents above the 80th percentile of income. It is close to 0 below that level. However, they use a discount rate of only 1% in constructing this estimate. Furthermore, they do not consider the link between earnings prior to retirement and initial wealth or between career earnings and non-asset retirement income. Our calculations of $\frac{\partial \bar{Y}^*}{\partial y}$ based on (4) suggest that using an interest rate of 4% and accounting for initial retirement income and non-asset retirement income would reduce their estimate to about 0.10. If one regards this estimate as capturing only bequests, then it compares to our estimate of .031 for $EB_{\bar{Y}*}$ for whites at the 90th percentile. Alternatively, it could be compared to our estimate of $EB_{\bar{Y}*} + ER_{\bar{Y}*}$, which is .069 based on the PSID for the 90th percentile. (Tables 6 and 7). Accounting for bias resulting from the fact that people with no estate or very small estates do not show up in the probate records would probably lead to a further downward adjustment. Finally, Menchik and David control for whether there is a surviving spouse but

Table 6: The effect of parental lifetime resources on expected bequests.

	Parent Permanent Earnings Level Used to Evaluate Y*		
	10th percentile (y=18,640)	Average (y=44,260)	90th percentile (y=76,030)
Panel A: Baseline specification			
1. PSID whites	.0161	.0250	.031
	(.0073)	(.0042)	(.0063)
2. AHEAD,whites	.0186	.0211	.0248
	(.0050)	(.0025)	(.0037)
3. PSID, nonwhites	.0036	.0157	.0227
	(.0070)	(.0044)	(.0068)
4. AHEAD, nonwhites	.0124	.0174	.0211
	(.0075)	(.0050)	(.0062)
Panel B: Alternative functional form (local linear regression)			
5. PSID, Whites	.0075	.0248	.0246
	(.0075)	(.0050)	(.0062)
6. PSID, Nonwhites	-.0037	.0161	.0161
	(.0087)	(.0075)	(.0075)
Panel C: Part of Bequest happens after the death of first parent (PSID)			
7. Whites	.0312	.0398	.045
	(.0077)	(.0058)	(.0078)
8. Nonwhites	.0210	.0320	.0381
	(.008)	(.0068)	(.0087)
Panel D: Part of Bequest happens after the death of first parent (AHEAD)			
9. Whites	.0286	.0311	.0335
	(.0062)	(.0050)	(.0062)
10. Nonwhites	.0224	.0286	.0311
	(.0075)	(.0075)	(.0087)

The table presents estimates (standard errors) of the derivative of expected bequests with respect to the present value of parental lifetime resources Y*, dEB/dY*, The calculation of dEB/dY* is explained in the text and documented in Table 4 and 5 in the PSID case. The value of dY*/dy is 106.353. The computations assume an interest rate of 4%. The reported standard errors do not account for cross-correlations betweeen unobservables driving wealth accumulation at age 70, initial wealth and post-retirement income. In the AHEAD case, standard errors ignoring the fact that lifetime resources measures are generated.Panel B is based on a semiparametric estimation of the relationship between income and wealth. Panels C and D relax the assumption that bequests happen after the death of the second parent.

do not allow the effect of $\bar{Y}^*$ on bequests to depend on it. The large negative coefficient that we obtain for the interaction between a widow/er dummy and $\bar{Y}^*$ suggests that adding the interaction would reduce their estimates under the assumption that bequests to children occur upon the death of the second parent.

We have also performed two sensitivity analyses using the PSID. First, as we mentioned earlier, we estimated $EB_{\bar{Y}^*}$ without removing wealth outliers. Using a third-order global polynomial, we obtain an estimate at the mean of .027 (.009) and at the 90th percentile of .006 (.009). Using Robinson's estimator we obtain .026 at the mean and .011 at the 90th percentile. The estimates are noisy and the decline with income is not sensible. There is little evidence that our treatment of wealth outliers leads us to understate effects.

The second sensitivity analysis addresses the problem posed by the fact that the very wealthy are undersampled even after outlier observations are restored. First, we assume that *all* wealth observations above the 98th percentile and *none* below that value are missing. Second, we assume that our estimate of $EB_{\bar{Y}^*}$ is the correct value for those whose wealth is below the 98th percentile value in the unconditional distribution of wealth. In reality, sample selection might lead our estimate to understate MPS even for those with wealth below the 98th percentile value. We strongly suspect, however, that this bias is relatively minor, because the fraction of observations that are missing in the PSID appears to be low even at the 90th percentile of the $\bar{Y}^*$ distribution. Rename our estimate $E(B_{\bar{Y}^*}|W \leq W_{98})$, where W_{98} is the 98th percentile in the population. Define $P(W \leq W_{98}|\bar{Y}^*)$ to be the probability that $W < W_{98}$ conditional on $\bar{Y}^*$ and let $E(B_{\bar{Y}^*}|W > W_{98})$ be the response of bequests to lifetime resources for people above W_{98}, whom we assume are missing from our sample.

$$EB_{\bar{Y}^*} = P(W \leq W_{98}|\bar{Y}^*)E(B_{\bar{Y}^*}|W \leq W_{98})+P(W > W_{98}|\bar{Y}^*)E(B_{\bar{Y}^*}|W > W_{98})$$

To get an upper bound for $E(B_{\bar{Y}^*}|W > W_{98})$, note that if parental consumption is a normal good, then MPS through bequests must be less than 1. Furthermore, the value of 1 is almost 35 times larger than the value we obtain at the 90th percentile of $\bar{Y}^*$ in our sample. Given these facts, we choose .4 as an upper bound estimate of $E(B_{\bar{Y}^*}|W > W_{98})$ for persons at the 90th percentile of $\bar{Y}^*$. To get an upper bound for $P(W > W_{98}|\bar{Y}^*)$ at the 90th percentile of $\bar{Y}^*$, note that the most conservative assumptions would be (a) that all of the missing top 2% of the wealth observation correspond to people in the top 10% of the $\bar{Y}^*$ distribution and (b) that the top 2% of the wealth observations are distributed uniformly over the top 10% of the $\bar{Y}^*$ observations. In this case, at the 90th percentile of $\bar{Y}^*$, 0.02/0.10 of the wealth observations are missing. However, the probability that W exceeds the 99th wealth percentile in our sample, which under our assumptions is roughly the 97th percentile in the population, is only 0.020 for people between the 88th and 94th percentiles of $\bar{Y}^*$ and only 0.022 for people between the 90th and 96th percentile values. We triple the latter number and use 0.066 as an upper bound for $P(W > W_{98}|\bar{Y}^*)$)

for persons at the 90th percentile of $\bar{Y}^*$. Evaluating the above equation, we arrive at $EB_{\bar{Y}^*} = 0.934 \cdot 0.031 + 0.066 \cdot 0.4$ or 0.055.

We conclude that undersampling of the very wealthy leads our estimates of $EB_{\bar{Y}^*}$ at high income levels to be biased downward by an amount that is large relative to our estimates but modest in absolute terms. We doubt that there is much bias at the 10th percentile or the mean levels of income. It is likely that our estimates $ER_{\bar{Y}^*}$ are also biased downward for high values of $\bar{Y}^*$, for similar reasons.

It bears repeating that we only provide evidence on how much parents pass on out of variation in Y^* that is associated with the permanent component of earnings. Our results are perfectly consistent with a world in which $EB_{\bar{Y}^*}$ is small over most of the distribution of $\bar{Y}^*$ but the MPS out of inheritances and income or wealth shocks late in life is large.

5.2 Expected Inter vivos Transfers

We now turn to estimates of the impact of parental permanent income on inter vivos transfers. We use the 1988 Transfer Supplement File of the PSID to estimate $ER_{\bar{Y}^*}$. We use a matched sample of parents and children that is similar to that described in Altonji et al. (1997). For each parental household, we aggregate the inter vivos transfers given to all children. The summary statistics for this sample are presented in Appendix Table C1. Thirty-three percent of parents made a transfer to at least one of their adult children in 1987.

The conditional mean of R, $R(\bar{Y}^*, a, Z, D_{fa}, D_{ma})$, is equal to

$$P(R > 0|\bar{Y}^*, a, Z, D_{fa}, D_{ma})E(R|R > 0, \bar{Y}^*, a, Z, D_{fa}, D_{ma}).$$

We report estimates $\frac{dR(\bar{Y}^*,a,Z,D_{fa},D_{ma})}{d\bar{Y}^*}$ using three alternative methods but focus on the results of our preferred approach, which is to estimate $P(R > 0|\bar{Y}^*, a, Z, D_{fa}, D_{ma})$ using a probit model and $E(R|R > 0, \bar{Y}^*, a, Z, D_{fa}, D_{ma})$ by OLS regression for R on the subsample of parents who give transfers. We recover $\frac{dR(\bar{Y}^*,a,Z,D_{fa},D_{ma})}{d\bar{Y}^*}$ using the properties of the normal distribution (see McDonald and Moffit (1980)). The models include a fourth order polynomial in $\bar{Y}^*$ and demographic variables, with 0 transfer observations included. As in the wealth models, $\bar{Y}^*$ is entered in deviation from mean form and age is the deviation from age 70 Consequently, the coefficient on the linear $\bar{Y}^*$ term is the derivative with respect to $\bar{Y}^*$ of inter vivos transfers to all children for a parent who is 70 years old, evaluated at the sample mean of y. The response is increasing over most of the range of the income distribution. The model estimates are in Appendix Table D1, but we do not discuss them to save space.

Next, we use the estimates from Table D1 to estimate $ER_{\bar{Y}^*}$. We obtain these by computing the expected discounted value of the response of lifetime inter vivos transfers to permanent income. The calculations are for a husband and wife who are the same age and survive to at least age 60. We use an interest rate of 4%, and the mortality rates after age 60 are the ones we use in the previous subsection (see footnote 23).

In Table 7, we report estimates of $ER_{\bar{Y}^*}$. Our preferred estimates for whites are 0, .028, and .038 at the population weighted 10th percentile, mean and the 90th percentile of income (row 2). The estimates for nonwhites are 0, .022, and .031 (row 5).

5.3 Implications of the Estimates for Intergenerational Sharing of Resources

5.3.1 Estimates of MPS

To obtain MPS for whites, we sum the PSID estimates of $EB_{\bar{Y}^*}$ and $ER_{\bar{Y}^*}$ reported in the first row of Table 6 and second row of Table 7, respectively. MPS is 0.018 (=0.016+0.002) at the 10th percentile of the income distribution. At the average income level, MPS is 0.053 (=0.025+0.028). Even at the 90th percentile, MPS is only 0.069 (=0.031+0.038). The corresponding estimates for nonwhites are 0, 0.038 and 0.054 evaluated at the 10th, average and 90th percentile of the combined income distribution. Using the AHEAD estimates of $EB_{\bar{Y}^*}$ we obtain very similar numbers. From these results, we conclude that only a small fraction of an extra dollar of lifetime resources is passed on to children as bequests and inter vivos transfers. If we assume a discount rate of 6% rather than 4%, the estimates are .009, .029, and .039. If we assume a 4% discount rate but we use the values of $EB_{\bar{Y}^*}$ based on the assumption that part of the bequest occurs at the death of the first parent (Table 6, row 7), the estimates of MPS for whites are .033, .068 and .083 at the 10th, average and 90th percentile of income. Given the results of our analysis of the effects of underrepresentation of the wealthiest households in the sample, we would not want to rule out a value as high as 0.11 or 0.12 for households at the 90th percentile.

5.3.2 The Relative Value of $\bar{Y}^*$ and $\bar{Y}_k^*$ from the Child's Point of View

From the child's point of view, what are the terms of trade between another dollar of $\bar{Y}^*$ for the parent and another dollar of $\bar{Y}_k^*$ for the child? Assume that the child is 25 years younger than the parent. The estimates in row 1 of Table 6 imply that a one dollar increase in $\bar{Y}^*$ leads a .053 increase in the expected bequest and in transfers, which have a present value of $1.04^{25} * .053$ or \$0.141 after discounting forward to when the child is age 70. [27]

[27] These estimates ignore the effect of the resources of the parent on the initial wealth of the child. To address this issue we expanded the regression model for initial wealth of the child to include permanent earnings of the parent. The coefficient is small but is not precisely estimated.

Table 7: The effect of parental resources on expected lifetime inter vivos transfers.

	Parent Permanent Earnings Level Used to Evaluate Y*		
	10th perc. (y=18,640)	**Average (y=44,260)**	**90th perc. (y=76,030)**
1. Regression including zeros (whites)	.0027	.0296	.0279
	(.006)	(.0064)	(.0094)
2. Probit+flexible OLS (whites)	.0022	.0276	.0377
	(.0071)	(.0077)	(.0166)
3. Tobit (whites)	.0071	.0217	.0283
	(.0040)	(0.0027)	(.0066)
4. Regression including zeros (non whites)	-.0006	.0251	.0237
	(.0049)	(.0064)	(.0098)
5. Probit+flexible OLS (nonwhites)	.0015	.0219	.0310
	(.0051)	(.0081)	(.0186)
6. Tobit (nonwhites)	-.0174	-.0139	.0126
	(.0070)	(.0048)	(.0122)

The Table presents estimates of $ER_{\bar{Y}*}$, the effect of an extra dollar of lifetime resources on expected lifetime inter vivos transfers using the Transfer model estimates in Table D1. Standard errors in parentheses. The computations assume an interest rate of 4%. Standard errors in the Tobit specification do not allow for correlation within dynasties.

A crude way to account for the fact that the average parent in our sample has 3 children and that bequests and gifts are shared among all the children is to simply divide the \$0.141 figure by 3, which is 0.047 (Table 8 row 1a, col 6 -whites). A better way to account for siblings is to re-estimate the wealth model after dividing W_a by the number of children and adding the interaction between number of children and $\bar{Y}^*$ as a regressor. In the case of transfers one may directly estimate $dR_a/d\bar{Y}^*$ on a per child basis by using the transfer data on individual children with the interaction between $\bar{Y}^*$ and the number of children included. Using this procedure, we find that for a parent with 3 children the effect of a \$1 increase in $\bar{Y}^*$ on the sum of expected bequest per child and the expected transfer discounted to the age 70 of the child is \$0.054 (row 1b). For an only child the corresponding value of the increase is \$0.078 (row 6b). These calculations suggest that, from the perspective of the child,

Table 8: Terms of trade between a dollar of parents' resources $\mathbf{Y}^*$ and a dollar of child's resources ($\mathbf{Y}_k^*$)

	Regression coef. linking y_k and y_p (1)	Part of Bequest at Death of First Spouse? (2)	Interest rate (3)	Adjustment for family size (4)	Effect of \$1 increase in Y^* on expected value of bequests and transfers per child discounted to when child is age 45 (MPS per child) (5)		Value of \$1 increase in Y^* in units of Y_k^* with discounting accounted for. (6)		Effect of y on transfers and bequests as a fraction of total effect of y on resources of adult children (7)	
					Whites	Non whites	Whites	Non whites	Whites	Non whites
1a	0.4	no	0.04	divide bequests and transfers by 3	.018	.013	.047	.033	.105	.077
Wealth Models on a Per Child Basis, Transfer Models Estimated Using Data for for Individual Children										
					Whites	Non whites	Whites	Non whites	Whites	Non whites
1b.	0.4	no	0.04	assume 3 kids	.020	.017	.054	.044	.119	.099
2b.	0.4	yes	0.04	assume 3 kids	.024	.021	.064	.055	.138	.121
3b.	0.4	no	0.06	assume 3 kids	.0112	.0090	.048	.039	.108	.088
4b.	0.4	no	0.1	assume 3 kids	.0042	.0032	.046	.034	.102	.079
5b.	0.28	no	0.04	assume 3 kids	.020	.016	.054	.042	.163	.131
6b.	0.4	no	0.04	assume 1 kid	.029	.026	.078	.070	.163	.148
7b.	0.4	yes	0.04	assume 1 kid	.033	.030	.088	.081	.180	.168
8b.	0.28	yes	0.04	assume 1 kid	.033	.030	.088	.081	.239	.224

The estimates in Column (6) are obtained by discounting to age 70 of the child the MPS/child measured at age 70 of the parent (Column (5)). Col (6) = Col(5)*(1+Col(3))^{25}. Column (7) shows the ratio of the impact of parental permanent earnings on transfers and bequests at age 70 of the child to the sum of the impacts of parental permanent earnings on transfers and bequests and on the after tax lifetime income of the child. The calculation assumes that parents and children face the same tax rate on earnings and that transfers and bequests are not taxed. The impact of parental permanent earnings on transfers and bequests is the product of the estimate in Column (6) and our estimate of the effect of permanent income on lifetime resources (dY*/dy). When the interest rate is .04 and the tax rate .2, dY*/dy=106.353. The impact of parental permanent income on lifetime income of the child is the product of the estimate in Column (1) and (dY*/dy).

the impact of an extra dollar of parental resources on own resources through gifts and bequests is small but not neglible.

5.3.3 The Share of Transfers and Bequests in the Link Between Parent and Child Resources

Next we compare the link from parental resources to the child's resources that operates through transfers and bequests to the link from y to y_k. Let ρ be the coefficient of the regression of y_k on y and a constant. The present value to the child at age 70 of the increase in lifetime resources associated with a 1 dollar increase in y holding bequests and inter vivos transfers constant is $\rho \cdot d\bar{Y}_k^*/dy_k$. Setting $d\bar{Y}_k^*/dy_k$ to our estimate of 106.353 and setting ρ to 0.4 based on Solon's (1999) survey of the evidence on the link between y_k and y, one obtains $0.4 \cdot 106.353$ or \$42.51. This figure may be compared to the present discounted value of the increase in bequests and transfers associated with a 1 dollar increase in y. If the interest rate is 0.04 and the child is 25 years younger than the parents this is equal to $1.04^{25} * d\bar{Y}_k^*/dy_k * MPS = 2.67 * 106.353 * .053$ or \$15.05. Simply dividing by 3, the average number of children yields 5.02. Thus about $5.02/(5.02 + 42.51)$ or .105 of the effect of an increase in y on the child's adult resources operates through the link between y and y_k. This says that 10.5% of the effect is through bequests and transfers (Table 8, row 1a, col 7 -whites). When we account for number of children by directly modelling wealth and transfers on a per child basis the estimate is .119 (col 7, row 1b -whites), which is not negligible. Assuming that part of the bequest follows the death of the first parent raises the value to .138 (row 2b). The estimate rises to .163 if we set ρ to .28, which is the value we obtain from a regression of y_k on y and a cubic in the birth year of the child in our sample. Finally, if we use .28 for ρ and evaluate the wealth and transfer models for an only child we obtain estimates of .217 (not shown) and .239 (row 8b) depending on whether we use the coefficient on $widow * \bar{Y}^*$ coefficient as an estimate of the part of the bequest that follows the death of the first parent.

At the average income level, our preferred estimates for whites suggest that the response of bequests and gifts accounts for about 13% of the effect of parental resources on the adult resources of a child who has two siblings. The estimate varies between 12 and 22 percent depending on assumptions about the degree of intergenerational correlation in income and is higher for only children. The calculations in column 6 imply that one should add between .05 and .085 to the intergenerational correlation coefficient in y if one wishes to obtain an estimate of the effects of parental earnings on a child's resources for a child with 2 siblings. Our estimates are somewhat larger at the 90th percentile of y, and these may be biased downward for reasons discussed above. The corresponding estimates for nonwhites suggest a slightly smaller role for the bequest and inter vivos channel.

5.3.4 Comparison to the Marginal Propensity to Spend on Children Under 18 and on College

To provide further perspective on the results for spending on adult children, we use two sources of information to construct estimates of the marginal propensity to spend on young children and on college expenses. Espenshade (1984) reports the total expenses on children between ages 0-17 for three income groups as a function of the wife's labor force status. For each labor force state, we compute $d(Spending_{0\_17})dy$ as the ratio of the differences in expenditures between income groups and the differences in the value of income (at age 40 conditional on education and occupation). We then take a weighted average across labor force states. We obtain 2.04 as $d(Spending_{0\_17})dy$ based on the comparison of medium and high SES households and 2.52 as the value based on the comparison of low and medium SES households.[28] We use the simple average of these numbers, 2.28, as the estimate of $d(Spending_{0\_17})dy$ for a family at mean income. Assuming three children and Espenshade's estimate of 0.77 for economies of scale, we find that the derivative of expenses with respect to parental income at age 40 is 2.28*3*0.77=5.26. To take these numbers to age 70 of the parent, we assume that the parents have the children when the father is 25, 27, and 29 and use age 27 as the midpoint. Assuming an interest rate of 4 percent, 5.26 dollars at age 27 is equivalent to 28.43 dollars at age 70. Using our estimate of 106.353 for $d\bar{Y}^*/dy$, $d(Spending_{0\_17})/d\bar{Y}^*$ is 28.43/106.353=.267. That is, parents spend .267 of an extra dollar of lifetime resources on young children, which is about 5 times as large as our estimate of MPS through transfers and bequests to adult children. We obtain a value of .20 for $d(Spending_{0\_17})d\bar{Y}^*$ when we use estimated costs of raising a child, net of college costs from the US. Dept. of Agriculture (Lino, 2002) which are based on a different methodology than Espenshade's.[29]

What about college expenses? Cameron and Heckman (2001) report estimates of the marginal effect of parental income on the probability of attending a two-year college, a four-year public college, and a four-year private college.[30] The estimated effects are small. Using estimates of tuition, assuming parents pay all of tuition and children pay living expenditures through loans or earnings, Cameron and Heckman's (2001) estimates imply that the marginal

[28] See Table 4 in Espenshade (1984)

[29] Espenshade uses the share of family income devoted to food consumption as a measure of welfare. His strategy to identify the cost of raising a child is the following. He uses a sample from the Survey of Consumer Expenditures to run regressions of the share of food consumption in total family income on income and demographics. The age-specific cost of raising a child is obtained by calculating the income difference between a two-person family and a three person family who have the same predicted share of food consumption. Lino (2002) uses a different strategy. He regresses shares of consumption on family composition dummies and income measures. For each family-type and income group, he predicts consumption of each item, and assigns the cost to each person in the household on a per-capita basis.

[30] We do not use Espenshade's college expenditure numbers because he simply assumes probabilities of attendance by type of school rather than using direct data on college expenditures or estimating the effect of parental income on college attendance.

propensity to spend on college tuition out of a dollar of lifetime resources is less than 0.004 per child in age 70 dollars. We obtain a similar result using Hauser's (1993) estimates of the effect of parental income on college attendance probabilities.

6 Implications of the Wealth Functions for the Existence of a Bequest Motive

Our main focus is on simply measuring the MPS on inter vivos transfer and bequests, but we also investigate whether our estimates suggest the presence of a bequest motive. The analysis of this issue requires a theoretical model of life cycle savings behavior that incorporates both a motive for intended bequests and uncertainty about lifetimes and income. The latter factors drive precautionary savings and unintended bequests. Since analytic models do not deliver sharp quantitative predictions about the link between income and bequests we use a computable structural intergenerational model of wealth and income developed by De Nardi (2004) to simulate data on $W_a, W_1, y_{i1}, ...y_{ia}$, and Z_i under alternative assumptions about the degree of parental altruism.[31] We use the simulated data to estimate $dW(y, Z, a)/dy_i$ and compare the results to estimates based upon the PSID. Overall, the results suggest three conclusions. First, at high income levels the simulated EB_y is much larger with a bequest motive than without one. In the absence of a bequest motive EB_y declines at high income levels. Second, the derivatives based upon the PSID are reasonably close to those based upon the simulated data for income levels up to the median. At the 90th percentile the PSID derivatives lie above the derivatives of the simulations with no bequest motive and below the derivatives for the model with the bequest motive. The exact relationship between the PSID results and the results based on the simulation model depends on whether we assume that part of the bequest occurs when the first parent dies or not and on the treatment of taxes. Third, the monotonic increase in the PSID estimates of EB_y increase over the entire range of income and are more in line with the pattern in the simulated data for the model incorporating a bequest motive. See Altonji and Villanueva (2003) for details.

The above line of analysis is loosely related to that of Dynan et al. (2004), who argue that a life-cycle model including a bequest motive and uncertainty about medical expenses predicts a positive relationship between the ratio of wealth to lifetime income for prime-age individuals. Using three household surveys, Dynan et al (2004) document that savings rates and wealth-income ratios increase with a measure of lifetime income. Their results contradict Gustman and Steinmeier (1998), who use social security earnings records matched to the HRS.

We checked if our PSID results are consistent with Dynan et al's findings. We computed wealth-income ratios using and evaluated income derivatives at

[31] In contrast, the altruism model does provide very sharp predictions about inter vivos transfers. See Cox and Rank (1992) and Altonji, Hayashi and Kotlikoff (1997).

age 56 in keeping with the fact that Dynan et al.'s prediction of higher wealth-income ratios for high-income households holds for households in their prime age. To this end, we first we used a regression specification similar to Model II, Table 3.1 to predict wealth levels. Second, we obtained wealth–income ratios by dividing predicted wealth by permanent income. Finally, we ran a regression of the predicted wealth income ratio on a third-order polynomial in permanent income. Contrary to Dynan et al (2004), we obtain a U-shaped relationship between wealth-income ratios and permanent annual income. The derivative of the wealth-income ratio with respect to income is -.019 (.016) at the average income level.[32] It should be kept in mind that our sample is not the most appropriate one for detecting a bequest motive using Dynan et al's strategy. It includes a substantial fraction of retired households, for whom the prediction of wealth-income ratios increasing in income does not necessarily hold—see Dynan et al (2004).

Hurd (1989) and others compare the age profile of wealth for couples with and without children to gain insight into a possible bequest motive. To provide a possible benchmark with which to assess the importance of altruism toward children in the wealth/income relationship, in Altonji and Villanueva (2003) we estimate the Model IV in Table 3.1 using a sample of older men and women who had no children. Variables corresponding to children, such as $\overline{y}_k$ are excluded. Overall, our results are somewhat mixed but for the most part suggest that the relationship between wealth and income does not depend that much on children. However, we argue that the degree of difference between older adults with and without children in the response of wealth late in life to income does not say very much about the extent to which bequests are motivated by altruism.

7 Conclusion

In this paper, we use matched data on parents and their adult children from the PSID as well as the AHEAD survey of the elderly to estimate the marginal propensity of parents to spend their lifetime resources on inter vivos gifts and bequests to their adult children. In the absence of sufficient direct information about actual bequests we estimate the response of bequests to income by combining age specific estimates of the response of wealth to income with data on mortality rates. We use a similar strategy to estimate the present value of inter vivos gifts associated with an extra dollar of parental income.

We have three main findings. First, white parents at the overall mean of permanent earnings pass on between 2 and 3 cents of every extra dollar of lifetime resources to their children through a bequest. The estimate increases with income and decreases with the assumption about the interest rate. Second, parents spend about 2.5 cents of an extra dollar of lifetime resources on inter vivos transfers. The estimate is increasing in income. Third, when we

[32]The result is robust to a number changes in the definition of permanent income, such as dropping our correction for secular growth in wages. It holds when we exclude realizations of income after wealth is observed when constructing permanent income measure.

add together the two values, we conclude that parents spend about 5 cents out of an extra dollar of parental resources on adult children. The estimates are lower for nonwhites at a given income level. For whites we estimate that from the point of view of a child with two siblings the increased gifts and bequests associated with a $1.00 dollar increase in parental lifetime resources is equivalent to an increase in the child's resources from earnings or other sources of between 5 and 8 cents. Using our estimate of MPS in combination with consensus estimates of the intergenerational correlation in income, we estimate that about 87% of the link between parental resources and the resources that child enjoys as an adult is through intergenerational links in human capital and about 13% is through the effect of parental resources on gifts and bequests.

We wish to flag four lines for further research. The first is to perform similar analyses for other countries, where savings incentives, retirement provisions, inheritance laws, and family links may differ from the US. As an initial step in this direction, Villanueva (2005) applies our methodology to the UK and Germany and finds that MPS is smaller in those countries than in the US. The second is to use the bequest data from AHEAD and the PSID as these samples continue to age to estimate the derivative of bequests with respect to income. The third is to study the effects of income shocks and capital gains at various ages on expected bequests, which is the subject of our current research. The fourth is to embark on a full scale study of the marginal propensity of parental spending on children under 18 and on college.

8 Appendix A: The Effect of Permanent Income on Initial Wealth and Retirement Income

Estimates of the relationship between the wealth of individuals early in adulthood and y are required to estimate the link between $\bar{Y}^*$ and y. We do not observe initial wealth for the parents, so we estimate regression models of the response of initial wealth to permanent income of the child using the children who are under 35 in our matched sample. These are reported in Appendix Table A1. Model IV in Table A1 includes a cubic in y_k as well as the interaction between y_k and (Age - 22). The results imply that at age 22 and the mean of y_k, a 1 dollar increase in y_k is associated with a $0.17 increase in initial wealth. We assume the relationship between initial wealth and y is the same for the parents' generation.

In Appendix Table B1 we report a similar set of regressions of retirement income on permanent income. We allow the relationship to depend on age and marital status.

9 Appendix B: Construction of the Matched Parent-Child PSID Sample for Estimation of Wealth Models

The PSID contains a cross-year individual file and year-specific household files. The single-year household files contain household-level variables collected in each wave, and the single cross-year individual file contains individual-level variables collected from 1968 to 1999 for all individuals who were ever in the survey. First, we excluded from the cross-year individual file all individuals who are never observed as heads or wives/"wives." Then, using the cross-year individual file, we select (i) individuals who were male heads in the 1968 original household (potential fathers) (ii) individuals who were female heads or wives/"wives" in the 1968 original household (potential mothers) and (iii) individuals who were children in at least one of the 1968-1974 waves of the PSID. That selection is done using the "individual relationship to head" variable. To each child, we match the information of each parent using the original 1968 household identifier. We match 6,057 children to 2,257 parents. Next, we add to each "parent-child" match information from the 1984, 1989, 1994 and 1997 household files. The 1997 file was the last available that could be used with the 1999 wealth file at the time we constructed our data sets. We require that in each of the years in which we observe the parent-child match, the parent must be either the head or the wife/"wife" of the household he or she belongs to (note that we do not impose such restriction on the child). We further restrict our sample to "parent-child" matches in which either (i) any of the parents reaches age 60 between 1968 and 1999, or (ii) any of the parents dies between 1968 and 1997. Children who do not leave their parents to form their own household by 1997 are not included. Children who form independent households and later co-reside with their parents continue to be followed as independent households and are included. Parents and children for whom annual earnings are never observed, and parents for whom wealth is never observed are excluded from the analysis. As a result, our sample contains 14,999 "parent-child-year" observations.

Additional Sample selection rules

Divorced parents: We add 943 additional records of parent-child-year cases in which parents divorced and formed a new household following the divorce. In those additional records, the child is matched to the mother. After the inclusion, the sample contains 15,942 household-years.

Wealth and permanent income: We drop 1,749 parent-child-year cases for which either the wealth of the household of the parent, or both the permanent income of the parent and the permanent income of the mother were missing.

Age-year of birth: After selecting parents who reached age 60 for the period between 1984 and 1999, we re-examined the age variable and found that reported age was not consistent over time for some individuals. We imputed the year of birth from the multiple reports of age. The imputation of the year of birth was obtained substracting the reported age of the individual from the year of the interview. That imputation may vary over time if reported age does not increase on a year-per-wave basis, in part because of variation within the year in the survey date. In such cases we assigned the year of birth as the maximum year of birth implied by the responses. We drop 219 cases in which the new estimated age resulted in none of the parents reaching 60 years of age between 1984 and 1999. We also drop 139 observations for which year of birth is missing for both mother and the father. The resulting sample contains 13,835 parent-child-year matches.

Next, we keep one observation per parent-wave in most cases. We have two observations per 1968 parent household if the parents divorced prior to the survey year in which wealth is collected. In the 125 cases in which divorced parents live in the same household, we drop the observation on the mother. The resulting sample has 4,421 household-years for parent households. We further drop 44 cases using the median regression analysis described in the text. The final wealth sample has 4,377 observations.

Details of the construction of the inter vivos transfer sample are available upon request.

10 Appendix C: Construction of the AHEAD Sample for 1993 and 1995

We use three files from the 1993 wave of AHEAD: the individual respondent file, the household file, and the "other persons" file. The first file contains 8,222 individual respondent records. We match each individual record to the corresponding household records, which contain information on income and wealth. We select one individual per 1993 household. We keep one observation per household and obtain a sample of 6,046 households of potential parents.

The "other persons" file contains records on 17,424 persons. We drop 2,369 cases of "other persons" who were neither sons nor daughters of the respondents. Next, we merge the resulting sample of "other persons" to their parents using the 1993 household identifier. The resulting 1993 sample contained 15,055 records of parent-child matches.

Occupation: We drop 2,727 parent-child matches in which the occupation of the father in the longest-held job was missing.

Child variables: We then delete 1,357 parent-child cases for which we could not assign the income of the child in the following categories: less than 20,000, between 20,000 and 30,000, between 30,000 and 50,000 and more than 50,000. We also drop 644 parent-child matches for which the head in the household of the child is missing or below 21.

Education: We also drop 1,169 parent-child matches for which the number of years of education of the father is either missing or less than 5 years. We drop 323 cases for which the number of years of education of the mother is either missing or less than 5 years.

Age: We could not impute the year of birth of the father for 64 parent-child matches. Overall, we could impute permanent income of the child and parent for 6,751 parent-child matches.

We merged the 1993 sample of 6,751 parent-children with observations from the 1995 wave of AHEAD. Our sample contained 15,629 parent-child-year matches for which we could impute both the permanent income of parents and the average permanent income of the children.

Change in marital status: We dropped 56 cases corresponding to parent-child cases for which parents had changed their marital status between waves. We selected one observation per parental household-year, which leaves us with a sample of 4,854 cases.

We dropped 166 cases for which we could not identify the mother. We deleted and additional 54 cases from the 1995 wave because we could not identify the age of either parent. The resulting sample contained 4,634 household-years. We eliminate 46 outliers using the same trimming strategy used with the PSID sample.

11 Appendix D: Construction of the Permanent Component of Annual Labor Earnings, y_i

We used the panel data on all individuals from the PSID who were either a head or a wife to construct the measures of permanent earnings. In constructing the permanent income measures we make use of the regression model

$$\ln y_{it} = \gamma_0 + X_{1it}\gamma_1 + X_{2i}\gamma_2 + D_t\gamma_t + f(age_{it})\gamma_4 + v_i + u_{it}, \tag{8}$$

where $\ln y_{it}$ is the logarithm of the sum of real labor earnings of the head and wife in the family that person i belonged to in year t and the vector X_{1it} consists of a set of marital status dummies, an indicator for children, and the number of children, X_{2i} consists of a vector of six dummies for educational attainment and race, D_t is a vector of dummies for the years 1968 to 1997 with 1993 as the omitted category, $f(age_{it})$ is a vector of the first 4 powers of age (centered at 40), v_i is a time invariant person specific component, and u_{it} is a transitory component. We estimate (8) by OLS using observations for a particular year if labor earnings exceeded \$900 in 1993 dollars and the household head was between the ages of 20 and 61. Separate models are estimated for men and women. The sample used to estimate the permanent income components uses observations on individuals who are heads or wives/"wives" in years between 1968 and 1997. The samples used for the regressions contains 99,689 individual-years for males and 109,107 individual-years for females. Details of how they were selected are available upon request. We then estimate v_i as the average of the OLS residuals for person i.

Our estimate y_i of permanent earnings is the arithmetic average

$$y_i = \sum_{age=-20}^{20} [\exp\{\hat{\gamma}_0 + X_{2i}\hat{\gamma}_2 + \hat{v}_i + D_{c+age+40}\hat{\gamma}_{c+age+40}]/41$$

where the subscript c indicates year of birth and where we have removed the effects of $f(age_{it})$ by setting age to 40 in all years.[33]

Including the demographic variables $X_{1it}\gamma_1$in the construction of y_i for the years that we observe had little effect on our estimates of the wealth/parental income derivative. By using the above adjusted average of family earnings to construct permanent income, we are implicitly assuming that the variance and degree of serial correlation in u_{it} is sufficiently weak that the variance across households in lifetime earnings contributed by $X_{2i}\gamma_2 + v_i + u_{it}$ is dominated by the permanent component $X_{2i}\gamma_2 + v_i$.[34]

Note that the estimates of the age profile and the coefficients on the year dummies will pick up the effects of variation across birth cohorts in the mean of v_i, because the effects of age, cohort, and time are not separately identified. We assume that v_i is orthogonal to birth cohort conditional on education and race. Under this assumption, the age profile $f(.)$ and the year dummy coefficients γ_3 are identified. Since the PSID starts in 1967, we estimate year effects by linking the year effect estimates for the 1967-1997 period based on the PSID to aggregate time series data on annual earnings of full time employees in the private sector. We use a ratio link based on the average from 1967-1969 of the aggregate wage series and corresponding elements of γ_t for the years 1967-1969. We use a labor force quality index constructed by Denison (1974, page 32, Table 4-1) to account for the effects of shifts in the age-sex composition of hours as well as intragroup changes, intergroup shifts, and changes in the amount of education on the efficiency of an hour of work. We use nominal average annual earnings of full time employees, Series D 722 from the Historical Statistics of the U.S., Colonial Times to 1970, page 164 divided by the CPI. Denison does not report values for years prior to 1929, 1930-1939, or 1942-1946. We assigned the 1929 value for the small number cases earlier than 1929. We filled in missing values for 1930-1939 and 1942-1946 by linear interpolation of the log of the index. We strongly suspect that the effect of any remaining errors in accounting for trends in cohort quality and in aggregate labor market factors will have only a small effect on $d\hat{W}_a(\bar{Y}^*, Z, D_a, a)/d\bar{Y}^*$ given the huge within-cohort variance in permanent income and the fact that we control for age, time, and the interaction between age and time in the

[33]Using the geometric average $y_i = \exp[\sum_{age=-20}^{20}\{\hat{\gamma}_0 + X_{2i}\hat{\gamma}_2 + \hat{v}_i + D_{c+age+40}\hat{\gamma}_{c+age+40}\}/41]$ made little difference in the results. Allowing age to vary when computing permanent income also made little difference. Accounting for effects of variance in u_{it} when going from logs to levels when constructing for permanent income would imply multiplying our estimates of y_i by the factor of 1.20 for men and 1.23 for women. This would reduce our estimates of the response of wealth to y_i by about 17%.

[34]Suppose that $u_{it} = \rho u_{it-1} + \xi_{it}$ where ξ_{it} is iid with variance σ_ξ^2. If $u_{i1} = \xi_{i1}$ then one may show that the contribution of u_{i1} to u_{i42} to the variance across households of the sum of Y_{it} from age 18 to 60 is $var(\xi)\sum_{k=1}^{42}\ [(1-\rho^k)/(1-\rho)]^2)$. If ρ is .65, then this expression equals $325.67 var(\xi)$. The contribution of $X_{2i}\gamma_2 + v_i$ is $42^2 var(X_{2i}\gamma_2 + v_i) = 1764 var(X_{2i}\gamma_2 + v_i)$. Consequently, even if $var(\xi_{it})$ were as large as $.5 var(X_{2i}\gamma_2 + v_i)$, then variation in v_i would account for 91.5% of the variance in accumulated earnings or in average earnings per year over the lifecycle, after abstracting from the contribution of the age earnings profile. If $\rho = .85$ the corresponding variance percentage is 70% .

wealth models. The wealth models control for a fourth order polynomial in the age of the oldest parent and dummy variables for the year of the wealth observation, which will absorb some of the effects of any unobserved differences across cohorts. The estimates of the response of wealth to income are reduced by about 20 percent if one does not account for economy wide time trends in earnings when constructing y_i.

12 Appendix E: Appendix Tables

Appendix Table A1: Regression of Initial Wealth on permanent Income

Dependent variable: first observation of wealth holding of a child	Model I	Model II	Model III	Model IV
yk	.32 (.04)	.15 (.055)	0.14 (.06)	0.17 (.07)
yk * yk			.00025 (.001)	.0015 (0.001)
yk*yk*yk				−.000015 (1e−5)
yk * (Age - 22)		0.05 (0.02)	0.05 (0.02)	0.05 (0.02)
age-22				−0.38 (1.38)
(age-22) squared				1.04 (.55)
(age-22) cubic				−0.1 (.06)
Nonwhite				−14.87 (1.86)
Child is a female				3.03 (1.67)
Child not married				−16.13 (1.91)
Wealth observed in 84				−19.41 (8.73)
Wealth observed in 89				−17.24 (8.7)
Constant				23.02 (2.06)

The sample is drawn from the matched sample of parents and children and excludes wealth observations after age 35. Sample size 1,874. The standard errors (in parentheses) allow for arbitrary correlation and heteroscedasticity within the family. yk is permanent annual earnings of the child and is in deviation from sample means.

Table B1: Regression of Pre-Tax Post Retirement Non Asset Income on Permanent Earnings

Dep. Var.: Post Retirement Non-Asset Income (y_a^r) Explanatory Variables	Coefficient	(std. error)
y	.378	(.021)
y x y	-0.0002	(.0006)
y x y x y/1000	-0.00103	0.00349
y x (Age - 70)	-.011	(.002)
y x widow	-.21	(.03)
y x divorced	-.20	(.04)
y x nonwhite	0	(.023)
y x single	-.20	(.04)
age-70	-.65	(.06)
(age-70) squared	.02	(.006)
(age-70) cubic	.004	(.0006)
(age-70) quartic	-.0002	(.0004)
Nonwhite	-1.41	(.45)
Age 62	0.87	(.37)
Female	-4.11	(.816)
Single	-8.34	(.89)
Divorced	-8.1	(.92)
Widow	-6.27	(.96)
Widower	-6.94	(.57)
Constant	20.83	(.80)
R2	.45	

Sample size 17,349. The standard errors (in parentheses) allow for arbitrary correlation and heteroscedasticity within observations belonging to the same individual. y, the permanent component of earnings, is in deviation from sample means.

Appendix Table C1: Summary Statistics for the Matched PSID Sample.

Sample used for Transfer Models **Variable**	Mean	S.D.	Minimum	Maximum
Proportion of parents who give	.36	.47	0	1
Sum of intervivos transfers	.881	4.220	0	63.873
Permanent earnings, father	43.920	27.513	1.547	308.079
Permanent earnings, mother	42.806	28.507	1.015	362.667
Nonwhite	.32	.48	0	1
Age of the father	58.28	7.87	38	89
Age of the mother	55.85	7.75	36	78
Number of children	3.25	1.92	1	12
Parents divorced	.20	.40	0	1
Parents divorced, father remarried	.11	.31	0	1
Parents divorced, mother remarried	.09	.29	0	1
Father is a widower	.04	.20	0	1
Mother is a widow	.14	.35	0	1
Parent widow, father remarried	.02	.14	0	1
Parent widow, mother remarried	.02	.14	0	1
Average permanent income of children	52.159	21.421	4.204	192.904
Average age of children	31.55	4.93	20	63
Fraction of children who are:				1
Single males	.170	.38	0	1
Single females	.200	.40	0	1
Married females	.325	.47	0	1

Sample size: 2888 All magnitudes are in thousands of 1993 dollars

Table D1: The Effect of Lifetime Resources on Intervivos transfers.

	OLS	Probit	OLS, R > 0	Tobit
		Dependent Variable		
	R	0 if R = 0	Transfer Amount (R)	
Explanatory Variables	(with zeroes)	1 if R > 0	(no zeroes)	(with zeroes)
$\overline{Y}^*$	.00059	.00016	.00076	.0012
	(.00012)	(.000030)	(.00023)	(.00016)
$(\overline{Y}^*)^2/1000$	.0530	.0000023	.000087	.0000
	(.025)	(.0000079)	(.000071)	(.000042)
$(\overline{Y}^*)^3/10^7$	-121	-.000026	.000014	.00013
	(32.7)	(.000013)	(.000074)	(.00004)
$(\overline{Y}^*)^4/10^{11}$	4140	.000012	.000046	.000046
	(985)	(.000051)	(.000017)	(.000010)
$(\overline{Y}^*)$ x (Age - 70)/1000	.00148	.00092	-.0062800	.00178
	(.0048)	(.0018)	(.013)	(.012)
$(\overline{Y}^*)^2$ x (Age - 70)//10^7	1.480	-	.0319	.0202
	(.77)	-	(.0098)	(.0076)
$(\overline{Y}^*)$ x (Widowed)	-.00052	-.00012	-.00059	-.00110
	(.00013)	(.000057)	(.00033)	(.0003)
$\overline{Y}^*$ x (Divorced/Sep)	-.000350	-.000016	-.00061	-.00042
	(.00011)	(.000042)	(.00026)	(.00022)
$\overline{Y}^*$ x Nonwhite	-.000047	.000064	-.00008	.00026
	(.000074)	(.000043)	(.00015)	(.00024)
kids' permanent inc ($\overline{Y}^*_k$)	-.000062	.000021	-.000350	-.000057
(sibling average)	(.000048)	(.000024)	(.00014)	(.00013)
age minus 70	.0330	.0185	.0860	.12
	(.0166)	(.0064)	(.048)	(.039)
Parents divorced,	.098	.397	.300	1.950
and father remarried	(.17)	(.187)	(.56)	(1.05)
Parents divorced	.098	-.374	1.19	-1.06
and mother remarried	(.175)	(.179)	(.54)	(1.02)
Parents divorced	-.730	-.699	-1.160	-4.060
	(.17)	(.165)	(.59)	(.98)
Parents divorced	.043	.163	.290	.913
(mother)	(.15)	(.160)	(.48)	(1.00)
Widower	-.620	.098	-1.090	-.144
	(.345)	(.287)	(.73)	(1.49)
Widow	-1.02	-1.39	0.916	-7.6
	(.196)	(.199)	(1.49)	(1.11)
Widower, remarried	–	-0.571	2.58	-1.48
	–	(.472)	(2.34)	(2.42)
Nonwhite	-.271	.020	-.580	-.140
	(.144)	(.099)	(.44)	(.566)

Table D1 (cont.) The Effect of Lifetime Resources on Inter vivos transfers.

	OLS	**Probit**	**OLS, R > 0**	**Tobit**
		Dependent Variable		
	R, zeros included	0 if R = 0 1 if R > 0	Transfer Amount (R) (no zeros)	(w. zeroes)
Explanatory Variables				
Nonwhite	-.271	.020	-.580	-.140
	(.144)	(.099)	(.44)	(.566)
Mean age, children	-.031	-.044	.019	-.226
	(.0197)	(.011)	(.098)	(.065)
Fraction of children	-.040	0.23	0.85	0.69
who are single males	(.30)	(.15)	(1.21)	(.85)
1/# of siblings	-.656	-.790	-.191	-3.943
	(.364)	(.137)	(1.142)	(.788)
Constant	1.346	0.043	2.691	-1.157
	(.399)	(.13)	(1.162)	(.733)

Notes: Sample size: 1,387. Transfers are aggregrated over children. The probit and tobit columns report the latent index coefficients. In the first three columns, standard errors in parentheses account for the unbalanced panel and heteroskedasticity. In the Tobit case, standard errors are not adjusted.

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