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Pension Participation: Do Parents Transmit Time Preference?

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Abstract

A wide range of economic and health behaviors are influenced by individuals' attitudes toward the future – including investments in human capital, health capital and financial capital.

Intergenerational correlations in such behaviors suggest an important role the family may play in transmitting time preferences to children. This article presents a model of parental investment in future-oriented capital, where parents shape their children's time preference rates. The research identifies a dual role for a parent's time preference rate in the process of shaping the offspring's attitude toward the future, and discusses paths through which parents may socialize children to be patient. The model's implications are studied by investigating the parent-child correlation in pension participation using data from the Panel Study of Income Dynamics

Keywords

Family and economic issues; human capital theory; intergenerational correlations; pensions; saving

A handful of patience is worth more than a bushel of brains

-Dutch Proverb

Introduction

Many studies have documented a strong correlation in the economic outcomes of parents and children. Examples include research on educational attainment (Black et al. 2005; Mulligan 1999), income (Mulligan 1997; Solon 1992), wealth (Charles and Hurst 2003), asset holdings (Chiteji and Stafford 1999), occupation (Long and Ferrie 2005; Kerckhoff et al. 1985), and work hours (Toledo 2005). However, the mechanisms creating the observed similarities in outcomes across generations are not well understood.

Emphasizing the effect of cognitive skills on earnings, the human capital literature traditionally has explained the intergenerational persistence of outcomes by inheritance of cognitive abilities and by liquidity constraints that prevent children of poor families from obtaining better education (Becker 1993; Becker and Tomes 1986). Combined together, innate intelligence, schooling and wealth have been estimated to account for about 23% of the intergenerational correlation in income (Bowles and Gintis 2002). The large unexplained portion of intergenerational income variation led Bowles and Gintis (2002) to suggest that

intergenerational transmission of attitudes and personality traits also may play an important role in the intergenerational correlation of outcomes. The hypothesis is supported by recent empirical research documenting correlations in attitudinal and behavioral measures between children and parents, for example in the propensity to save (Knowles and Postlewaite 2005), in answers to a hypothetical lottery question (Dohmen et al. 2006), in risk and trust attitudes (Charles and Hurst 2003; Dohmen et al. 2006), and in generosity (Steinberg and Wilhelm 2003).

A related and newly-emerging literature argues that non-cognitive skills or even preferences themselves, such as time-management skills, discipline, social abilities, and time preference have a bearing on labor market outcomes (Carneiro and Heckman 2003). Yet existing empirical studies of human capital have focused mostly on cognitive skills and schooling; the role of parents in the transmission of income-relevant non-cognitive skills has been given much less attention.

This paper explores the intergenerational transmission of time preference as revealed in pension participation. The paper presents a theoretical model of preference formation with altruistic parents shaping their children's rate of time preference, and follows the theoretical framework with empirical analyses using data from the Panel Study of Income Dynamics (PSID) and the Survey of Consumer Finances (SCF). The model that we employ draws on the model of endogenous time preference formation proposed in Becker and Mulligan (1997), where individuals can invest in "future-oriented capital" in order to alter their own rate of time preference. However, our model extends this process to an intergenerational context, which allows parents the opportunity to invest in capital that raises their offspring's discount factor.¹ A distinguishing feature of our model is that parental time preference is an important factor in determining the optimal level of investment in future oriented capital. By assuming that the price of investment in future-oriented capital is a decreasing function of the parental discount factor, we introduce a mechanism that explains why more patient parents might have more patient children.² In Becker and Mulligan (1997) such correlation is explained by the intergenerational correlation in wealth. Our model suggests that such correlation may exist for an additional reason: because it is easier for more patient parents to teach their children to be patient.

Reduction of the price of investment in future-oriented capital is a natural assumption. This declining costs assumption captures the notion that a parent with high a discount factor (a high degree of patience) would be more efficient at acquiring or investing in future-oriented capital. In particular, parents who are better at imagining the future are expected to find it easier to convey the importance of attaching weight to the future to their children. For example, in instances in which future-oriented capital is conceptualized as something that is produced within the home, one would expect patient parents to be likely to find it easier to teach their children patience, or to be more effective at the task, since the parents already know how to be patient. Parents who do not know how to do something themselves are not likely to be effective teachers.³ This is particularly true since children learn much by imitation (e.g., Mischel et al. 1989; Tinsley 1992).⁴

¹We are not the first to argue that parents may desire to influence their children's attitudes toward the future. Doepke and Zilibotti (2005) present a theoretical model that illustrates conditions under which one can expect to observe a connection between parents' discount rates and their offspring's during adulthood.

²The Becker-Mulligan model has this price fixed at 1 for all individuals.

³Alternatively, if one conceptualizes future-oriented capital as something a family purchases in the marketplace, one can expect costs to be lower for parents who are already patient themselves because these parents might have better knowledge about products that make the future more salient. Becker and Mulligan (1997) argue future-oriented capital can be purchased in markets.

⁴Research on parental modeling of behavior abounds in the psychology literature. For example, Mischel et al. (1989) write about the importance of "an early family environment in which self-imposed delay is encouraged and modeled" in their discussion of delay of gratification in children (Mischel et al. 1989, p. 936).

Our model predicts that the parental rate of time preference affects the desired level of future-oriented capital in two ways. On one hand, a high parental discount factor will favor allocation of resources toward a parent's future consumption and away from other uses including investment in the future-oriented capital. On the other hand, the lower price of the future-oriented capital associated with a high parental discount factor will create an incentive for higher levels of investment. If the latter effect dominates, we should observe a positive association between parents' and children's discount factors.

In empirical work we find evidence consistent with such a positive relationship in time preference across generations. Since time preference is unobserved we here employ pension participation as its indicator. Using pension participation as an indicator of time preference finds support elsewhere in empirical literature. For example, Ippolito (1997) argues that individuals with low rates of time preference will seek out firms that provide pension plans and then remain with the company until retirement in order to receive the deferred pension payments, while other workers who have a higher preference for current income will select employers who do not provide deferred compensation. Another study by Curme and Even (1995) finds that workers who have been denied credit are less likely to be covered by a pension plan, which supports the hypothesis that workers who discount the future greatly will avoid jobs with pensions because it is costly to borrow against pension savings. One additional benefit from using pension participation in the analysis is that, to the best of our knowledge, this is the first study to look at pension participation in an intergenerational setting. While, there is an emerging literature that examines the effects that peer or social networks have on participation in retirement plans (example.g., Duflo and Saez 2003), the potential role of the family has not been studied extensively.⁵

Our results indicate that having a parent who receives pension income at age 66–70 increases the probability of an adult child's having a pension by about 9%. The magnitude of the association is similar to that of estimates of intergenerational association in business ownership and real estate ownership. We further show that the effect of father's pension participation is not entirely due to parental resources. This finding of a positive effect net of parental resources is consistent with the dominating effect of decreasing cost of investment in future-oriented capital among parents with low rates of time preference.

The remainder of the paper is organized as follows. Section II presents the theoretical framework. Section III and IV discuss our empirical analysis. Section V discusses some applications of the results. Section VI concludes.

Model

In our model an altruistic parent influences her child's time preference by investing in future-oriented capital of the child. In the economy each agent lives for two periods as an adult. During the first period of adulthood a child is born to each agent, and the parent makes an investment into the future-oriented capital of the child, s , which determines the child's discount factor according the time preference production function, $\tilde{\beta}(s)$. The parent's second period of adulthood is a retirement period, so the parent must also choose a level of consumption (c_2) for this period during the first period. The child becomes an adult in period 2 and the cycle repeats. For simplicity we assume that each parent is altruistic and cares only about her child but does not care directly about her grandchild.

The parent's problem is to choose (a) how much to consume in each of two periods, c_1 and c_2 and (b) how much to invest in the future-oriented capital of the child. The parent solves

⁵One exception is a paper by Lusardi (2003) in which the effect of siblings on planning for retirement was examined.

$$\max_{c_1, c_2, s} \{u(c_1) + \beta \cdot u(c_2) + \gamma \cdot V(s)\}, \quad (1)$$

$$\text{subject to } c_1 + c_2 + \pi(\beta) \cdot s \leq A, \quad (2)$$

where $u(\cdot)$ is the instantaneous utility function and $V(s)$ is the child's value function resulting from the following maximization problem⁶:

$$V(s) = \max_{\tilde{c}_1, \tilde{c}_2} \{u(\tilde{c}_1) + \tilde{\beta}(s) \cdot u(\tilde{c}_2)\}, \quad (3)$$

$$\text{Subject to } \tilde{c}_1 + \tilde{c}_2 \leq \tilde{A} \quad (4)$$

where (c_1, c_2) is the consumption bundle chosen for each period of the parent's life and A is parental wealth; β is the parent's discount factor; γ is the altruism parameter.⁷ For simplicity we will assume that the interest rate and altruism parameter are equal to 1. Parameters with tilde denote corresponding child values.

The parent makes an investment in her child's stock of future-oriented capital, s by acquiring it at price " π ." The price is a function of the parental discount factor: $\pi = \pi(\beta)$. We assume that it is easier for more patient parents to teach their children to be patient and, therefore, $\pi'(\beta) < 0$.⁸ The future-oriented capital serves as the input in the time preference production function of the child, $\tilde{\beta}(s)$. The following conditions govern the partials of the $\tilde{\beta}(s)$ function: $\tilde{\beta}' > 0$ and $\tilde{\beta}'' < 0$.⁹

We start our analysis of the model (1)–(4) by noting that $V(s)$ is increasing and concave when the patience production function $\tilde{\beta}(s)$ is sufficiently concave (see Appendix for a proof). The fact that $V(s)$ is increasing and concave insures that a solution to the maximization problem (1)–(4) exists.

Assuming an interior solution, the first order conditions are

$$u'(c_1) = \beta u'(c_2) = \frac{V'(s)}{\pi(\beta)} \quad (5)$$

This is the standard requirement that the ratio of marginal utility to price for each "good" or element of the utility function must be equated for every element in the utility function.

Our main objective is to understand how the child discount factor $\tilde{\beta}$ changes in response to a change in the parental discount factor β . Given that higher levels of future-oriented capital,

s , make a child more patient and, thus, produce higher values of $\tilde{\beta}$, studying the sign of $\frac{d\tilde{\beta}}{d\beta}$ is

⁶Note that the problem (3)–(4) is the adult child's maximization problem from the point of view of a parent who cares only about her immediate offspring, but not about grandchildren and subsequent generations.

⁷While related, the terms "discount factor" and "discount rate" are not synonymous. The phrase "discount rate" or "rate of time preference" describes the parameter that is often compared to the market rate of interest. Hence the rate of time preference is the "d" term in the denominator of an expression such as $\beta \equiv 1/(1+d)$, while β is the discount factor.

⁸There also may be an inherited propensity to intertemporal choices. Studies of smoking have shown genetic patterns that predict who will smoke and who is unable to quit (Uhl et al. 2007)

⁹These assumptions make the return to investing in future-oriented capital positive, and they stipulate that the child discount factor rises at a decreasing rate in s . The assumptions are similar to those made by Becker and Mulligan (1997) in their model showing how an individual might shape her own preferences.

equivalent to studying the sign of $\frac{ds}{d\beta}$. In the model, the optimal amount of the future oriented capital s is affected by the parental discount factor β in two ways. First, when β increases, the marginal utility of second period consumption, c_2 , goes up, resulting in reduction of c_1 as well as s . Second, an increase in β leads to a decrease in the price $\pi(\beta)$ of the future-oriented capital, which should lead to an increase in s , provided that future-oriented capital is a normal good. The opposite effects of these forces on s is evident in the following expression (for derivation see Appendix):

$$\frac{ds}{d\beta} = \frac{u'(c_2) - \pi'(\beta) \cdot \left\{ s \cdot \beta \cdot u''(c_2) - \left[u''(c_1) + \beta \cdot u''(c_2) \right] \cdot \frac{V'(s)}{\pi^2 \cdot u''(c_2)} \right\}}{[u''(c_1) + \beta \cdot u''(c_2)] \cdot \frac{1}{\pi(\beta)} \cdot \frac{V''(s)}{u''(c_1)}} \quad (6)$$

The denominator in (6) is negative. The numerator is a sum of the positive term $u'(c_2)$ and the negative term $-\pi'(\beta) \cdot \{ \cdot \}$ ¹⁰. The relative magnitude of these two terms determines the sign of the derivative.

Consider a hypothetical case where $\pi'(\beta) = 0$, i.e. when the cost of the future-oriented capital is the same for all parents. Then the second term in the numerator is zero, and the derivative is negative. In this case when the parent's β rises, utility from the second period consumption is valued more highly, pushing the parent to want to substitute into c_2 and away from both c_1 and s . Since the price of s would remain unaffected ($\pi' = 0$), there would be no offsetting pressure to raise s .

Now consider the case of a strictly negative derivative, i.e., when $\pi'(\beta) < 0$. Now if β goes up, in addition to a rising marginal benefit of the second period consumption, there is a decrease in the marginal cost of the future-oriented capital. If the cost decreases strongly in response to a rise in the parental discount factor, the derivative (6) will be positive --- the situation when more patient parents have more patient children.¹¹

In practice, while the theory is suggestive of the possibility of a positive relationship between β and s , and provides guidance as to when this will obtain, with the two opposing channels of influence on s identified above the net effect of parental discount factor on the child's time preference is ambiguous. To test whether parental patience causes more or less patience in children we turn to empirical evidence.

Pension Participation and Time Preference

Since individual discount factors are inherently unobservable, we approximate time preference with pension participation. A link between pension participation and time preference has been noted by a number of studies (Curme and Even 1995; Ippolito 1997; Samwick 2000). Ippolito (1997) hypothesizes that more patient workers would more likely to accept pension-covered jobs and remain with the firm; while Samwick (2000) concludes

¹⁰ $-\pi'(\beta) \cdot \{ \cdot \}$ is negative because $\pi'(\beta) < 0$ and the expression in the brackets is also negative.

¹¹ It is important to note that a corner solution with the parent choosing zero investment in future-oriented capital of the child cannot be ruled out. This situation is possible, for example, when the relative price of future-oriented capital investment facing the parent is prohibitively high. In such scenario, the corner solution should disproportionately occur among parents with low patience since they are likely to have high π . Furthermore, at the lower end of the discount factor distribution we may observe that while β is increasing

the optimal investment in future-oriented capital remains zero, giving a range of β values over which $\frac{d\tilde{\beta}}{d\beta} = 0$. For the empirical strategy we employ, which is described in section four, the cases with corner solutions will bias the estimates of the intergenerational association in time preference toward zero.

that there is evidence to suggest that workers differ in their patience or rates of time preference, and that less patient workers are less willing to forego wages for pension contributions. A relationship between pension participation and time preference also can be seen using data from the 2004 Survey of Consumer Finances (SCF) covering households' planning horizons and their pension coverage.¹² The SCF asks respondents about the length of their planning horizons, and these data can be used to discern how much weight a respondent attaches to the future. As shown in Table 1, there is a positive association between having a pension and having a long planning horizon: a greater percentage of households with long time horizons have pensions than households with short horizons.¹³ Moreover, the effect of a long time horizon remains even after several covariates that affect pension-holding are controlled for (see Table 2). Having a long time horizon is associated with a 10 percent increase in a household's likelihood of having a pension, after factors such as education levels; union membership status, race, and marital status are taken into account.¹⁴

Intergenerational Analyses

In what follows we use data from the Panel Study of Income Dynamics (PSID), a nationally representative longitudinal household survey conducted by the Survey Research Center at the University of Michigan to analyze the intergenerational correlation in pension participation. The PSID, which began in 1968 with about 5000 families, tracks the original sample members and their children as they transition into adulthood and form their own families.

Every survey year, since 1999, information has been collected on the specifics of the pension participation decision¹⁵ for single household heads, and for both the husband and wife in married or cohabiting couples.¹⁶ The pension specifics, such as the plan type (defined benefit or defined contribution, employer matching and other features) are reported. These data also allow us to determine when households are dual pension holders – situations where both spouses participate – and when there is an absence of any pension--situations where neither husband and wife has a pension.

We focus on the pension plan participation decision of individuals approaching retirement. We use PSID data from the 2001 interview year. Our sample consists of heads and wives from the Baby Boomer generation, i.e. ages between 39 and 57 in 2001. We further restrict the sample to those who report working for money in 2000 and have non-missing values for the pension participation variables.

We use two pension participation measures. One pension indicator - WHETHER PENSION - is a binary variable constructed from a series of questions in the pension module. Baby Boomers who report working are asked the following question: "Next I need to get some information about any pension or retirement plan (you /HEAD) may be eligible for at (your/

¹²The question asked is, "In planning your saving and spending, which of the time periods listed is most important to you?" Response categories are (1) the next few months, (2) the next year, (3) the next few years, (4) the next 5–10 years, and (5) longer than 10 years. (This is variable x3008 in the dataset.).

¹³Here, having a long time horizon is defined as having a planning horizon that is at least five years long. We get similar results—qualitatively—when we define long horizon as including only those whose time horizons are in the SCF's 10 years or longer category.

¹⁴This analysis and the regressions are done using a sample of households with heads age 42–60 in 2004. This age restriction makes the age group comparable to the baby boom age group used in the next few sections of the paper.

¹⁵We use the phrase "pension participation decision" to indicate whether an individual participates in a pension plan. Pension coverage comes from either choosing to participate in a defined contribution (DC) plan, for companies whose coverage takes that form; or by selecting a job that comes with defined benefit (DB) coverage, for employers with this type of plan. Additionally, some individuals obtain coverage by choosing to establish an individual retirement account (IRA plan).

¹⁶By convention the PSID collects data on the head and the spouse for couples who are legally married, and for the two unmarried partners in the case of couples that are co-habiting but not legally married.

his) place of work. Not including Social Security or Railroad Retirement, (are you/is he) covered by a pension or retirement plan on (your/his) present job, at (NAME OF CMJ EMPLOYER)?” If a respondent does not participate currently in any pension plan he/she is asked additionally: “Will (you/he) be covered by such a plan if (you/he) continue to work for this employer?” Our WHETHER PENSION variable is equal to one if answer is “yes” to at least one of the above questions and zero if it is “no” to both of the questions.

The second pension measure that we use is whether the person participates in a defined benefit (DB) pension plan. Curme and Even (1995) suggest that a DB plan may be a good indicator of a low individual discount rate. They argue that since defined benefit plans generally offer less flexibility than a defined contribution plan (DC) in choosing the pension saving rate and less frequently allow workers to borrow against the accumulated balance, DB plans will be a greater deterrent to workers who have high rates of time preference (and low discount factors). Our WHETHER DEFINED BENEFIT PLAN indicator is equal to 1 if a respondent’s pension plan benefits are entirely or partially based on a defined formula that depends on years of service or/and salary. The WHETHER DEFINED BENEFIT PLAN variable is zero if a respondent’s pension plan benefits are based exclusively on the amount of money accumulated in the retirement account, defined contribution plan, or if a respondent does not participate in pension plan.

To confirm that the pension participation variables in our data are plausible indicators of discount factors, we test whether our pension variables are correlated with a more traditional proxy for time preference – smoking (Fuchs, 1982; Munasinghe and Sicherman, 2006). Table 3 reports the results for the sample of 2001 heads and wives with positive labor income¹⁷. The first two columns in the Table 3 show the results from a regression of the WHETHER PENSION variable on WHETHER SMOKE NOW (column1) and on WHETHER SMOKE NOW with additional demographic controls such as age, gender, race, years of education and marital status (column 2). Parallel results for the dependent variable WHETHER DEFINED BENEFIT PLAN are reported in columns 3–4. For both pension variables, the coefficient of smoking is statistically significant and negative indicating that those who smoke are less likely to participate not only in a DB pension plan but also in any pension plan. While the magnitude of the smoking estimates are reduced, the addition of demographic controls to the regressions does not change the inference, and estimates of smoking remain statistically significant.¹⁸ These results echo the findings reported in Table 1 portraying the relationship between time preference and pensions when planning time horizon was used to gauge time preference.

In the intergenerational context, the sample of Baby Boomers described above is a sample of “children” in our analysis. To investigate how the pension participation decision of this group is related to whether or not their parent has/had a pension, we augment the data set with information on fathers from the PSID. The percent of the Baby Boomers’ mothers who worked substantially is remarkably low – this was prior to the major upsurge in labor force participation of women. Accordingly, the parental information consists of summary variables constructed for fathers. Our measure of whether a father has/had a pension or not is constructed by observing fathers once they have reached retirement age (age 66–70), and

¹⁷Results in Table 3 are based on the entire unrestricted by age sample of working heads and wives.

¹⁸Some readers also may find the estimated effects of race and marital status to be of interest. Table 3 shows that being black raises a household’s probability of having a pension when other characteristics are controlled for. This is consistent with the job selection literature (see Chiteji et al. 2006 for example). Black families may be more likely to seek out “good” jobs when all other characteristics of the job are comparable. Accordingly, the racial disadvantage seen in other domains—in lower rates of bank account ownership or lower rates of stock market participation, for example—does not appear to be present for pension participation. For marital status, the positive and statistically significant effect found on pensions (using the DB measure) also is consistent with the existing literature. Empirical research shows that marriage is correlated with greater wealth, higher pension wealth, and greater family resources more generally (Wolff 2007; Keister 2000).

looking to see if they receive any pension income during this period.¹⁹ The father's pension indicator is 1 if, while being 66–70 years old, he ever reported receiving an income from a pension, annuity, or other retirement pay, and it is zero if the parent does not report any such income during the age interval.²⁰ Measuring pension income receipt by focusing on multiple years during the life points when the father would reasonably be expected to be retired and receiving pension income creates a better measure of pension participation than would pension income from a single year. By selecting our fathers' information using an age interval we obtain a better measure of parental participation in pension plans.²¹ We have 807 parent-child pairs with non-missing observations for the parental and child pension variables. Table 4 reports summary statistics for selected variables used in the analysis.

Estimation Strategy

To estimate the intergenerational association in pension ownership, we use the following linear probability model:

$$\Pr(P_{ij}^c=1) = \alpha + \rho P_i^f \quad (7)$$

where P_{ij}^c is a zero/one indicator of whether child j of father i participates in a pension plan; the binary variable P_i^f shows whether or not a parent reported income from a pension when he was between 66 and 70 years old. In this model ρ is the change in the probability of a child participating in a pension plan when the father receives a pension.

In our dataset a father can have more than one child; and therefore the assumption of independence among observations is violated. Pension outcomes for siblings coming from the same family and having the same father might possibly be correlated for reasons different from influence of parental time preference. The within family correlation presents a challenge for the proper estimation of the standard errors.

A simple way around the problem is to leave only one child observation for each father observation in the dataset and to discard observations for other children. Doing this, however, causes a loss of information contained in the discarded observations. To avoid the loss of information we follow another approach of using a statistical model that accounts for correlation in the data. One possibility is to apply the unobserved effect model and to model heterogeneity among households explicitly. This approach requires a restrictive distributional assumption about heterogeneity among households. However, since correlation among siblings resulting from sources different from similarity in time preference is not important for our analysis we use another modeling approach. Following Zeger et al. (1988) we employ population – averaged (PA) model, which treats within family correlation as a nuisance parameter. In the context of this model, the parameter ρ in (7) represents the average population response to change in P^f . To complete the PA model we specify the following correlation matrix for P_{ij}^c .

¹⁹Because the PSID did not ask workers whether they had pension coverage in early waves of the survey (prior to 1999), data on pension coverage for the father generation is inferred from actual receipt of pension income during retirement.

²⁰In the PSID receipt of pension income as a separate question has been asked since 1993. From 1984 to 1993 receipt of pension income was asked in combination with receipt of annuities and other retirement pay.

²¹The PSID family id mapping system (FIMS) software that makes it possible to construct age-comparable pension measures has obvious applications to other forms of intergenerational analysis. For example, when attempting to study the correlation between earnings of fathers and sons, it is important to have each father-son pair at a similar point in the lifecycle when one measures the incomes of the two different generations, but it is equally important to have life cycle point comparability within generations in order to measure the association correctly.

$$\text{corr}(P_{ij}^c, P_{i'j'}^c) = \begin{cases} 1 & \text{if } i=i' \text{ and } j=j' \\ \delta & \text{if } i=i' \text{ and } j \neq j' \\ 0 & \text{if } i \neq i' \end{cases} \quad (8)$$

For estimation of (7) – (8) we use SAS procedure based on the Generalized Estimating Equations (GEE) approach (Zeger et al. 1988). The estimates of parameters obtained with the GEE are multivariate weighted nonlinear least squares estimates that are consistent and asymptotically normal, even if the correlation matrix (8) is mis-specified.

Empirical Results

In this section we discuss our regression results. We start by presenting the base association between parental pension-holding and adult children's pension participation. This discussion is followed by discussion of the results of empirical analyses that control for parental socio-economic status and other factors.

The intergenerational association in pension-holding

We start by examining the percentage of adult children who have or do not have a pension, conditional on father's pension status. Using measure WHETHER PENSION, Table 5 shows an association in pension ownership across generations. The likelihood that a working individual between 39 and 57 years old in 2001 had a pension is about 70% if father had pension income and about 61% if a father did not have pension income. This association is statistically significant. The hypothesis that the probability of a child having a pension does not depend on father's pension ownership status is rejected by a chi-squared test statistic ($p=0.0104$).

We estimated (7)–(8) using both our measures of pension participation (separately): WHETHER PENSION and WHETHER DEFINED BENEFIT PLAN (see Table 6). In both cases the likelihood ratio test indicates that inclusion of father's pension indicator significantly improves model fit compared to the model with intercept only. The rate of adult child's pension plan participation with fathers not receiving a pension is approximately 61% (see Table 6, column 2). The rate increases by about 9% if the father has a pension. The estimate is statistically significant at 5% level. When the DB pension measure is used as the dependent variable, father's pension-holding produces a similar 10% increase on the predicted probability of child's participating in a pension plan (see Table 6, column 4).

To assess the magnitude of the estimate of the parental pension effect on child's pension participation, we compare it to the magnitudes of the corresponding estimates for other household assets, such as stocks, business, checking account, and other real estate ownership.²² For each type of asset we estimated the linear probability model (7) – (8). Based on the regression, Table 7 reports estimates of ρ indicating the change in probability of asset ownership when the father reports owning the same asset. The results show that although the estimate of the increase in probability of having a pension when one's father has a pension (0.089) is smaller compared to the estimates of the increase in probability of owning stocks when fathers own stock and the intergenerational association in checking account ownership, 0.293 and 0.319 correspondingly, it is very close to the estimates of the change in probability of business ownership associated with a father owning a business, 0.0892, and to that of the intergenerational association in other real estate ownership, 0.0967.

²²The other real estate variable does not include main home ownership.

Controlling for parental socioeconomic status and occupation

The positive association between parent and child pension participation found in the previous subsection is consistent with the scenario where parents with higher discount factors invest more in their children's future-oriented capital because it is less costly for them. This association, however, also might be a result of a third variable causing both parental and child patience. A strong candidate for the third variable influencing both parental and child time preference is parental socio-economics status. In the Becker-Mulligan (1997) model, for example, the father-child correlation in pension participation could result from the effect of wealth on time preference. Since richer parents have more resources to invest in own and child's future-oriented capital and wealth levels are correlated across generations, parents and children would end up with similar time preferences.

To investigate whether parental patience has an independent effect on child's patience beyond a parental resource effect we estimate the correlation in pension participation by controlling for parental economic status. In addition to the parental pension indicator, we added father's education and father's family income to the regression. The family income variable used is logarithm of average family income measured when the father is between 39 to 57 years of age.

Table 8 shows the results of regressions when each and both of the additional variables are added to the model (columns 2, 3 and 4 of the Table 8). For ease of comparison, in the first column, we also report the regression outcomes with no additional controls. When entered separately, both father's education and father's family income have significant positive effect on the predicted probability of child participation in a pension plan. The coefficient on the parent pension variable remains significant, however. When the income and education variables appear in the regression simultaneously, only the effect of father's education is significant (of the two parental SES measures).

As expected, the inclusion of controls for parental socioeconomic status in the model reduces the effect that parental pension participation has on child's pension participation; the coefficient estimate goes from 0.089 to 0.066. However, it still remains significant at 10% significance level.²³

While the above result suggests that a parent's having a pension has an effect on children's pension participation that is beyond the parental socio-economic status' effect, one could argue that the remaining correlation still may be a result of other factors omitted from the model that are correlated across generation and related to pension participation. An intergenerational association in occupation, for example, is potentially of concern. If people in certain occupations are more likely to participate in pension programs because of greater availability of the programs in those occupations, and if children tend to follow parents' footsteps in choosing occupations, a positive association in pension participation across generations would be observed. Such criticism, however, is valid only if occupational choice itself is not a function of time preference. Some evidence suggests that people who are less future oriented might prefer jobs with more immediate reward but lower growth rate. For example, Munasinghe and Sicherman (2006) find that smokers are less likely to invest in human capital and, therefore, have lower earning profiles; and that smoking is widespread among dancers. If time preference is important for occupational choice and is correlated among generations, occupational controls in the regression actually would pick up some of the time preference effect.

²³The weak significance is due in part to rather small sample size of 800. For comparison, the only other significant variable in the regression is father's education which is similarly significant at 10% level.

We probed further to see how the results would fare if controls for occupation and industry are included in the model. We used two dummy variables that indicate low/high prevalence of pension programs at father's occupation and industry. To construct these variables, we estimated the frequency of reports of pension receipt for each of the 15 industry and 12 occupational groups in the PSID.²⁴ Then for each respondent, the HIGH PENSION OCCUPATION variable is 0 if the frequency of reports of pension in the father's occupation is less than 50 percent, and it is 1 otherwise. A similar procedure is followed to obtain the HIGH PENSION INDUSTRY variable.²⁵ Table 8 column 5 reports the results. Both HIGH PENSION OCCUPATION/INDUSTRY dummies are not significant; but their addition makes the estimate of the father's pension variable stronger than in the previous specification. This rather surprising result may possibly be explained by the fact that if intergenerational pension correlation is due to intergenerational time preference correlation, and occupational choice is also determined in part by time preference, then the new controls are adding little if any to the explanatory power of the model can make the estimates less stable.

To summarize, the intergenerational pension correlation remains statistically significant after controlling for father's income, education, occupation/industry indicators of the degree of pension prevalence. In addition, the positive sign of the association is evidence in favor of the dominating effect of decreasing cost of investment in future-oriented capital among parents with low time preference rates.

Some Potential Applications of the Analysis

Heterogeneity in time preference can help explain the heterogeneity in savings that is observed in the United States. Empirical studies reveal that there are considerable differences in wealth levels both within income groups and within age groups; and, especially interesting, among well-to-do households and among households that are near retirement (Finke et al. 2006; Juster et al. 1999; Lusardi 2003; Ulker 2009). This suggests that the ability to make one's children future-oriented can have important implications for how they will fare relative to others during adulthood. Understanding how parents make decisions to raise their children's stock of future-oriented capital then becomes important for researchers who are interested in understanding social inequality. Moreover, the model and the empirical results presented in this paper help one to understand processes that occur within the family that have the potential to affect a wide range of saving behaviors, including saving for retirement, and observed differences in asset ownership across the population such as those documented for bank accounts (Hogarth et al. 2005). They also may explain observed differences in end-of-life planning, such as those documented in Su (2008).

As noted in the introduction, other empirical research indicates that there is correlation in wealth levels across generations (Charles and Hurst 2003). About 65% of this correlation can be explained by income and human capital differences, along with gifts, expected bequests and similarities in portfolio composition. However, in their study using attitudes toward risk to characterize preferences, Charles and Hurst (2003) find that risk tolerance does little to account for the 35% that remains unexplained. Our research suggests that the missing element may be differences in attitudes toward the future. Such differences may explain the residual portion of the parent-child wealth association. Indeed, in research

²⁴For each individual occupation and industry were assigned based on the most frequently reported occupation and industry.

²⁵In our dataset four occupation groups, such as laborers, farmers/farm laborers, service workers and private household workers, and five industries, such as agriculture, construction, trade, business/repair service and entertainment, have less than 50 percent chance of pension receipt being reported.

mentioned earlier in this paper, Knowles and Postlewaite (2005) argue that parental attitudes can explain a third of the variation in household saving rates that exists after controlling for income and other demographics. Our research shows how these attitudes might be transmitted within the family and how they therefore might come to matter for adult children.

Does our work on time preference have implications for any other social issues? Grafova (2007) notes that time preference rates may affect both debt and health behaviors, presenting a challenge for researchers who seek to examine the causal relationship between health and debt. If it is important to understand time preference in order to understand health behaviors, health researchers may be another group that stands to benefit from analyses of the role of the family in shaping time preference. Finke and Huston's (2003) research on the relationship between time preference and the probability of choosing a risky diet underscores this notion that understanding time preference better may help researchers who seek to understand how and why particular health behaviors are adopted. Accordingly, our findings potentially have applications for health research, particularly health research aimed at analyzing intergenerational associations in health outcomes.

Our research also allows us to think about several existing policies and programs in a new way. In recent years a number of policies and programs have been introduced to promote asset accumulation and financial literacy among the poor in the United States.²⁶ Our research suggests that these programs may have benefits for the next generation, not just the adults that they are designed to help. By making more adults asset owners, the programs that focus on asset building may inadvertently create opportunities for more parents to show their children the return to saving, i.e., to teach their offspring about the value of patience. Similarly, financial literacy programs may impart noncognitive skills that parents can pass on to the next generation if the programs emphasize the importance of adopting a long time horizon and planning for the future. This means that policymakers who want to assist low-patience parents may not need new programs to accomplish this objective.

Conclusion

This paper presents a theoretical model of preference formation in an intergenerational context. Altruistic parents affect their children's rate of time preference by investing in future-oriented capital which serves as an input in the production of children's time preference. Our model identifies a dual role of parental discounting in shaping children's time preference. While future-oriented parents may want to invest less in their children in order to allocate more for their own future consumption, they are also likely to invest more since the price of such investment is lower for them than for parents with high rates of time preference and low discount factors.

Empirical analysis using pension participation as a proxy for time preference reveals a) that there is a positive association between father and child pension participation decisions, b) that the magnitude of the association is similar to magnitudes of estimates for intergenerational correlation in other financial domains, such as business ownership and real estate ownership, and c) the parent-child association in pension-holding cannot be fully explained by the effect of parental socio-economic status or parental occupational choice. To the extent that pension participation reflects time preference and based on our theoretical model, the observed data pattern is consistent with the dominating effect of a lower price of investment in future-oriented capital among parents with higher degree of patience.

²⁶See McKernan and Sherraden (2008) and Sanders and Porterfield (2010) for example. Additionally, see Fry et al. (2008) for discussion of similar programs outside the United States.

Our research has implications for research on the family, as it discusses a previously understudied linkage between the family and economic outcomes. It also has implications for public policies directed at the reduction of economic inequities. Influencing children's time preference in a direct way, for example, developing and teaching skills to delay gratification and to do planning, and reducing the cost of producing future-oriented capital at home can be potentially effective policy tools in reducing economic disparities. This research also may have implications for outcomes in other domains, such as health outcomes like smoking.

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APPENDIX

Conditions for Concavity of the Value Function

$V(s)$ is the value function resulting from maximization of child's utility:

$$\text{Max } U(\tilde{c}_1, \tilde{c}_2, s) = u(\tilde{c}_1) + \tilde{\beta}(s) \cdot u(\tilde{c}_2) \quad \text{subject to } \tilde{c}_1 + \tilde{c}_2 \leq \tilde{A}$$

Let $(\tilde{c}_1^*(s), \tilde{c}_2^*(s))$ be the solution.

By the envelope theorem,

$$\frac{dV}{ds}(s) = \tilde{\beta}'(s) \cdot u(\tilde{c}_2^*(s)) > 0$$

The second derivative:

$$\frac{d^2V}{ds^2}(s) = \tilde{\beta}''(s) \cdot u(\tilde{c}_2^*(s)) + \tilde{\beta}'(s) \cdot u'(\tilde{c}_2^*(s)) \cdot \tilde{c}_2^{*'}(s)$$

The first term in the above expression is negative, and the second term is positive. So for the value function to be concave the following condition must hold

$$-\tilde{\beta}''(s) \cdot u(\tilde{c}_2^*(s)) \geq \tilde{\beta}'(s) \cdot u'(\tilde{c}_2^*(s)) \cdot \tilde{c}_2^{*'}(s)$$

i.e. $\tilde{\beta}(s)$ should be sufficiently concave.

Derivation of Equation (5)

First order conditions for problem (1)–(2) are

$$\begin{aligned}
 (i) \quad & u'(c_1) - \beta \cdot u'(c_2) = 0 & (ii) \quad & u'(c_1) - \frac{V'(s)}{\pi(\beta)} = 0 \\
 (iii) \quad & A - c_1 - c_2 - \pi(\beta) \cdot s = 0
 \end{aligned}$$

We totally differentiate the three equations with respect to the endogenous variables c_1, c_2, s and the exogenous parameter β :

$$\begin{aligned}
 u''(c_1)dc_1 - \beta \cdot u''(c_2)dc_2 - u'(c_2)d\beta &= 0 \\
 u''(c_1)dc_1 - \frac{V''(s)}{\pi(\beta)}ds - \frac{\pi'(\beta)V'(s)}{\pi^2(\beta)}d\beta &= 0 \\
 dc_1 + dc_2 + \pi(\beta)ds + s \cdot \pi'(\beta)d\beta &= 0
 \end{aligned}$$

Then solving this system of equations for $ds/d\beta$ we get (5)

Table 1

Pensions and households' time horizons

	% with Pension	% No pension
Long time horizon (5 years or longer)	74.14	25.59
Short horizon	57.15	42.85
All households regardless of time horizon	65.48	34.52

Notes:

1. Authors' calculation using the 2004 Survey of Consumer Finances (SCF).
2. All data are weighted using the SCF's weight variable.

Table 2

Marginal effects with standard errors in parenthesis: The effect of a long time horizon on having a pension

	Model 1	Model 2
Long time horizon (5 years or longer)	.173 *** (.009)	.103 *** (.010)
Age		.004 *** (.001)
Non-white		-.082 *** (.012)
Years of schooling		.041 *** (.002)
Married		.131 *** (.011)
Union membership		.254 *** (.009)

Notes:

1. Authors' analysis using the 2004 Survey of Consumer Finances (SCF).
2. Results are from Probit regressions and use the SCF weight variable.
3. Sample is households with head age 42–60 in 2004

[†]
 p < 0.1,

^{*}
 p < 0.05,

^{**}
 p < 0.01,

^{***}
 p < 0.001

Table 3
Association between pension participation and smoking

(Linear probability model)

	Dep var: WHETHER PENSION		Dep var: WHETHER DEFINED BENEFIT	
	Model 1	Model 2	Model 1	Model 2
Intercept	0.632 (0.007) ***	0.233 (0.042) ***	0.335 (0.007) ***	-0.221 (0.042) ***
Whether smoke now (0/1)	-0.067 (0.015) ***	-0.040 (0.016) *	-0.090 (0.015) ***	-0.048 (0.016) **
Age		-0.003 (0.001) ***		0.002 (0.001) **
Male (0/1)		0.066 (0.012) ***		0.043 (0.012) ***
Black (0/1)		0.137 (0.021) ***		0.132 (0.021) ***
Years of education		0.035 (0.002) ***		0.032 (0.002) ***
Married (0/1)		-0.005 (0.014)		0.032 (0.014) *
Summary statistics				
N:	6457	6142	5955	5665
R-squared:	0.003	0.052	0.006	0.044

Notes:

1. Authors' analysis of data from the Panel Study of Income Dynamics (PSID).
2. Sample consists of 2001 heads and wives who report working for money in 2000.
3. Sampling weights were used in calculations.

[†] p < 0.1,

* p < 0.05,

** p < 0.01,

*** p < 0.001

Table 4

Summary statistics for selected variables

Variable	N	Mean	Std	Min	Max
Whether pension now or later(0/1)	807	0.67	1.91	0.0	1.0
Whether defined benefit pension (0/1)	762	0.38	1.98	0.0	1.0
Father has pension (0/1)	807	0.71	1.83	0.0	1.0
Age	807	45.9	17.39	39.0	57.0
Male (0/1)	807	0.5	2.03	0.0	1.0
White (0/1)	804	0.91	1.15	0.0	1.0
Black (0/1)	804	0.07	1.05	0.0	1.0
Married (0/1)	807	0.66	1.92	0.0	1.0
Years of education	780	14.08	8.77	6.0	17.0
Whether smoke now (0/1)	807	0.19	1.6	0.0	1.0
Owens stocks (0/1)	807	0.39	1.98	0.0	1.0
Owens other real estate(0/1)	807	0.17	1.53	0.0	1.0
Owens checking account (0/1)	807	0.88	1.32	0.0	1.0
Owens business (0/1)	807	0.15	1.46	0.0	1.0
Father owns stocks (0/1)	807	0.67	1.9	0.0	1.0
Father owns other real estate (0/1)	807	0.53	2.02	0.0	1.0
Father owns checking account (0/1)	807	0.98	0.58	0	1
Father owns business (0/1)	807	0.29	1.84	0	1
Father: log(mean(inc))	801	11.25	2.02	9.21	13.08
Father's years of education	807	12.64	12.75	0	17
Father: High pension occupation category (0/1)	703	0.85	1.46	0	1
Father: High pension industry category (0/1)	703	0.71	1.87	0	1

Notes:

1. Authors' analysis of PSID data.
2. Sample consists of heads and wives who are between 39 and 57 years old in 2001, report working for money in 2000 and have non-missing values for own pension variables and parental pension indicator.
3. Father's income is measured when the father is 37–59 years old.

4. Sampling weights were used in calculations.

Table 5

Percent distributions of child having a pension plan conditional on whether or not father has/had a pension

	Father has a pension	Father does not have a pension
Child participates in a pension plan	69.57	60.69
Child does not participate in a pension plan	30.43	39.31

Notes:

1. Authors' analysis of PSID data.
2. Total number of child-father pairs is 806.
3. Child information is based on data from the 2001 wave of the PSID. Sample consists of heads and wives who are between 39 and 57 years old and report working for money in 2000.
4. Father's pension is a summary variable that is equal to 1 if a father was in the PSID as a head aged 66 and 70 and ever reported receiving pension, annuity or other retirement pay during this period.

* Chi-Squared test statistic is 6.5656 with 1 degree of freedom which is significant at 5% level.

Table 6
Association between parent and child pension participation

(Linear probability model)

	Dep var: WHETHER PENSION		Dep var: WHETHER DEFINED BENEFIT	
	Estimate	Std. Err	Estimate	Std. Err
Intercept	0.609 ***	0.030	0.328 ***	0.032
Father has pension (0/1)	0.086 *	0.037	0.094 *	0.04
Summary statistics:				
N:	806		761	
Chisq:	6.502		6.767	
DF:	1		1	
P-value(chisq):	0.01		0.009	

Notes:

1. Authors' analysis of PSID data.
2. Sample consists of heads and wives who are between 39 and 57 years old in 2001, report working for money in 2000 and have non-missing values for own pension variables and parental pension indicator.
3. Standard errors are robust to within-family correlation.

[†] p < 0.1,

* p < 0.05,

** p < 0.01,

*** p < 0.001

Table 7
Intergenerational association of other household portfolio assets

(Linear probability model)

Dependent variable	Independent variable	Estimate	Std. Err	N
Child owns business (0/1)	Father owns business (0/1)	0.0892 **	0.03	1191
Child owns stocks (0/1)	Father owns stocks (0/1)	0.2929 ***	0.03	1191
Child owns checking account (0/1)	Father owns checking account (0/1)	0.3185 ***	0.06	1191
Child owns other real estate (0/1)	Father owns other real estate(0/1)	0.0957 ***	0.02	1191

Notes:

1. Authors' analysis of PSID data.
2. Sample consists of heads and wives who are between 39 and 57 years old in 2001 and report working for money in 2000.
3. Standard errors are robust to within-family correlation.

[†] p < 0.1,

* p < 0.05,

** p < 0.01,

*** p < 0.001

Table 8
Association between parent and child pension participation with controls for parental socioeconomic status included
(Linear probability model; dependent variable is WHETHER PENSION)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	0.607 (0.03) ***	0.008 (0.36)	0.485 (0.06) ***	0.419 (0.44)	0.967 (0.48) *
Father has pension (0/1)	0.089 (0.04) *	0.074 (0.04) †	0.063 (0.04) †	0.066 (0.04) †	0.085 (0.04) *
Father: log(mean(inc))		0.055 (0.03) †		0.006 (0.04)	-0.041 (0.05)
Father's years of education			0.012 (0.01)	0.012 (0.01)	0.015 (0.01) *
Father: High pension occupation category (0/1)					-0.082 (0.05)
Father: High pension industry category (0/1)					0.004 (0.04)
N:	806	800	806	800	700
Chisq:	6.592	10.693	13.65	14.725	13.01
DF:	1	2	2	3	5
Pvalue(chisq):	0.010	0.005	0.001	0.002	0.023

Notes:

1. Authors' analysis of PSID data.
2. Sample consists of heads and wives who are between 39 and 57 years old in 2001 and report working for money in 2000.
3. Father's income is measured when the father is 37–59 years old.
4. Standard errors are robust to within-family correlation.

† $p < 0.1$,
 * $p < 0.05$,
 ** $p < 0.01$,
 *** $p < 0.001$