The Marginal Propensity to Spend on Adult Children[1].

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Abstract

We examine 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 infer bequests from the stock of wealth late in life. We use mortality rates and age specific estimates of the response of transfers and wealth to permanent income to compute the expected present discounted values of these responses to permanent income. Our estimates imply parents pass on between 2 and 3 cents out of an extra dollar of expected lifetime resources in bequests and about 2 cents in transfers. The estimates increase with parental income and are smaller for nonwhites. They imply that about 15 percent of the effect of parental income on lifetime resources of adult children is through transfers and bequests and about 85 percent is through the intergenerational correlation in earnings, although these estimates are sensitive to assumptions about the intergenerational earnings correlation, taxes, and the number of children. We compare our estimates to the implications of alternative computable benchmark models of savings behavior in order to assess the likely importance of intended bequests for the wealth/income relationship.

Key words: bequests, intervivos transfers, permanent income.

JEL codes: D1, D31, D91, E21

1 Introduction

Some of the most important questions in the theory of income distribution and in public finance hinge on the economic relationships between parents and children. Parental resources may influence the resources of children through intergenerational transmission of human capital. Solon's (1999) survey of the rich 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] However, parental resources also affect 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 particular cohorts are shared across generations. It 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?"

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] However, the focus of the literature 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 of the parent on the MPS, aggregating over children, and accounting for mortality.

In contrast to the rich recent literature on transfers, there is very little work on the effects of parental and child earnings on bequests.[3] A big obstacle to research on the parental

[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 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 coresidence, which we ignore here.

[3] Menchik (1980), Wilhelm (1996), and McGarry (1999) are part of 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. There is also a substantial literature on the relationship between wealth and

income—bequest relationship, at least for the U.S., is a lack of data. One needs information on parental wealth and/or bequests as well as income of both the parents and children over the life cycle.[4] Data sets containing information about bequests received by children typically lack information about the income of the parents and often lack panel data on the incomes of the children. The U.S. tax records exclude cases of 0 bequests as well the vast majority of positive bequests, which are smaller than the threshold above which a state tax return must be filed. This is why we adopt the strategy of estimating models of the age profile of bequeathable wealth as a function of permanent income of the parents and children, and other relevant variables.[5] In conjunction with estimates of mortality rates as a function of age and parental earnings, we are then able to infer the response of the eventual bequest to the permanent income of the parents, assuming that the entire bequest goes to the children.

As suggested by the above discussion, our empirical strategy has six steps. The first is to measure the permanent annual earnings of the parents and the children from panel data. The second is to estimate the age profile of the response of inter vivos transfers and the response of the wealth of the parents to permanent earnings. We use two complementary data sets to measure the response of bequests to parental resources. The first is matched data on parents and their adult children from the Panel Study of Income Dynamics (PSID).

age that is relevant for an assessment of whether planned bequests are an important determinant of the relationship between income and wealth. However, this literature does not address directly the issue of how much an extra dollar that a parent obtains at age 50, say, will ultimately be passed on to the children. There are also a number of studies examining the role of bequests in the wealth stock, including the influential paper by Kotlikoff and Summers (1981). Laferrère and Wolff (2002), Arrondel and Mason (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 (1981) investigates the relationship between parental income and wealth but did not have income data on the parents. Kotlikoff (1981) 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. 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 received a bequest, a dollar increase in parental lifetime resources increases the inheritance received by each child 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 Berhman and Rosenzweig (2002) for evidence based on the Minnesota Twins Survey.

[5] We chose not to pursue the alternative strategy of studying actual bequests using the sample of PSID children because we believed that the number of children for whom both parents had died is too small. After this paper was essentially completed we learned of the work of Laitner and Ohlsson (2001), who pursue this approach, with some success. See the previous footnote.

The second is the first and second waves of the Asset and Health Dynamics Among the Oldest Old (AHEAD) panel survey of adults. We analyze transfers using the PSID. The third step is to estimate parental mortality rates as a function of age, permanent earnings, and gender. We use the rates to determine the distribution of parental ages at which inter vivos transfers and bequests occur. The fourth is to combine our estimates of the age specific responses of inter vivos transfers to parental income with our estimates of mortality rates to estimate the present discounted value of the inter vivos gifts to the children. Similarly, we combine our estimates of the response of wealth at a given age to parental income with the mortality rate estimates to infer the response of the eventual bequest to the permanent income of the parents, assuming that the entire bequest goes to the children.[6]

The final two steps involve translating the derivatives of present value of bequests and inter vivos transfers with respect to permanent earnings into the marginal propensity to spend on bequests and inter vivos transfers out of total lifetime resources of the parent. To do this, we estimate a regression model relating wealth at young ages to permanent earning and a regression model relating nonasset income at each age after 60 to permanent earnings. We use these models to compute the derivative with respect to permanent earnings of the expected lifetime resources of the parent (discounted to age 70) with mortality probabilities taken into account. With these estimates we are able to translate our estimates of the response of inter vivos transfers and the expected bequest to permanent earnings into an estimate of the response of the expected bequest to parental lifetime resources.

We have three main findings. First, at the sample mean of permanent earnings, parents 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 assumed interest rate. Second, parents spend about 2 cents of an extra dollar of lifetime resources on inter vivos transfers. The estimate is increasing in parental income. Third, when we add together the two values, we conclude that parents spend about 4 cents out of an extra dollar of parental resources on adult children. We estimate that the increased gifts and bequests per child associated with a $13.82 increase in parental permanent income would

[6] We are implicitly assuming that there are no systematic wealth changes around the death of the last member of the household. Hurd and Smith (1999, 2002) use AHEAD to compare the distributions of estates of decedents to their last report of wealth. For single decedents, they find very similar means for both distributions. For decedents who leave a surviving spouse, they find similar means of the estate and household wealth when the value of the main home is excluded from the wealth measure but also find that part of the bequest goes directly to the children.

be equivalent to the present value of the increased earnings associated with a \$1 increase in the child's permanent income. Using our estimate of MPS in combination with consensus estimates of the intergenerational correlation in income, we find that about 85% 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 15% is through the effect of parental resources on gifts and bequests. The latter estimate varies between 12 and 20% depending on assumptions about the marginal income tax rate and about the degree of intergenerational correlation in income. The corresponding estimates for nonwhites suggest a slightly smaller role for the bequest and inter vivos channel. We also compare our estimates of the MPS on adult children to crude estimates of the marginal propensity of spending on children under age 18 and on college education which we construct from studies of the "cost of children" and the effect of parental education on years of college education. We find that the MPS through bequests and transfers is a fifth of the MPS through other investments.

Our main focus is on simply measuring the MPS on inter vivos transfers 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 computable models to provide a sense of the magnitudes.[7] One is a very simple lifecycle model in which parents smooth consumption over their lifetimes. The results from this model are ambiguous. The second are two versions of De Nardi's (2002) intergenerational model of income, savings, and wealth. In one version there is a bequest motive and in the other there is not. Our results are broadly in keeping with evidence suggesting that the income sensitivity of inter vivos transfers is smaller than predicted by an altruism model. However, they also suggest that a bequest motive plays a role at the top of the income distribution.

The paper continues in Section 2, where we provide a simple model of transfers and bequests and define the parameters of interest. In section 3 we discuss the data and the methods used to estimate permanent earnings. In section 4 we present estimates of effects of parental income and children's income 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

[7] In contrast, the altruism model does provide very sharp predictions about intervivos transfers. See Cox and Rank (1992) and Altonji et al (1997).

the present discounted value of transfers. We then present the overall MPS on adult children and explore the implications of our estimates. In section 6 we compare the estimates to the predictions of models of savings behavior. In section 7 we summarize the paper and provide a research agenda.

2 The Derivative of Expected Transfers and Bequests with Respect to Permanent Income

Parental spending on children may be divided into three categories. The first is expenditures on food, clothing, medical care, education investments, etc. while the child is a dependent. The second is inter vivos transfers after the child has formed his own household. The third is a bequest to the child. We focus on transfers and bequests.

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_{ia} 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_{ia}^r. The flow is a stochastic function of earnings over their careers and is not subject to choice. The flow depends on the marital status of the parents and terminates when both parents are dead.

From age a_1 on, the parents choose how much to spend from income and wealth and how much to save. We treat fertility as exogenous and defer a discussion of likely biases from our treatment of earnings and fertility as exogenous till later. 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. Let x_a denote the consumption expenditure of the parents at age a. It includes child expenditures in the years before the child leaves the home, including expenditures on education.

Let R_a denote inter vivos transfers to the child after the child has left the home. As specified below, x_a and R_a depend on W_1 and $(y_{i1}, ..., y_{ia})$. They also depend on a, a vector Z of observed characteristics of parents and the child, the vector D_a of dummy variables (D_{ma}, D_{fa}) indicating if the father and the mother are still alive (respectively) at age a and a vector u_a of unobserved characteristics that influence consumption and transfers. The vector u_a includes past, current and expected future preference shifters as well as past and future values of variables that influence expected future income and longevity conditional on

$y_{i1}, ..., y_{ia}$, and Z.

$$x_a = x(W_1, y_{i1}, ..., y_{ia}, a, Z, D_a; u_a)$$

(1) $$R_a = R(W_1, y_{i1}, ..., y_{ia}, a, Z, D_a; u_a)$$

Wealth evolves according to

(2) $$W_a = (1 + r)W_{a-1} + (y_{ia} - x_a - R_a),$$

where r is the interest rate. Consequently, wealth at age a may be expressed as

(3) $$W_a = W_a(W_1, y_{i1}, ...y_{ia}; a, Z, D_a; u_a)$$

Because past choices of x_a and R_a constrain future choices through W_a, u_a includes u_{a-1} as a subvector. We have in mind a model that blends elements of models of parental trade-offs between consumption, investments in the human capital of children, and monetary transfers to adult children, models of parental choice between own consumption and transfers under uncertainty about future income or consumption needs, and modern theories of consumption and savings that stress precautionary motives in the presence of uncertainty about income and longevity as well the effects of the timing of income and consumption.[8] However, we do not formally estimate such a model and so there is not that much to be gained from presenting one, especially since closed form solutions for the wealth function are not available in realistic cases.

We wish to measure how much of each additional dollar of lifetime resources parents pass on to their adult children. The derivatives of the functions $x(.)$, $R(.)$ and thus W_a with respect to $y_{i1}, ..., y_{ia}$ capture both the direct effect of these variables and the effect that they have through their influence on expectations of future labor earnings and retirement income. The derivatives depend on age a in a complicated way. One will not capture the effect of

[8]See Becker and Tomes (1986), Behrman, Pollak and Taubman (1982), Mulligan (1997) and the survey by Haveman and Wolfe (1995) on investing in children. See footnote 2 for references to the literature on transfers, and Browning and Lusardi (1996) for a survey of the consumption and savings literature.

an extra dollar on lifetime resources by simply estimating the relationship between W_a and income in a given year. In principle, with complete data on W_1 and the incomes of the parents, one could estimate the relationship between $W_a(W_1, y_{i1}, ...y_{ia}; a, Z, D_a; u_a)$ and W_1, past, current, and future income. The estimated relationship at each age a would capture the influence of credit constraints as well as uncertainty about future income conditional on past income, the life span, and the future needs of children.[9] However, while the PSID provides a relatively long panel on income for most parents, the data are not rich enough to support such estimation. Furthermore, information about income histories in the AHEAD data is very limited.

Consequently, we abstract from the effect of timing of income receipts and focus on the effect of a shift in the entire income profile that is associated with a shift in permanent component of annual earning prior to retirement, y_i. y_i can be accurately estimated for most members of the sample and explains most of the variance across households in lifetime earnings. (See note 42 below.) We estimate the regression function

(4) $$W_a = W_a(y_i, a, Z, D_a) + \varepsilon_a$$

where $W_a(y_i, a, Z, D_a)$ is the conditional expectation of W_a and ε_a is an error term. We also estimate the regression functions

(5) $$W_1 = W_1(y_i, Z) + \varepsilon_1$$

and

(6) $$y_a^r = y_a^r(y_i, D_a, a) + \varepsilon_r$$

relating initial wealth W_1, and post retirement nonasset income to y_i. The specification for y_a^r allows the relationship between retirement income y_a^r and y_i to depend on the survival of the husband and the wife.

With estimates of $W_a(y_i, a, Z, D_a), y_i, W_1(y_i; Z)$, and $y_a^r(y_i, D_a, a)$ one can estimate the response of W_a at each age to a one dollar shift in the discounted present value of lifetime

[9] Throughout the paper, we treat earnings as exogenous. Even with complete data, the coefficient of a regression of wealth on income will be a biased estimate of the response of wealth to an exogenous change in parental resources if consumption preferences are correlated with income.

resources of the parent, with survival probabilities taken into account. We discount to age 70. Let Y_i^* equal the expected discounted value of lifetime resources conditional on y_i and Z. Y_i^* is given by

(7)

$$Y_i^* = W_1(y_i, Z)(1+r)^{70-24} + \sum_{j=24}^{a_r}(1+r)^{70-j}E(y_{ij}|y_i, Z) + E_D\sum_{j=a_r}^{100}(1+r)^{70-j}y_j^r(y_i, Z, D_j, j)$$

where the expectation operator E_D in the last term is over the joint distribution of the survival dummies D_j conditional on y_i and Z and we assume that both parents die before reaching 101 years of age.[10] One can estimate $dW_a(Y_i^*, Z, D_a, a)/dY_i^*$ as $(d\hat{W}_a(y_i, Z, D_a, a)/dy_i)/(d\hat{Y}_i^*/dy_i)$ where the "hats" denote estimates.

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

The bequest B is equal to W_a in the year when the second parent dies. 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 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

$$P_{ba} = (1 - S_{fa-1}) * S_{ma-1} * H_{ma} + (1 - S_{ma-1}) * S_{fa-1} * H_{fa} + S_{fa-1} * S_{ma-1} * H_{ma}H_{fa}$$

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 the expected value of the response of the bequest to a dollar increase in y_i discounted to the year in which the parent is 70 is

(8) $$EB_{y_i} = E\sum_{a=60}^{100}(1+r)^{70-a}[dW_a(y_i, Z, D_a, a)/dy_i]P_{ba}$$

[10] When we compute $d\hat{Y}_i^*/dy_i$ we assume a_r is 62 for all individuals.

The response EB_{Y^*} of the bequest to a dollar increase in lifetime resources, is estimated as

(9) $$EB_{Y^*} = EB_{y_i}/(dY_i^*/dy_i).$$

We use a similar approach to estimate the derivative of expected inter vivos transfers. The effect of Y^* on expected transfers with mortality accounted for is

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

where we have taken age 45 as the age at which the parents start giving transfers to adult children.

Following the strategy above, we estimate ER_{Y^*} as $ER_y/(dY^*/dy)$ where ER_y is the derivative of the expected present value of transfers with respect to parental permanent income y and is defined by replacing the terms involving $dR(Y^*, a, Z, D_{fa}, D_{ma})/dY^*$ in the above equation with $dR(y, a, Z, D_{fa}, D_{ma})/dy$. We provide details in Section 5.4. Our estimate of MPS is the sum of ER_{Y^*} and EB_{Y^*}

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 Panel Study of Income Dynamics began with an initial survey in 1968 of more than 5,000 U.S. households. The households have been surveyed annually through 1997, and again in 1999. Wealth data were collected in 1984, 1989, 1994, and 1999.[11] We selected parent

[11] We use both SEO low income sample and the SRC random sample of the PSID. A substantial number of households from the SEO low income sample of the PSID were not interviewed in 1999.

households in which either the father or the mother in the case of two-parent households from the 1968 base year of the PSID or the mother in the case of single parent households reached the age of 60 between 1984 and 1999. We also include parents whose spouses died after 1968. Fathers are defined as the male head of the 1968 household, and mothers as the female head or the WIFE/"WIFE" of the 1968 household. 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.[12] If the parents have more than one child who becomes a head or wife, 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.[13] Appendix B provides details of how the sample was selected.

3.1.1 Calculation of the permanent earnings component y_i:

To account for the fact that our series on labor earnings of the head and spouse (if present) covers only years of the survey, we use a regression procedure to adjust earnings for 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 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

[12] 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.

[13] The number of 1968 households who contribute one wealth observation is 80, two observations is 123, three observations is 385, four observations is 581, five observations is 13, six observations is 28, seven observations is 13, and eight observations is 31.

computing the permanent earnings component y_i. 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 several years of data suggests that transitory income and measurement error have only a minor effect on them.[14] Our results are not very sensitive to constructing permanent income measures for each wealth observation that are based only on y_{it} observations collected prior to the year of the wealth measure. Details concerning the construction of y_i are in Appendix D. Below we use y_{ki} to denote y_i of a kid and use $\bar{y}_{ki}$ to denote the average of y_{ki} over kids from the same family. In most cases we suppress the p subscript on parental permanent income y_p. We also typically suppress the i subscripts.

The value of y_{it} is identical for a man and a woman who were husband and wife in year t. The basic assumption is 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. The addition of controls for number of years since death of a spouse and its interaction with the permanent income measure to the wealth equation does not have much effect on 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, 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 relatively small until the 99th and 100th percentiles of the wealth distribution. Because we focus on income-wealth derivatives rather than the wealth level, we doubt if this has a big effect on our results.[15]

[14] 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.

[15] Carroll (2000) argues that the savings behavior of the richest households cannot be explained by models in which the only purpose of wealth accumulation is to finance future consumption. He argues that the very richest households derive direct utility from wealth. In that case, the marginal propensity to save is very high at the top of the wealth distribution. However, De Nardi (2002) shows that a model in which parents have an isoelastic utility function and a bequest motive can approximate the distribution of wealth in the US, without need of extra motives for wealth accumulation. Furthermore, we show in Section 6.2 that

The wealth distribution is heavily skewed to the right, with several very 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.[16] 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 also leads to a reduction in point estimates of the effect of y on wealth.

Table 1 provides variable definitions and summary statistics (mean, stand dev., minimum and maximum) for the matched sample of parents and children. This sample contains 4,377 observations on 1,389 parent households from 1,281 1968 parent households. We have matching data on 3,521 children. The number of child observations matched to a parent observation ranges from 1 to 20, with an average of 3.48.

3.3 The Response of Lifetime Resources to Permanent Income

In appendix Tables A1 and B1 (respectively) we report regression estimates of (5) and (6.) We use the estimate of these equations and (7) to estimate dY_i^*/dy_i assuming an 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 discounted expected present value of retirement income depends on expected mortality and is \$7.28 for a white household with average income. Combining the derivatives for Y_i^*, earnings, and retirement income using (7) we find that at the sample mean dY_i^*/dy_i is \$132.11. (In Table 6 and 8 below we evaluate dY_i^*/dy_i at the indicated value for y_i). 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 dY_i^*/dy_i equal to 130.51 for nonwhites.

the derivatives of wealth with respect to income implied by De Nardi's model increases only modestly with income. Consequently, the downward bias in dW_a/dy from undersampling the top 2% is probably small.

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

3.4 The AHEAD Sample

The PSID matched sample contains only 470 wealth observations on parents who are over age 75.[17] This hinders estimation of the effect of permanent income 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. It 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 exspouse. The details of sample selection are in Appendix C.

The wealth measure in AHEAD 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, the value of trusts, minus household debt. 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 permanent income of the parent and the children using AHEAD variables that were also collected or could be constructed for the PSID sample. The imputations are based on regressions for permanent income using about PSID. We relegate the details to a footnote.[18]

[17] 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 90 and 95 to 100 years of age are 321, 115, 32 and 2, respectively.

[18] 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 4 income brackets), age of the head of the household,education of head and wife, labor market status of the head and wife (namely, whether they work full time, part time or are not employed). We use these variables to impute permanent income of the parent and mean permanent income of the descendents as follows. We regress the logarithm of permanent income on dummies for the education of the father and the mother, occupation indicators, dummies for educational attainment of the head and wife 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

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

$$\begin{aligned} W_{it} &= a_0 + a_1 y_i + a_2 y_i^2 + a_3 y_i^3 + a_4 y_i (age_{it} - 70) + a_5 y_i^2 (age_{it} - 70) + \\ &\quad + a_6 \overline{y}_{ki} + f(age_{it} - 70) + b' X_{it} + e_{it}, \end{aligned} \tag{10}$$

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, father is divorced and remarried, mother is divorced and remarried, father is widowed and remarried, and mother is widowed and remarried. It also contains interactions between $age - 70$ and parental income, the inverse of the number of siblings, race, the number of children who are females and the number of children who are female heads. Throughout the paper we normalize y by subtracting off the unweighted sample mean of $42,960. Consequently, even in the cubic specifications the estimate of a_1 is the derivative of wealth at age 70, W_{70}, evaluated at the mean of y.

As we noted above, $\overline{y}_k$ is the average of observations of y_{ki} of independent children for whom we have data. The variable age_{it} is the maximum of the age of the husband or wife when both are present or the age of the individual for persons who are widowed or divorced.[19] The standard errors allow for arbitrary correlation and heteroscedasticity among the error

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 information the mother. Our measures of y_{ip} and y_{ik} are constructed by evaluating the regressions using the data for the members of the AHEAD sample. The sample size and the adjusted R^2 of the model for y_{ip} are 16,200 and 0.42. The corresponding values of the model for y_{ik} are 16,742 and 0.50.

[19] We obtain very similar results using the minimum of the ages of the husband and wife.

terms for observations on parents from the same 1968 household. They do not account for the fact that y and $\overline{y}_k$ are estimated.

The results are in Table 3.1. Model I excludes the quadratic and cubic terms in y. The coefficient (standard error) on y is 5.24 (0.43). This says that a one dollar increase in permanent earnings (earnings per year) leads to a 5.24 dollar increase in wealth at age 70. The interaction term a_3 is small and positive: 0.02 (.036). The derivative with respect to y is 5.04 (0.50) at age 60, 5.44 (0.61) at age 80, and 5.54 (0.75) at age 85. Dividing the 5.24 figure by the estimate 132.11 for dY^*/dy yields .0397 as the effect of a one dollar increase in Y^* on wealth at age 70 at the mean of Y^*.

In Model IV in Table 3.1, we add interactions between y and dummies for widowed parent and for divorced/separated parent (all models include widowed and divorced/separated dummies). At the sample mean dW_{70}/dy is 5.62 (.57), which implies a .0425 as the estimate of dW_{70}/dY^*. Divorce status also has a substantial negative, precisely estimated effect on the income derivative. The sensitivity of wealth to permanent income is much lower for widows. The coefficient on the interaction term is -2.44 (0.72), and the average derivative at age 70 for widows is 3.18 (evaluated at the sample mean of income). 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 death of a spouse alters the relationship between our measure of permanent income and the present discounted value of lifetime resources.[20] We have estimated a specification in which we include the product of income, a dummy for whether the parent is a widow/er and the number of years since the surviving parent became a widow/er in the model, along with the number of years since the parent became a widow/er. The coefficient of the interaction between income and the dummy for a widowed parent is -2.07 in the new specification.

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 house-

[20] Zick and Smith (1991) document that older widows and widowers have lower income-needs ratios than comparable intact couples. Using an event history analysis, they decompose the differences in income-needs ratios into differences prior to the death and differences after the death. They find that most of the differences in living standards already exists 5 years prior to death. They also find a fall in income from dividends, rents and interest in the year of the death of one of the spouses, which is consistent with an early bequest happening after the death of the first spouse.

holds.[21] The race gap in wealth is much larger than the corresponding gap in income. In Table 3.1, Model V, we have estimated models in which we interact y with a race indicator that equals 1 for nonwhites. (91 % of the nonwhites in the PSID matched sample are African-American.)[22] The coefficient on the interaction term is -2.20 (0.69), and the point estimate of dW_{70}/dy at the mean of income for the full sample is 3.89. When the interaction between y and widowed is taken into account, the estimates imply that dW_{70}/dy is only 1.60 for non-white widows and widowers. (The model assumes that the quadratic and cubic term and the age interactions are the same for whites and nonwhites.) 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 blacks for broad age groups.

4.2 AHEAD Results

In Table 3.2 we report estimates of variants of (3.1) using the AHEAD sample. We report robust panel standard errors but do not correct them for the fact that permanent income is imputed. They are probably understated. For the linear specification we obtain a coefficient of 6.72 (0.63) on y and a coefficient of -0.11 (0.05) on $y(age - 70)$. In column 2 we add y^2 and $y^2 * (age - 70)$. We subtract the PSID sample mean from y prior to estimation, and so the coefficient on the linear term (5.27) is dW_{70}/dy at the PSID mean. This estimate is somewhat above the value of 4.29 we obtained using the PSID sample. The quadratic term in wealth is similar to that in the PSID. 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 over 10 years.

In keeping with the PSID results, the income derivative is substantially lower for widows. Being divorced or separated reduces the derivative by -1.87 (1.79) in the AHEAD sample. This is smaller than the value of -2.25 (.87) in the PSID sample, but the AHEAD estimate is not very precise.[23] Overall, however, the PSID and AHEAD results are remarkably close given sampling error and the fact that we had to impute y and y_k for the AHEAD sample.

[21] See for example, Blau and Graham (1990), Avery and Rendall (1997), Menchik (1980), Altonji et al (2000), and Barsky et al (2002). Scholz and Levine (2002) provide a recent literature survey.

[22] The race indicator is included as a separate control in all of the models in the table. The estimates of permanent income reflect race differences in the distribution of income.

[23] Note that the regression used to impute y for AHEAD respondents contains a dummy variable for widow, a dummy for widower, and another one for divorced.

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

5.1 The Response of Expected Bequests to Permanent Income.

We now use equation (8) and estimates of dW_a/dy from Table 3.1, Model V to calculate EB_y, the derivative of expected bequests with respect to permanent income. The calculations are for a husband and wife who are the same age and survive to age 60.[24] 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 y.[25] We assume that H_{ma} and H_{fa} are 1 at age 100. We compute dW_a/dy by setting the age term in the interactions that appear in Model V to the age of 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 $widowed * y$ to 0. Panel A in Table 4 displays values of $S_{fa}, S_{ma}, H_{ma}, H_{fa}, P_{ba}$, and dW_a/dy for whites. The values of dW_a/dy are evaluated at the mean y of the combined sample of whites and nonwhites.[26] As one can see in the last two columns of the table, dW_a/dy increases slowly with age. EB_{y_i} is the sum of the derivatives dW_a/dy for each value of a weighted by the probability that the second parent dies at age a. We use an interest rate of 4% to discount the bequests to when the parents are 70 years old. In Table 4 panel B, we report that EB_y is 1.68, 2.56, and 3.10 dollars respectively at the 10th percentile, sample mean, and 90th percentile value of income.[27]

[24] Our estimates of the derivative of expected bequests are not sensitive to a variety of alternative functional forms for the terms involving y, the interaction between y and age-70, and the interaction between y and widowed, including the cubic interactions between y and the linear age term and a quadratic interaction between y and widow status, and the use of a spline with different slopes for each quintile of the income distribution.

[25] We adjusted the probability of death at a given age by permanent income 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 the following regressors: permanent income of the head of the household, the mortality probability for race and gender estimates contained the U.S. life tables for1998 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 age 80, for a given income level we adjust the mortality rate by multiplying the U.S life table 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.

[26] These values use the household weights for 1989.

[27] 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 we obtain estimates of EB_y of 1.08 (0.10), 2.17 (0.08) , and 3.10 (0.09) at

When we use the AHEAD parameter values in Table 3.2, Model IV, the estimates of EB_y at the 10th percentile, sample mean, and 90th percentile values of y are 3.24 (1.16) , 3.72 (1.12) , and 4.01 (1.05) respectively in the case of whites. For nonwhites the PSID based estimates of EB_y are 0.21, 1.46, and 2.12 at the 10th percentile, mean, and 90th percentile of the income distribution for the combined sample. (Table 5 panel B). The AHEAD estimates for nonwhites are 2.40 (.80), 3.19 (1.07) and 3.67 (1.19).

5.2 The Response of Expected Bequests to Lifetime Resources

In row 1, column 2 of Table 6 we report that at the sample mean, $EB_y/(dY_i^*/dy_i)$ is 0.019 (0.003). (The estimate is obtained by dividing the corresponding estimates of EB_y in Table 4, Panel B by \$132.11.) That is, at the sample mean two cents of every dollar of lifetime resources is passed on to the children through bequests. The estimates at the 10th percentile and 90th percentiles of y_i are equal to 0.013 (0.006) and 0.023 (0.005) in the case of the PSID. Row 2 of the table values based on AHEAD at the 10th percentile, sample mean, and 90th percentile. These are 0.024 (0.008), 0.028 (0.008) and 0.03 (0.008). For both samples, the estimates are lower for nonwhites (rows 3 and 4).

The previous estimates assume that the bequest happens after the death of the last member of the couple. Nevertheless, there may exist an early bequest after the death of the first parent. To explore this possibility, we make 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 added it (after appropriate discounting) to our previous estimate that was based on the entire bequest occuring after the death of the second spouse. Compared to the estimates in the first row of Table 6 the derivative of expected bequests with respect to lifetime resources increases by about 1.3 cents, becoming .026 (.006), .033 (.005) and .037 (.006) at the 10th, average and 90th percentiles of the income distribution. However, this is almost certainly an overestimate.

the 10th percentile, mean and 90th percentile of the income distribution. (Standard errors ignore serial correlation due to the panel structure of the data.) Because of randomness in lifespan these estimates cannot be interpreted as the derivatives of the conditional median of bequests.

5.3 The Response of Expected Inter vivos Transfers to Permanent Income and Lifetime Resources

In this subsection, we present 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_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 gave a transfer to at least one of their adult children in 1987.

The conditional mean of R, $R(y, a, Z, D_{fa}, D_{ma})$, is equal to

$$P(R > 0|y, a, Z, D_{fa}, D_{ma})E(R|R > 0, y, a, Z, D_{fa}, D_{ma}).$$

We estimate $\frac{dR(y,a,Z,D_{fa},D_{ma})}{dy}$ using three alternative methods. We focus the discussion around the results of our preferred approach, which is to estimate $P(R > 0|y, a, Z, D_{fa}, D_{ma})$ using a probit model and $E(R|R > 0, y, a, Z, D_{fa}, D_{ma})$ by OLS regression for R on the subsample of parents who give transfers. The second method is to estimate $R(y, a, Z, D_{fa}, D_{ma})$ by OLS on the full transfer sample, with 0 transfers included. The third method uses a Tobit model on the full sample. We recover $\frac{dR(y,a,Z,D_{fa},D_{ma})}{dy}$ using the properties of the normal distribution (see McDonald and Moffit (1980)). The estimates are in Table 7.

The first column of Table 7 shows the results from an OLS estimation of the regression of inter vivos transfers on a fourth order polynomial in y and demographic variables, with 0 transfer observations included. y is the deviation from the sample mean and age is the deviation from age 70, so the coefficient .056 (.014) on the linear term is the derivative with respect to income of inter vivos transfers to all children evaluated at the average level of income for a parent who is aged 70. The response is increasing over most of the range of the income distribution.

Next, we use the estimates from Table 7 to estimate ER_{y^*}. We obtain these by first computing the expected discounted value of the response of lifetime inter vivos transfers to permanent income and dividing by dY^*/dy. 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 25).

In Table 8, we produce estimates of ER_{Y^*} by dividing the estimates of ER_y by dY^*/dy (132.11 for a white person with average income). The estimates in the first row in Table 8 indicate that at the mean and the 90th percentile of income, ER_{Y^*} is 2.3 cents and 2.2 cents respectively. The corresponding estimate based on probit-OLS approach in row two are 1.24 cents and 1.9 cents.

5.4 Implications of the Estimates for Intergenerational Sharing of Resources

To obtain MPS for whites, we sum the PSID estimates of EB_{Y^*} and ER_{Y^*} reported in the first row of Table 6 and second row of Table 8, respectively. MPS is 0.013 (=0.013-0.0002) at the 10th percentile of the income distribution. At the average income level, MPS is 0.031 (=0.019+0.012). Even at the 90th percentile, MPS is only 0.042 (=0.023+0.019). The corresponding estimates for nonwhites are 0.002, 0.019 and 0.03 evaluated at the 10th, average and 90th percentile of the combined income distribution. Using the AHEAD estimates of EB_y we obtain slightly bigger numbers. From these results, we conclude that at most, a small fraction of an extra dollar of lifetime resources is passed on to children as bequests and inter vivos transfers.

From the child's point of view, what are the terms of trade between another dollar of y for the parent and another dollar of y_k for the child? In each of the rows of Table 9 we provide the details of alternative calculations of this number. In all cases we assume that the child is 25 years younger than the parent, and, without loss of generality, compute the terms of trade when the child is 25 years of age. The results in the first row of Table 4 Panel B imply that, at the mean of y, an extra dollar of y increases the expected bequest by \$2.56 (discounted to when the parent is 70 and the child is 45). Next, we assume perfect credit markets and an interest rate of 4%. From the child's point view receiving 2.56 extra dollars when he is 45 and the parent is 70 is equivalent to receiving \$1.17 (=\$2.56/$(1+0.04)^{20}$) at 25 (Table 9, row 1A, col 7a -whites). The corresponding estimate for inter vivos transfers implies that an extra dollar of y increases the expected value of inter vivos transfers discounted to when the parent is 70 by \$1.65. From the point of view of the child, receiving \$1.65 when the parent is 70, is equivalent to receiving \$0.75 (=1.65/$(1+0.04)^{20}$) when the child is 25 (row 1A, col 8a -whites). The sum of the bequest and the transfers is \$1.92.[28] On the other hand, an extra dollar of y_k increases the lifetime resources of the child by \$22.62.[29] The ratio between

[28] These estimates ignore the effect of permanent income of the parent on the initial wealth of the child. We have expanded equation 5 to include permanent income of the parent. The coefficient of parental income on initial wealth of the child, although imprecisely estimated, is not statistically different from 0.

[29] The number 22.62 is obtained by calculating the effect of an extra dollar of permanent income on initial

\$1.92 and \$22.62 is 0.085. In other words, the lifetime resources of the child increase by the same amount if own permanent income increases by a dollar or if the permanent income of the parent increases by \$11.77 (row 1a col 9a -whites.)

The number is larger if we take into account the fact that the average parent in our sample has 3 children, and that bequests and gifts are shared among all the children. A crude adjustment is simply to divide the 0.085 figure by 3, which is 0.028, and multiply the \$11.77 figure by 3, which is \$35.31 (Table 9 row 2a, col 9 -whites). A better way is to re-estimate the wealth model allowing dW_a/dy to depend on the number of children by adding the interaction between number of children and y to the wealth model and to estimate dR_a/dy directly on a per child basis by using the transfer data on individual children with the interaction between y and number of children included. Using this procedure, we find that for a parent with 3 children the effect of a \$1 increase in y on the expected bequest and the expected transfer are 0.79 and 0.39 respectively (row 1b -whites). The increase in y required to compensate the child for a \$1 decrease in y_k is \$18.92. If we take into account the fact that child's earnings are pre tax while bequests and transfers are largely post tax, and apply a tax rate of .27 to earnings, the estimated trade-off is \$13.81 (row 2b, col 9 -whites). For an only child the value is \$10.68 (row 4b, col. 9 -whites). These calculations suggest that, from the perspective of the child, the impact of an extra dollar of parental resources on own resources through gifts and bequests is small. These results are qualitatively consistent with but smaller than Altonji et al's (1992) estimate that the impact of the income of members of the extended family on the consumption level of a household is about 1/5th as large as the impact of own income on consumption. Note, however, that Altonji et al's estimate does not isolate the impact of the parents alone and should be revisited in future work.

It is also interesting to compare the link between parental resources and the child's resources that operates through transfers and bequests to the link between the permanent income of the parent to the permanent income of the child. Solon's (1999) survey suggests that 0.4 is a reasonable estimate of the link between y and y_k. Consequently, 0.4 times the present value to the child at age 25 of a 1 dollar increase in y_k is an estimate of the value to the child of a 1 dollar increase in y holding bequests and inter vivos transfers constant. This figure is 0.4×22.62 or \$9.05. It may be compared to \$1.92, the present discounted value of the increase in bequests and transfers associated with a 1 dollar increase in y. That is,

wealth, the life-cycle stream of earnings and post-retirement income. That number is 132.11 for a white couple at age 70. The value \$132.11 at the age of 70 is equivalent to \$22.62= $\frac{132.11}{(1.04)^{45}}$ at the age of 25.

about 9.05/(1.92+9.05) or .82 of the effect of an increase in y on the child's adult resources operates through the link between y and y_k. This means that .18 of the effect is through bequests and transfers, which is not negligible. (Table 9, row 1a, col 10 -whites). The estimated fraction through bequests and transfers is .07 if we adjust for the average number of children by simply dividing the effect of y on bequests and transfers by 3. (col 10, row 2a -whites). Using the procedure in panel B to estimate bequests and transfers on a per child basis, the estimate is .12 (col 10, row 1b -whites). Taking account of taxes raises the value to .15. The estimate rises to .20 if we use the value .28 that we obtain from a regression of y_k on y_p and controls for a cubic in the birth year of the child in our sample instead of .4. Finally, if we use .28 as the link between y_k and y_p, apply a tax rate of .27 to the child's earnings, and evaluate the wealth and transfer models for an only child, we obtain .25 as the fraction of the effect of y on child's resources that operates through transfers and bequests. This is quite substantial.

At the average income level, our preferred estimates for whites suggest that the response of bequest and gifts accounts for about 15% of the effect of parental resources on the resources of a child as an adult. The estimate varies between 12 and 20% depending on assumptions about the marginal tax rate and the degree of intergenerational correlation in income. The corresponding estimates for nonwhites suggest a slightly smaller role for the bequest and inter vivos channel

5.4.1 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 have used 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.[30] We use the simple average of these numbers, 2.28, as the

[30] See Table 4 in Espenshade (1984)

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%, 5.26 dollars at age 27 is equivalent to 28.43 dollars at age 70. Using our estimate of 132.11 for dY^*/dy, $d(Spending_{0\_17})/dy^*$ is 28.43/132.11=.215. That is, parents spend .215 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 .16 for $d(Spending_{0\_17})/dy^*$ 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. [31]

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.[32] 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 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.

[31] 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 rising 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.

[32] Espenshade also reports estimates of college expenditures by income level, but 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. Consequently, we do not use his college expenditure numbers.

6 Implications of the Wealth Functions for the Adequacy of Savings and the Existence of a Bequest Motive

To put the magnitude of the estimate of the bequest response to income in theoretical perspective, we use a computable structural intergenerational model of wealth and income developed by De Nardi (2002) to simulate data on $W_a, W_1, y_{i1}, ...y_{ia}$, and Z_i under alternative assumptions about the degree of parental altruism. We use the simulated data to estimate $dW(y_i, Z, a)/dy_i$ and compare the results to estimates based upon the PSID.[33,34]

[33] We do not attempt to compare estimates of $dW(Y^*, Z, a)/dY^*$ from the simulated data to estimates from the PSID given the discrepancy between the assumptions about post-retirement income and initial wealth assumptions built into De Nardi's model and our PSID based estimates of the link between y and these two components of Y^*.

[34] We have also examined our estimates using a simple certainty equivalence model. The model assumes no bequest motive, perfect credit markets, no uncertainty about income or life span (although life spans vary across people), and that parents strongly prefer a smooth consumption path but do not have access to an annuities market. Assume in addition that that parents work from age 20 to age 62, both survive till at least age 70, and that the after-tax real interest rate is 4%. In this case, our estimates of the wealth model and the retirement income models imply that .05 out of each extra dollar of lifetime resources (discounted to age 70) is available for consumption in the years after age 70 or for a bequest. Assuming a constant consumption stream per person, discounting the later years back to age 70 while taking account of the likelihood that one or both will be alive, and discounting consumption in earlier years forward yields the fraction of the lifetime consumption of the husband and wife that must be provided for. That fraction is 0.049. (The value 0.049 is equal to 16.49/(317.55+16.49).) If one assumes instead that the interest rate is 0 when discounting income and consumption streams, then .16 of an extra dollar of lifetime resources remains at age 70 or will acrue in future years, while the expected fraction of consumption expenditures after age 70 is .23. (The value .16= 6.88/43.89. The value .23=29.8/(50+50+29.8)). For both interest rates the fraction of an extra dollar of lifetime resources that remains at age 70 thus appears to be in the general ballpark of the fraction of lifetime consumption remaining. If we assume an interest rate of 6% and that desired consumption/year after retirement at age 62 is only 3/4 of pre-retirement consumption, then the fraction of lifetime resources remaining at age 70 is 0.03 and expected fraction of consumption expenditures after age 70 is 0.01. One would like to make a further adjustment for the fact that at least part of the wealth at age 70 (eg, housing) is not be subject to further taxes. This would raise the estimate of the fraction of lifetime resources remaining somewhat.

We conclude that for reasonable parameter values the wealth model estimates are consistent with a world in which on average families divide up an extra dollar of resources in accordance with expected consumption before and after age 70, with only a small margin for intended bequests. However, the average could hide a situation in which some families undersave while others put resources aside for planned bequests. For this reason, our results are not inconsistent with the findings of Bernheim et al (2001) or Banks et al. (1998) about the inadequacy of retirement savings. Furthermore, while the above calculations have the advantage of transparency, they ignore uncertainty, involve a long list of simplifying assumptions, and the specific estimates are sensitive to assumptions about the interest rate and preferences for pre and post retirement consumption.

6.1 Comparison to De Nardi (2002)

We also compare our estimates to those implied by De Nardi's (2002) fully dynamic intergenerational model of income and wealth. The basic outline of her model is as follows. There are overlapping generations of people and heterogeneity in productivity. The income of an individual at age 20 is influenced in part by the income of her parent at age 45. Subsequently, income evolves according to a discrete Markov process until retirement at age 60. After retirement people receive lump sum benefits that do not depend upon prior earnings. Parents have an additively separable power utility function with an intertemporal elasticity of substitution of 0.66. In some versions of the model the parents get utility from bequests. In other versions of the model there is no bequest motive. Bequests occur at the time of death. The probability of death is 0 prior to age 60 and is set to accord with conditional survival probabilities for the U.S. economy for the years after age 60. The utility from the bequest does not depend directly upon the income of the children, but it is calibrated so that the marginal utility the parent obtains from the bequest is comparable to the marginal utility that the child receives from the bequest. Income taxes, taxes on asset income, and taxes on bequests are all accounted for in the analysis. The economy is closed with a standard neoclassical production function. Retirement benefits are not stochastic and do not depend upon career earnings. The interest rate is 6%.

De Nardi's main purpose is to examine the role of intergenerational links through income and through a bequest motive in explaining wealth inequality, so it is not surprising that her model has a few limitations for our purpose of evaluating the income wealth derivative.[35] The first is that the mortality rates differ from those for married couples because the model assumes only one parent. This will affect both the precautionary and lifecycle savings motive as well as the age at which bequests are made. Also, there are no inter vivos transfers in the model, and children do not receive wealth prior to entering the labor market. Finally, retirement benefits are in lump sum form. This might raise the derivative of wealth with respect to permanent income for persons in the low income quantiles, although we are not clear on this.

De Nardi graciously provided us with simulated data for three specifications of her model. For each specification, we have information on 10,000 artificial individuals, observed for at

[35] DeNardi's main finding is that voluntary bequests are the key to explaining very large estates. Unintended bequests of wealth that were accumulated for lifecycle and precautionary reasons are not enough to explain concentration at the high end of the wealth distribution.

most 14 periods. Each period in her model represents 5 years. For each individual, we know the earnings histories, asset histories, and year of death for a set of parents, along with the earnings histories of their children. We constructed the equivalent of our permanent income measure by regressing the logarithm of yearly household earnings on an age polynomial of order 4 in deviations from age 40. The sample for the regressions was restricted to individuals between 25 and 60 years of age. Separate regressions were run for parents and children. We then averaged the prediction errors of each individuals and took antilogs. To obtain the derivative of bequests with respect to income, we regressed net bequests on a third order polynomial in permanent income, the permanent income of the child, a fourth order polynomial in age in deviations from 70 and an interaction between permanent income and age. Trimming made little difference.

In Table 10 we present estimates of the derivative of bequests with respect to parental income based upon the simulated data and compare them to estimates from the PSID. We evaluate the derivatives at various points in the income distribution estimated from the artificial income data.

Experiment *2* corresponds to the case in which the incomes of parents and children are linked, but there is no bequest motive. In this case EB_y rises gradually from 1.184 at the tenth quantile of income to 1.737 at the 75th quantile. It then declines to 1.520 at the 90th quantile and to 0.879 at the 95th. We are surprised by the fact that EB_y declines at high income levels in the no bequest motive case.[36]

When the incomes of parents and children are linked and there is a bequest motive (experiment 3), below the median of income the income derivatives are similar to those in the case of no bequest motive . However, the derivatives are much higher at the 90th and especially the 95th quantile.

The fourth column presents estimates of EB_y based upon the PSID for a white couple with both the husband and wife alive at age 60. The values of the derivative rise monotonically in income. The estimate of EB_y are close to those for the simulation with linked incomes and a bequest motive up to the median of income. The PSID estimates continue to increase through the 95th percentile of income, but the gap in the estimates increases. One reason for the discrepancy is that the simulations use after tax income, with a linear tax of .28. This implies that the values of EB_y based on the simulations should be reduced

[36] A possible explanation is that the precautionary motive to save as a hedge against future income risk and longevity risk declines at high income and wealth levels.

by 28% to make them comparable to the PSID estimates. A second reason is that our assumption that the entire bequest occurs when the second parent dies may be incorrect. The last column of the table presents PSID estimates under the extreme assumption that all of the difference in dW/dy between couples and widows represents the part of the bequest that takes place when the first parent dies. These estimates range from 2.61 at the 10th percentile to 4.008 at the 95th percentile. If one makes both the tax adjustment and the change in our assumption about the timing of bequests, then the PSID estimates of EB_y exceed those from the simulation with altruism at low income levels and are a little below at high income levels.

Given the differences between the PSID data and the data concepts implicit in De Nardi's model, the fact that she did not make any use of the derivative of wealth with respect to income in calibrating her model, and the inevitable simplifications in her model, we believe that the correspondence between the estimates and the model simulations is very encouraging. 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. 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 is more in line with the pattern in the simulated data for the model incorporating a bequest motive.

6.2 Other Results

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, we estimate Model II from Table 3.1 using 327 wealth observations from a sample of 112 older men and women who had no children. Variables corresponding to children, such as $\overline{y}_k$, are of course excluded. We use the mean for the matched sample of parents and children to standardize y for the older people who do not have children. (This makes it easier to compare the coefficients across the samples.). In the cubic case the coefficient on y is 2.37 (1.04) which is smaller than the value of 6.09 (0.61) obtained for persons with children. Thus, we find the relationship between wealth and parental income is stronger for parents with children and the difference is statistically significant. The coefficient on the age interaction is basically zero (0.10). In Model IV of Appendix Table D3 the coefficient on $y * Widowed$ is 1.4 (1.92), and the sum of the coefficients on y and $y * Widowed$ is 3.77. This estimate, while imprecisely estimated, is similar to the value for widows and widowers with children (Table 3.1., model IV). Furthermore, in the AHEAD sample the coefficient on y is actually higher for persons without children. (Table D4) Overall, our results on this important issue are somewhat mixed but for the most part suggest that the relationship between wealth and income does not depend that much on children. We should emphasize, however, that this result is potentially consistent with a substantial bequest motive if persons without children develop stronger attachments to other relatives, friends, or organizations and leave bequests to them. We do not have evidence on this. Furthermore, the simulation results presented above suggest that the wealth—income derivative is not that sensitive to the presence of a bequest motive below the median of income. Consequently, the degree of difference between older adults with and without children in the response of wealth late in life to income may not say very much about the extent to which bequests are motivated by altruism.

The coefficient on the sibling average of permanent income $\overline{y}_k$ is also reported in the table. As we argued above, the presence of altruism implies a negative coefficient on the child's income term. The coefficient should be zero if parents are indifferent to the financial situation of their children. In any event, for model V in Table 3.1 the coefficient on this variable is 0.26 (.33). While the specific point estimates vary a bit, we consistently find that the effect of child's permanent income is small and always obtain positive signs. In AHEAD we also obtain a small, positive, and statistically insignificant coefficient on the child's income. (Table 3.2). There is little evidence that parents respond to $\overline{y}_k$ by saving less for a bequest.[37]

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

[37]Note that $\overline{y}_k$ is likely to be correlated with the error term in the parental wealth model. On one hand, if parental wealth helps to finance human capital investments in children, then one would expect a positive correlation. On the other hand, such investments are costly and may lead to lower wealth late in life. Consequently, the sign of the bias in the coefficient on $\overline{y}_k$ is ambiguous.

a t-value of about 1. The point estimate suggests that the total bequest is reduced by $12,747 as the number of children rises from 1 to 3. The result is not very informative about the extent to which the bequests are driven by altruism. The positive coefficient 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 transfer to adult children.[38]

Dynan et al. (2000) implicitly test for the presence of a bequest motive using the relationship between wealth and income. They 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 (2000) document that savings rates and wealth-income ratios increase with a measure of lifetime income.[39]

We checked if our PSID results are consistent with Dynan et al's findings. We computed wealth-income ratios using a model similar to the one included in Model II in Table 3.1. Instead of substracting 70 from the age of the oldest person in the household, we substract 56. The reason is that the prediction of higher wealth-income ratios for high-income households holds for households in their prime age. First, we used the modified regression included in Model 2 (Table 3.1) to predict wealth. Then, 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 (2000), 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.[40] It should be kept in mind that our sample is not the most appropriate one to detect 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

[38] Finally, we include the standard deviation of the income of the descendents in model II (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 don't 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 the needy children. The coefficient (standard error) is .31 (.63), positive, but not statistically different from zero.

[39] Their results contradict Gustman and Steinmeier (1998), who use social security earnings records matched to the HRS.

[40] 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.

increasing in income does not necessarily hold—see Dynan et al. (2000).

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 or 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 sample 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 cents of an extra dollar of lifetime resources on inter vivos transfers. The estimate is increasing in income. Third, when we add together the two values, we conclude that parents spend about 4 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 child's point of view the increased gifts and bequests associated with $13.82 increase in parental permanent income would be equivalent to the present value of the increased earnings associated with a $1 increase in the child's permanent income. Using our estimate of MPS in combination with consensus estimates of the intergenerational correlation in income, we provide a preliminary estimate that 85% of the link between parental resources and the resources that a child enjoys as an adult is through intergenerational links in human capital and about 15% is through the effect of parental resources on gifts and bequests. In addition, we provide estimates of the age profile of the wealth and inter vivos transfer responses to permanent income.

We wish to flag three obvious lines for further research. The first is make use of direct use of bequest data from both AHEAD and the PSID as these samples continue to age to estimate the derivative of bequests with respect to income. Hurd and Smith (1999) provide an initial analysis of bequest data from AHEAD. The second is to study the effects of income shocks and capital gains at various ages on expected bequests. The third is to embark on a full scale study of the marginal propensity of parental spending on children under 18 and on college.

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

A relationship between the wealth of individuals early in adulthood and permanent income that arises from monetary transfers from parents or grandparents will influence our estimates of the relationship between permanent income and wealth late in life. Such a relationship should be taken into account when computing the fraction of the income response of wealth at age 70 that represents intended savings toward a bequest. To address this issue, 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.

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 to which he or she belongs (note that we do not impose such restriction on the child). We further restrict our sample to "parent-child" matches in which either (i) one or both parents reaches age 60 between 1968 and 1999, or (ii) one or both 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 cases.

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 parent household, or the permanent incomes of both the father and 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 by 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 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 4,523 household-years for parent households. We further drop 44 cases using the median regression analysis described in the text and 102 cases in which we did not observe the average permanent income of children. The final wealth sample has 4,377 observations.

Details of the construction of the sample use to estimate the inter vivos transfer sample are also 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 to each individual the household records, with information on income and wealth. We select one individual per 1993 household. We keep one observation per household, obtaining 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 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 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 drop 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 drop 166 cases for which we could not identify the mother. We delete 54 additional cases from the 1995 wave because we could note 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

$$\ln y_{it} = \gamma_0 + X_{1it}\gamma_1 + X_{2i}\gamma_2 + D_t\gamma_t + f(age_{it})\gamma_4 + v_i + u_{it}, \tag{11}$$

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 (11) 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 samples used to estimate the permanent income regressions consists of observations on individuals who are heads or wives/"wives" in years between 1968 and 1997. The samples contains 99,689 individual-years for males and 109,107 individual-years for females. Details of how it was 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.[41]

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 $X_{2i}\gamma_2 + v_i$.[42]

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_3 for the years 1967-1969. We relegate the details to a footnote. We use a labor force quality index constructed by Denison (1974,

[41] 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%.

[42] 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 $325.67var(\xi)$. The contribution of $X_{2i}\gamma_2 + v_i$ is $42^2 var(X_{2i}\gamma_2 + v_i)$ = $1764var(X_{2i}\gamma_2 + v_i)$.. Consequently, even if $var(\xi_{it})$ were as large as$.5var(X_{2i}\gamma_2 + v_i)$, 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% .

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 $d\hat{W}_a(y_i, Z, D_a, a)/dy_i$ 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 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% if one does not account for economy wide time trends in earnings when constructing y_i.

Table 1: Summary Statistics of the Matched PSID Sample

Variable	Mean (sd)	Minimum	Maximum
PARENTAL VARIABLES (N=4377)			
Wealth holding, all years	184.811	-195.07	3010.5
	(296.95)		
Wealth holding in 1984	153.917	-15.372	2,733.05
	(278.018)		
Wealth holding in 1989	178.522	-36.857	2,827.27
	(288.489)		
Wealth holding in 1994	188.231	-33.162	3,010.49
	(300.625)		
Wealth holding in 1999	243.304	-25.544	2997.2
	(326.673)		
Permanent earnings, father	43.558	1.010	308.07
	(27.234)		
# observations of income, father	15.57	1	30
	(7.44)		
Permanent earnings, mother	42.948	1.015	362.66
	(27.234)		
# observations of income, mother	17	1	30
	(7.99)		
Nonwhite	0.31	0	1
Education of the father (years)	11.44	0	20
	(3.66)		
Education of the mother (years)	11.68	0	18
	(2.65)		
Only father present in 1968 hh	0.01	0	1
Only mother present in 1968 hh	0.11	0	1
Father and mother present in 1968	0.88	0	1
Age of the father	63.08	37	88
	(8.09)		
Age of the mother	61.28	35	86
	(8.66)		
Number of children	3.48	1	20
	(2.52)		
Parents divorced	0.2	0	1
Parents divorced, father remarried	0.07	0	1
Parents divorced, mother remarried	0.05	0	1
Father is a widower	0.06	0	1
Mother is a widow	0.19	0	1
Parent widow, father remarried	0.02	0	1
Parent widow, mother remarried	0.02	0	1
VARIABLES OF THE CHILD (Nobs=12861)			
Wealth holding (includes housing)	99.8	-918	16,458
	(437.08)		
Permanent income	52.95	3.36	237.89
	(26.27)		
Education (years)	13.28	6	17
	(2.11)		
Age of the kid	33.82	21	60
Kid is a female	0.49		
Kid is a female head	0.17		
Kid is not married	0.29		

Notes to Table 1.
All income and wealth measures are in thousands of 1993 dollars. The parental sample is an unbalanced panel of 1389 households from 1,281 1968 parent households. 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 are subtracted from the former, as well as student loans or bills of any members of the household. We drop 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. The sample of kids is an unbalanced panel of 4,211 splitoffs from the original 1281 1968 parent households. 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

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

Variable	Mean (sd)	Minimum	Maximum
PARENTAL VARIABLES (N=4,588)			
Wealth holdings of the parent	192.366	-42	2,476
	(258.819)		
Parental permanent earnings, imputed	44.888	7.523	129.362
	(15.629)		
Nonwhite	0.08	0	1
Education of the father (years)	11.68	0	17
	(3.23)		
Education of the mother (years)	11.89	6	17
	(2.52)		
Age of the father	76.84	48	98
	(5.27)		
Age of the mother	75.71	43	101
	(6.55)		
Number of children	2.95	1	14
	(1.77)		
Father is a widow	0.10	0	1
Mother is a widow	0.43	0	1
Father and mother are alive and together	0.41	0	1
No father found	0.01	0	1
Parent alone, divorced	0.03	0	1
Variables used for the imputation			
Parental Occupation			
Managers and professionals	0.29	0	1
Clerical	0.05	0	1
Sales	0.06	0	1
Craftsmen	0.27	0	1
Operatives	0.19	0	1
Laborers	0.05	0	1
Service	0.03	0	1
Farmers	0.03	0	1
VARIABLES OF THE CHILD (N*=6,573)			
Permanent income	51.245	12.230	122.297
	(18.927)		
Age of the head	47	21	84
	(8.71)		
Family income below 20,000	0.14	0	1
Family income between 20,000 and 30,000	0.16	0	1
Family income between 30,000 and 50,000	0.33	0	1
Family income above 50,000	0.38	0	1
Years of schooling, head of the household	13.66	1	17
	(2.31)		
Years of schooling, wife of the household	13.75	1	17
	(2.23)		
Child married male	0.39	0	1
Child married female	0.36	0	1
Chid single male	0.11	0	1
Child single female	0.14	0	1
Head is not employed	0.14	0	1
Head works part-time	0.04	0	1
Wife not employed (if present)	0.29	0	1
Wife works part-time (if present)	0.15	0	1

Notes to Table 2

Income and Wealth variables are in thousands of 1993 dollars.

"Father" is defined as the current married male respondent in a two person household or
the late spouse of a respondent who is widow or
the ex-spouse of a divorced female respondent.

"Mother" is defined as the current married female respondent in a two person household or
the late spouse of a respondent who is a widower or
the ex-spouse of a divorced male respondent.

(*) The number of observations of children correspond to the number of parent-child matches in 1993

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
Yp	5.24	4.29	4.38	5.617	6.09
	(.431)	(.47)	(.44)	(.575)	(.610)
Yp * Yp		0.055	0.047	0.041	0.037
		(.010)	(.011)	(.011)	(.011)
Yp * Yp * Yp		-0.0002	-0.0002	-0.00018	-.0002
		(.00004)	(.00005)	(.00006)	(.00005)
Yp * (Age - 70)	0.02	0.04	0.06	0.07	0.069
	(.036)	(.038)	(.03)	(.035)	(.034)
(Yp * Yp)*(Age - 70)			0.0006	0.0006	-0.0006
			(.0009)	(.0009)	(0.0008)
Yp * (Widowed)				-2.44	-2.3
				(.72)	(.70)
Yp * (Divorced/Sep)				-2.25	-2.02
				(.87)	(.92)
Yp * Nonwhite					-2.20
					(.69)
Yk (sibling average of permanent inc.)	0.14	0.28	0.29	0.247	0.26
	(.34)	(.33)	(0.33)	(.33)	(.33)
Control Variables in All Models: (Coefficients displayed for Model 5 only.)					
1/(number of children)					19.12
					(21.34)
Mother not present in 1968 hh					-31.46
					(41.11)
Father not present in 1968 hh					-44.42
					(16.05)
age minus 70					0.55
					(1.27)
age minus 70 squared					-0.185
					(.066)
age minus 70 cubic					0.0009
					(.004)
age minus 70 quartic					0.00008
					(.0001)
Parents divorced, father rem.					31.03
					(28.16)
Parents divorced, mother rem.					93.26
					(39.46)
Parents divorced					-86.45
					(16.29)
Widower					-63.15
					(17.39)
Widow					-80.25
					(13.01)
Widower, remarried					131.72
					(59.89)
Widow, remarried					219.65
					(65.67)
Nonwhite					-102.46

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
Second record, divorced					-36.52
					(26.75)
Number of kids who are female					-4.83
					(4.08)
Number of kids who are female heads					2.12
					(4.26)
Wave 84					-17.74
					(11.14)
Wave 89					-4.21
					(8.40)
Wave 99					14.09
					(9.83)
Constant					240.79
					(18.71)

Sample size: 4,377
Wealth outliers trimmed
Standard errors in parentheses account for unbalanced panel structure
and heteroscedasticity.
Parental permanent earnings Yp is the deviation from the unweighted sample mean
Income and wealth are measured in 1,000s of 1993 $
permanent income of the children is the mean across siblings
The R2 for models I, II, III, IV, and V are 0.3, 0.32, 0.32, 0.32 and 0.33 respectively

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
Yp	6.72	5.27	5.99	6.147
	(.63)	(.75)	(.82)	(.84)
Yp * Yp		0.058	.05	.046
		(0.022)	(.023)	(.023)
Yp * (Age - 70)	-0.115	0.18	.166	0.15
	(.05)	(.18)	(.18)	(.18)
(Yp * Yp)*(Age - 70)		-0.0025	-0.0022	-0.0022
		(.0015)	(.0016)	(.0016)
Yp * (Widowed)			-1.33	-1.32
			(.71)	(.71)
Yp * (Divorced/Sep)			-1.87	-1.84
			(1.79)	(1.78)
Yp * Nonwhite				-1.39
				(.86)
Average Income, kids	0.34	0.53	0.515	0.52
	(.30)	(.30)	(.30)	(.30)
Control Variables in All Models: (Coefficients displayed for Model 4 only.)				
1/(number of children)				23.54
				(14.13)
Mother not found				-
Father not found				107.44
				(85.07)
age minus 70				-4.60
				(5.17)
age minus 70 squared				0.24
				(0.29)
age minus 70 cubic				-0.013
				(0.024)
age minus 70 quartic				0.0001
				(.0008)
Parents divorced				1.78
				(28.38)
Widower				-54.71
				(13.96)
Widow				-7.64
				(28.93)
Nonwhite				-41.55
				(13.28)
Average number of kids who are married females				2.93
				(12.90)
Mean number of kids who are single females				-5.61
				(17.09)
Wave 93				-59.55
				(5.30)
Constant				240.51
R^2				0.19

Sample size: 4,588
Wealth outliers trimmed
Standard errors in parentheses account for unbalanced panel structure
and heteroscedasticity, but not for the fact that Yp and the average permanent income of children are estimated
Parental permanent earnings Yp is the deviation from the unweighted sample mean
Income and wealth are measured in 1,000s of 1993 $
permanent income of the children is the mean across siblings

Table 4 Response of Expected Bequests to Annual Permanent Income, Whites (PSID)

Panel A: The probability of observing a bequest at different ages

White couple, both of age 60, average permanent income

Age	Smt	Sft	Hmt	Hft	dW(t)/dy	dW(t)/dy widow	Pbt	Pbt-wid
60	1.000	1			5.676		0.000	
61	0.986	0.992	0.015	0.008	5.741	3.441	0.000	0.000
62	0.972	0.984	0.016	0.009	5.806	3.506	0.000	0.000
63	0.956	0.975	0.018	0.010	5.871	3.571	0.000	0.001
64	0.938	0.965	0.019	0.011	5.936	3.636	0.000	0.001
65	0.920	0.955	0.021	0.012	6.001	3.701	0.000	0.001
66	0.901	0.944	0.023	0.013	6.066	3.766	0.000	0.002
67	0.880	0.932	0.025	0.014	6.131	3.831	0.000	0.003
68	0.858	0.919	0.027	0.015	6.196	3.896	0.000	0.003
69	0.835	0.905	0.029	0.016	6.261	3.961	0.000	0.004
70	0.811	0.890	0.032	0.018	6.326	4.026	0.000	0.005
71	0.785	0.874	0.035	0.020	6.391	4.091	0.000	0.006
72	0.757	0.857	0.038	0.022	6.456	4.156	0.001	0.008
73	0.728	0.838	0.042	0.024	6.521	4.221	0.001	0.010
74	0.697	0.818	0.046	0.026	6.587	4.287	0.001	0.011
75	0.665	0.797	0.050	0.029	6.652	4.352	0.001	0.013
76	0.632	0.774	0.054	0.031	6.717	4.417	0.001	0.016
77	0.598	0.750	0.059	0.034	6.782	4.482	0.001	0.018
78	0.563	0.725	0.064	0.037	6.847	4.547	0.001	0.021
79	0.527	0.698	0.069	0.041	6.912	4.612	0.001	0.024
80	0.490	0.669	0.075	0.045	6.977	4.677	0.001	0.027
81	0.453	0.639	0.082	0.051	7.042	4.742	0.001	0.031
82	0.416	0.607	0.090	0.056	7.107	4.807	0.001	0.034
83	0.378	0.573	0.099	0.062	7.172	4.872	0.002	0.038
84	0.341	0.537	0.107	0.069	7.237	4.937	0.002	0.042
85	0.304	0.500	0.115	0.076	7.302	5.002	0.002	0.045
86	0.269	0.462	0.124	0.084	7.367	5.067	0.002	0.048
87	0.236	0.423	0.135	0.094	7.432	5.132	0.002	0.051
88	0.204	0.383	0.147	0.104	7.497	5.197	0.002	0.054
89	0.174	0.343	0.159	0.115	7.562	5.262	0.001	0.055
90	0.146	0.304	0.172	0.127	7.628	5.328	0.001	0.056
91	0.121	0.265	0.186	0.140	7.693	5.393	0.001	0.055
92	0.099	0.228	0.202	0.155	7.758	5.458	0.001	0.054
93	0.079	0.193	0.218	0.171	7.823	5.523	0.001	0.052
94	0.062	0.160	0.234	0.186	7.888	5.588	0.001	0.048
95	0.047	0.130	0.249	0.201	7.953	5.653	0.000	0.043
96	0.035	0.104	0.263	0.217	8.018	5.718	0.000	0.038
97	0.026	0.081	0.279	0.234	8.083	5.783	0.000	0.032
98	0.019	0.062	0.294	0.251	8.148	5.848	0.000	0.027
99	0.013	0.047	0.309	0.267	8.213	5.913	0.000	0.022
100	0.000	0.000	1	1.000	8.278	5.978	0.001	0.059

Panel B: Estimates of the expected response of bequests to annual permanent income

	10th percentile (Yp=18,640)	Average (Yp=46,240)	90th percentile (Yp=76,030)
Expected derivative	1.68	2.56	3.10
(standard error)	(.76)	(.44)	(.66)

Pbt: Probability of observing a bequest in period t if both members are alive on the previous period.
Pbt- wid: Probability of observing a bequest in period t if only one member of the couple was alive
A bequest occurs once both members are dead
dW(t)/dy : Effect of permanent income y on wealth holdings of a couple at age t
dW(t) /dy widow : Effect of permanent income y on wealth holdings of a widow(er) at age t
Expected derivative: sum of dW(t)/dy weighted by the probability of observing the bequest.
Standard errors in Panel B are derived using the delta method.

Table 5 Response of Expected Bequests to Permanent Income, Nonwhites (PSID)

Panel A: The probability of observing a bequest at different ages

Nonwhite couple, both of age 60, 10th income percentile

Age	Smt	Sft	Hmt	Hft	dW/dy	dW/dy widow	Pbeq	Pbeq widow
60	1.000	1.000			3.476		0.000	
61	0.976	0.987	0.024	0.013	3.541	1.241	0.000	0.000
62	0.951	0.972	0.025	0.014	3.606	1.306	0.000	0.001
63	0.925	0.957	0.027	0.016	3.671	1.371	0.000	0.001
64	0.898	0.941	0.029	0.017	3.736	1.436	0.000	0.002
65	0.870	0.924	0.032	0.018	3.801	1.501	0.000	0.003
66	0.840	0.906	0.034	0.020	3.866	1.566	0.001	0.005
67	0.810	0.887	0.036	0.021	3.931	1.631	0.001	0.006
68	0.779	0.867	0.038	0.022	3.996	1.696	0.001	0.007
69	0.747	0.846	0.041	0.024	4.061	1.761	0.001	0.009
70	0.714	0.824	0.044	0.026	4.126	1.826	0.001	0.011
71	0.680	0.801	0.047	0.028	4.191	1.891	0.001	0.012
72	0.646	0.777	0.051	0.030	4.256	1.956	0.001	0.015
73	0.611	0.752	0.054	0.032	4.321	2.021	0.001	0.017
74	0.575	0.726	0.058	0.035	4.387	2.087	0.001	0.019
75	0.540	0.699	0.061	0.037	4.452	2.152	0.001	0.021
76	0.506	0.671	0.064	0.040	4.517	2.217	0.001	0.023
77	0.471	0.643	0.068	0.043	4.582	2.282	0.001	0.025
78	0.437	0.613	0.072	0.046	4.647	2.347	0.001	0.028
79	0.403	0.582	0.078	0.050	4.712	2.412	0.001	0.030
80	0.368	0.550	0.086	0.056	4.777	2.477	0.001	0.034
81	0.334	0.515	0.094	0.062	4.842	2.542	0.001	0.037
82	0.300	0.480	0.101	0.068	4.907	2.607	0.001	0.040
83	0.268	0.445	0.107	0.074	4.972	2.672	0.001	0.042
84	0.238	0.410	0.113	0.079	5.037	2.737	0.001	0.042
85	0.210	0.375	0.118	0.085	5.102	2.802	0.001	0.043
86	0.183	0.341	0.125	0.091	5.167	2.867	0.001	0.043
87	0.159	0.308	0.133	0.098	5.232	2.932	0.001	0.043
88	0.136	0.275	0.143	0.107	5.297	2.997	0.001	0.043
89	0.115	0.243	0.156	0.116	5.362	3.062	0.001	0.043
90	0.095	0.212	0.170	0.128	5.428	3.128	0.001	0.042
91	0.078	0.182	0.185	0.140	5.493	3.193	0.001	0.041
92	0.062	0.155	0.200	0.152	5.558	3.258	0.000	0.038
93	0.049	0.129	0.212	0.163	5.623	3.323	0.000	0.035
94	0.038	0.107	0.221	0.172	5.688	3.388	0.000	0.031
95	0.029	0.087	0.229	0.183	5.753	3.453	0.000	0.027
96	0.022	0.070	0.240	0.197	5.818	3.518	0.000	0.023
97	0.017	0.055	0.253	0.211	5.883	3.583	0.000	0.020
98	0.012	0.043	0.265	0.226	5.948	3.648	0.000	0.016
99	0.009	0.033	0.278	0.239	6.013	3.713	0.000	0.013
100	0.000	0.000	1.000	1.000	6.078	3.778	0.000	0.041

Panel B: Estimates of the expected response of bequests to annual permanent income

	10th perc. (Y=18,640)	Mean (Y=46,240)	90th perc. (Y=76,030)
Expected derivative:	.21	1.46	2.12
(standard error)	(.73)	(.45)	(.71)

Notes: See Table 4.

Table 6: The Effect of parental lifetime resources on expected bequests (EB_y/(dY*/dy)

	10th percentile (Yp=18,640)	Average (Yp=46,240)	90th percentile (Yp=76,030)
1. PSID whites	.013	.019	.023
	(.006)	(.003)	(.005)
2. AHEAD,whites	.024	.028	.03
	(.009)	(.0085)	(.008)
3. PSID, nonwhites	.002	.011	.016
	(.006)	(.003)	(.005)
4. AHEAD, nonwhites	.016	.023	.027
	(.0066)	(.0088)	(.009)

The Table presents estimates of the derivative of expected bequests with respect to the present value of parental lifetime resources Y*: EBy/(dY*/dy), The calculation of EBy is explained in the text and documented in Table 4 and 5 in the PSID case. The value of dY*/dy is 132.11 for whites with average income and 130.5 for non-whites with average income. See the text for an explanation of how it is computed.
The computations assume an interest rate of 4%
Standard errrors in parenthesis. 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 the permanent income measures are generated.

Table 7 The Effect of Permanent income on Intervivos transfers.

	OLS	Probit model	OLS, R > 0	Tobit model
Dependent variable:	Transfer amount (includes zeroes)	0 if R = 0 1 if R > 0	Transfer Amount (zeroes excluded)	Transfer amount (includes zeroes)
Yp	.056	.017	.059	.118
	(.014)	(.003)	(.031)	(.0189)
Yp * Yp	.0005	.000018	.0009	.0002
	(.0003)	(.9e-5)	(.0008)	(.0005)
Yp * Yp * Yp	-1e-5	-3.51e-06	-.00002	-.00001
	(3.7e-6)	(1.67e-06)	(9e-6)	(4.98e-06)
Yp * Yp * Yp * Yp	5e-8	1.70e-08	5.00E-08	5.66e-08
	(1.2e-8)	(6.89e-09)	(2e-8)	(1.32e-08)
Yp * (Age - 70)	3.8e-4	.0003	.0004	.001
	(5e-4)	(.0003)	(.002)	(.0016)
(Yp * Yp)*(Age - 70)	2e-5	-	.00004	.00002
	(6e-4)	-	(.00001)	(9.59e-06)
Yp * (Widowed)	-.053	-.0113	-.056	-.112
	(.012)	(.0062)	(.035)	(.032)
Yp * (Divorced/Sep)	-.034	.001	-.06	-.0272
	(.011)	(.004)	(.028)	(.024)
Yp * Nonwhite	-.011	.002	-.007	.0027
	(.007)	(.005)	(.05)	(.027)
kids permanent inc (Yk), sibling average	-.007	0	-0.02	-.010
	(.0051)	(0.002)	.013	(.0098)
age minus 70	.0260	.0226	(.074)	.143
	(.018)	(.0064)	(.047)	(.039)
age minus 70 squared	.0018	-	-	-
	(.0023)	-	-	-
age minus 70 cubic	-1e-5	-	-	-
	(-1e-4)	-	-	-
age minus 70 quartic	-9.27e-06	-	-	-
	(6.70e-06)	-	-	-
Parents divorced, father rem.	.0878	.413	.19	2.02
	(.174)	(.187)	(.58)	(1.05)
Parents divorced, mother rem.	.257	-.282	1.21	-.640
	(.175)	(.183)	(.52)	(1.02)
Parents divorced	-.740	-.618	-1.11	-3.67
	(.161)	(.161)	(.54)	(.963)
Mother divorced, second record	.17	.259	.42	1.36
	(.14)	(.158)	(.51)	(.99)
Widower	-1,054	-1.37	-1.37	-.939
	(.345)	(.187)	(.64)	(1.50)
Widow	-1,067	-.01	.6	-7.66
	(.196)	(.268)	(1.5)	(1.11)
Widower, remarried	.950	-.374	3.19	-.1170
	.665	(.397)	(2.35)	(2.386)
Nonwhite	-.397	-.037	-.93	-.596
	(.140)	(.098)	(.36)	(.566)
Mean age of children	-.0146	-.050	.005	-.238
	.0147	(.010)	(.07)	(.061)
N. of children who are single males	.403	.186	0.78	1.29
Sample Size:	1391	1391	1391	1391

Notes: Transfers are aggregrated over children. In the probit and tobit columns we represent the coefficients of the latent index model.

In the first columns, standard errors in parentheses account for unbalanced panel structure and heteroscedasticity. In the Tobit case, standard errors are not adjusted.

Table 8: The derivative of expected lifetime intervivos transfers with respect to parental resources (ERY*)

	Parent Income Level		
	10th percentile (Yp=18,640)	**Average (Yp=44,260)**	**90th percentile (Yp=76,030)**
1. Regression including zeros	-.0013	.023	.022
(whites)	(.0057)	(.0055)	(.008)
2. Probit+flexible OLS	-.0002	.0124	.019
(whites)	(.0046)	(.005)	(.013)
3. Tobit	.004	.012	.015
(whites)	(.002)	(.0025)	(.0053)
4. Regression including zeros	-.005	.017	.0155
(non whites)	(.0047)	(.005)	(.008)
5. Probit+flexible OLS	0	.008	.0128
(nonwhites)	(.0037)	(.0056)	(.014)
6. Tobit	.004	.012	.014
(nonwhites)	(.002)	(.0033)	(.0074)

The Table presents estimates of ERY*, the effect of an extra dollar of lifetime resources on expected lifetime intervivos transfers using the Transfer model estimates in Table 7. We first compute ERy, the derivative of the expected discounted present value of transfers with respect to parental permanent income y. We then devide the estimate of ERy by dY*/dy, the derivative of the discounted value of lifetime resources (initial wealth, earnings, and post retirement income) with respect to y.
Standard errors in parentheses. The computations assume an interest rate of 4%.
(1) Standard errors in the Probit+Flexible OLS specification do not allow for correlation among the estimators of the Probit model and the estimators in the Post-retirement income regression.

(2) Standard errors in the Tobit specification do not allow for correlation within dynasties.

Table 9: Terms of trade between a dollar the parents' resources and a dollar of the child's resources

	Regression coef. linking yk and yp (1)	Tax rate on child's earnings (2)	interest rate (3)	adjustment for family size (4)	Effect of $1 increase in yk on child's lifetime earnings, discounted to age 25 (5)	Effect of $1 increase in yp on child's lifetime earnings, discounted to age 25 (6)	Effect of $1 increase in yp on expected value of bequest to child, discounted to age 25 (7)		Effect of $1 increase in yp on expected value of intervivos transfers to child, discounted to age 25 (8)		Increase in yp required to compensate child for $1 decrease in yk (col 5/(col 7 + col 8)) (9)		Effect of y on transfer and bequests as a fraction of total effect of y on resources of adult children [col 7+col 8]/[col 6+col 7+col 8] (10)	
							Whites	Non whites	Whites	Non whites	Whites	Non whites	Whites	Non whites
1a.	0.4	0	0.04	none	22.62	9.05	1.17	.67	.75	.51	11.77	19.21	.18	.11
2a.	0.4	0	0.04	divide bequests and transfers by 3	22.62	9.05	.39	.22	.25	.17	35.31	57.62	.07	.04
3a.	0.4	0.27	0.04	divide bequests and transfers by 3	16.51	6.60	.39	.22	.25	.17	25.78	42.07	.09	.06
4a.	0.28	0.27	0.04	divide bequests and transfers by 3	16.51	4.62	.39	.22	.25	.17	25.78	42.07	.12	.08
	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	Whites	Non whites
1b.	0.4	0	0.04	assume 3 children	22.62	9.05	.79	.62	.39	.35	18.92	23.28	.12	.10
2b.	0.4	0.27	0.04	assume 3 children	16.51	6.60	.79	.62	.39	.35	13.81	16.99	.15	.13
3b.	0.28	0.27	0.04	assume 3 children	16.51	4.62	.79	.62	.39	.35	13.82	16.99	.20	.17
4b.	0.28	0.27	0.04	assume 1 child	16.51	4.62	.92	.51	.61	.45	10.68	17.26	.25	.17
5b.	0.4	0.27	0.04	assume 3 children	16.51	6.60	.79	.62	.39	.35	13.82	16.99	.15	.13

Table 10 Derivative of bequests with respect to parental permanent income:

r=0.06	Permanent income	Experiment 1 No bequest motive No productivity links	Experiment 2 No bequest motive Productivity links	Experiment 3 Bequest motive Productivity links	PSID Wealth Model Table 3.1 (white couple)	PSID Wealth Model Table 3.1, Part of Bequest after death of first parent
10th quantile	17,048	0.938	1.184	1.476	1.39	2.61
		(.072)	(.072)	(.507)	(.587)	(.67)
25th quantile	21,852	1.133	1.327	1.596	1.54	2.76
		(.052)	(.051)	(.363)	(.519)	(.61)
Median	35,903	1.552	1.628	2.08	1.936	3.156
		(.023)	(.023)	(.171)	(.366)	(.51)
75th quantile	58,987	1.744	1.737	3.288	2.423	3.643
		(.037)	(.036)	(.242)	(.37)	(.54)
90th quantile	75,608	1.502	1.520	4.48	2.65	3.87
		(.028)	(.031)	(.225)	(.51)	(.66)
95th quantile	96,913	0.724	0.879	6.401	2.788	4.008
		(.07)	(.101)	(.754)	(.71)	(.82)
R-squared		0.85	0.85	0.14	0.33	

Computations for Experiments 1-3 use simulated data
The distribution of earnings is taken from the simulated data

The coefficients are calculated from a regression of bequests on a third order polynomial of lifetime resources, an interaction of lifetime resources and age of death and another interaction of lifetime resources squared and age of death. A fourth order polynomial on age of death is also included. The coefficients reported are the derivative of the value of bequests at age 70 with respect to permanent income
Mortality rates for all columns are taken from De Nardi (2002).

Appendix Table A1: Regression of Initial Wealth Holding on Permanent Income

Dependent variable: first observation of wealth holding of a child

	Model I	Model II	Model III	Model IV
y_k	0.32	0.15	0.14	0.17
	(0.04)	(0.055)	(0.06)	(0.07)
$y_k * y_k$			0.00025	0.0015
			(0.001)	(0.001)
$y_k * y_k * y_k$				-0.000015
				(1e-5)
y_k * (Age - 22)		0.05	0.05	0.05
		(0.02)	(0.02)	(0.02)
age-22				-0.38
				(1.38)
(age-22) squared				1.04
				(0.55)
(age-22) cubic				-0.1
				(0.06)
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)

Sample size 1,874

The standard errors (in parentheses) allow for arbitrary correlation and heteroscedasticity within the family.

y_k (permanent annual earnings of children) is in deviation from sample means.

Table B1: Regression of Post Retirement Non Asset Income on Permanent Income

Dependent variable: Post retirement income	
	Model
Yp	.378
	(.021)
Yp*Yp	-2.00E-04
	(.0006)
Yp*Yp*Yp	-1.03E-06
	3.49E-06
Yp * (Age - 70)	-.011
	(.002)
Yp*widow	-.21
	(.03)
Yp*divorced	-.20
	(.04)
Yp*nonwhite	0
	(.023)
Yp*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)
R^2	.45

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

Appendix Table C1 Summary Statistics of the Matched PSID Sample, Transfer Models

Variable	Mean (sd)	Minimum	Maximum
Proportion of parents who give	0.33	0	1
Sum of intervivos transfers	0.360	0	61.89
	(2.478)		
Permanent earnings, father	43.558	1.01	308.07
	(27.234)		
Nonwhite	0.32	0	1
Education of the father (years)	11.44	0	24
	(3.66)		
Education of the mother (years)	11.68	0	18
	(2.65)		
Age of the father	63.08	37	88
	(8.09)		
Age of the mother	61.28	35	86
	(8.66)		
Number of children	3.48	1	20
	(2.52)		
Parents divorced	0.2	0	1
Parents divorced, father remarried	0.11	0	1
Parents divorced, mother remarried	0.09	0	1
Father is a widower	0.04	0	1
Mother is a widow	0.14	0	1
Parent widow, father remarried	0.02	0	1
Parent widow, mother remarried	0.02	0	1
Average permanent income of children	43.11	18	71
	(26.27)		
Average age of children	31.6	19	81
	(6.84)		
Number of children who are single males	0.19	0	1
Number of children who are single females	0.16	0	1
Number of children who are married females	0.33	0	1

Sample size: 2905
All magnitudes are in thousands of 1993 dollars

Table D1 Summary Statistics for Childless Adults (PSID)

Variable	Mean (sd)	Minimum	Maximum
PARENTAL VARIABLES (N=327)			
Wealth holdings	184.87	-15.54	5339
	(409)		
Permanent earnings, elderly male	44.536	3.096	126.546
	(27.417)		
Permanent earnings, elderly female	47.731	3.775	139.59
	(31.122)		
Nonwhite	.262	0	1
Education of the elderly male (years)	11.5	3	17
	(3.91)		
Education of the elderly female (years)	12.02	3	17
	(3.52)		
Elderly male in 1968 hh was not found	0.49		
Elderly female in 1968 hh was not found	0.16		
Both male and female found in 1968	0.35		
Age of the elderly male	67.13	42	90
	(9.63)		
Age of the elderly female	69.24	41	90
	(9.92)		
Couple divorced	0.18		
Couple divorced, male rem.	0.01		
Couple divorced, female rem.	0.01		
Widower	0.02		
Widow	0.19		
Widower, male remarried	0		
Widow, female remarried	0.02		

All magnitudes are in thousands of 1993 dollars
The parental sample is an unbalanced panel of 112 original households.
We observe at most four observations per household. Divorced couples contribute two observations
The definition of wealth is the one provided by the PSID. It includes the following items:
Value of real estate (including own home) cars, trucks motor home, business owned, shares of stock, or investment trusts (including Individual Retirement Accounts), checking and savings accounts rights in trusts or state and life insurance policy

Debts are substracted from the former , as well as student loans

Appendix Table D2 Summary Statistics of Elderly without children, AHEAD

Variable	Mean (sd)	Minimum	Maximum
Wealth holdings	156,014	-47.5	3000.5
	(278.91)		
Permanent earnings, imputed	58.74	21.56	466
	(39.484)		
Nonwhite	.196	0	1
Education of male (years)	11.85	6	17
	(2.98)		
Education of female (years)	11.71	6	17
	(2.52)		
Age of elderly male	78.79	58	92
	(5.95)		
Age of elderly female	79.99	50	103
	(6.91)		
Widower	0.12	0	1
Widow	0.50	0	1
Both members are alive and together	0.14	0	1
Female alone, single	0.16	0	1
Female alone, divorced	0.08	0	1
Variables used for the imputation			
Occupation of male elderly			
Managers and professionals	0.24	0	1
Clerical	0.06	0	1
Sales	0.05	0	1
Craftsmen	0.20	0	1
Operatives	0.12	0	1
Laborers	0.06	0	1
Service	0.05	0	1
Farmers	0.02	0	1

Sample size: 816
All magnitudes are in thousands of 1993 dollars

Appendix Table D3: Wealth Models for Older Adults Without Children (PSID)

Dependent variable: wealth holdings of the household (1,000s of 1993$)

	Model I	Model II	Model III	Model IV	Model V
Yp	4.339	3.135	3.069	2.312	2.37
	(1.356)	(.946)	(.89)	(.877)	(1.04)
Yp * Yp		0.051	0.050	0.058	0.0574
		(.031)	(.029)	(.032)	(0.034)
Yp * (Age - 70)	-0.0008	0.054	0.085	0.088	0.089
	(.107)	(.068)	(.057)	(.054)	(.055)
(Yp * Yp)*(Age - 70)			-0.001	-0.0016	-0.0016
			(0.002)	(0.002)	(.0025)
Yp * (Widowed)				1.365	1.4
				(1.923)	(2.019)
Yp * (Divorced/Sep)				3.087	3.24
				(2.30)	(2.51)
Yp * Nonwhite					-0.312
					(1.81)
Parents divorced, father remarried					214.82
					(283.7)
Parents divorced, mother remarried					-1185.8
					(944.25)
Widower					261.63
					(354.57)
Widow					62.88
					(39.23)
Age of the oldest member-70					1.65
					(4.705)
Age of the oldest member-70 squared					-0.399
					(.348)
Age of the oldest member -70 cubic					-0.003
					(.0089)
Age of the oldest member -70, quartic					0.00017
					(.0007)
Nonwhite					-57.269
					(41.64)
No mother in 1968 household					-41.45
					(68.31)
No father in 1968 household					-184.71
					(58.98)
Second record, divorced household					1004.54
					(762.06)
Wave 84					-3.504
					(37.508)
Wave 89					59.326
					(41.581)
Wave 99					23.053
					(98.562)
Constant					222.711
					(47.818)

Sample size: 327

The permanent income Yp of the household is the deviation from the sample mean (1,000s of 1993 $).

Appendix Table D4: Wealth Model Estimates, AHEAD sample of elderly without children

Dependent variable: wealth holdings of a household (1,000s of 1993 $)				
	Model I	Model II	Model III	Model IV
Yp	9.405	9.677	10.104	10.17
	(1.210)	(1.371)	(1.731)	(1.792)
Yp * Yp		-0.02	-0.021	-0.022
		(.014)	(.015)	(.016)
Yp * (Age - 70)	-0.351	-0.38	-0.37	0.142
	(.0542)	(.091)	(.093)	(.269)
(Yp * Yp)*(Age - 70)		0.0007	0.001	0.001
		(.0004)	(.004)	(.001)
Yp * (Widowed)			-1.51	-1.10
			(1.44)	(1.44)
Yp * (Divorced/Sep)			-0.14	-0.14
			(1.85)	(1.86)
Yp * Nonwhite				-0.10
				(.27)
Yp*Single			2.6	2.59
			(2.84)	(2.84)
Control Variables in All Models: (Coefficients displayed for Model IV only.)				
age minus 70				35.31
				(18.22)
age minus 70 squared				-3.02
				(2.88)
age minus 70 cubic				0.132
				(.189)
age minus 70 quartic				-0.002
				(.0004)
Parents divorced				16.09
				(56.98)
Widower				-31.09
				(29.33)
Widow				-94.36
				(25.09)
Nonwhite				-30.34
				(16.34)
Wave 93				-76.73
				(22.22)
Constant				218.65
				(38.80)

Observations: 816