The Manipulation of Children's Preferences, Old Age Support, and Investment in Children's Human Capital*

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Abstract

We consider the link between parents' influence over the preferences of children, parental investments in children's human capital, and children's support of elderly parents. It may pay for parents to spend resources to "manipulate" children's preferences in order to induce them to support their parents in old age. Since parents invest more in children when they expect greater support, manipulation of child preferences may end up helping children and parents. A new result, that we call the "Rotten Parent Theorem," demonstrates that if children are altruistic, then even selfish parents will make the optimal investment in kids' human capital.

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1. Introduction

Throughout history most elderly parents received support from their children, either by having their children move in to live with them, or by living with one of their children—usually the eldest son. During past centuries, relatively few families did the opposite, where, instead of receiving support, parents left bequests of land or other assets to their children. For example, Table 1 shows that in 19th and early 20th century France, the vast majority of parents left negligible bequests. Even in modern times the same table shows that more than 30% of American parents and 40% of French parents leave either no bequest or a negligible amount.

Government-financed social security pension benefits provide elderly parents with incomes and thereby reduce their need to rely on children for support. Yet, social security benefits are still mainly concentrated in rich countries. As Table 2 shows, about 60% of the world's elderly population receives no old-age pension. This fraction is over 80% in Sub-Saharan Africa and about 70% in Asia and the Pacific. To maintain a decent standard of living, many elderly parents either have to save enough or rely on their children.

In countries with social security systems, many middle-class and even poorer elderly parents have sufficient income between social security benefits and their own savings so that they do not rely much on help from their children. Table 3 shows that in the United States and various European nations, less than 30% of children help out their elderly parents either through monetary transfers or by helping to care for them. However, the same table shows that the fraction of children helping out elderly parents exceeds 60% in many poorer countries, including India and China. Even in Singapore more than 80% of all elderly parents report that they receive help from their children.

This paper is divided into four basic parts. The first part, in Section 2, sets out an analysis of investments by altruistic parents in the human capital of selfish children. Perhaps unfamiliar is the incorporation of old age into the analysis, which links parental bequests and the amount invested in children. We show that elderly parents do not leave bequests to their children when they prefer greater consumption at old age to giving bequests. Parents who do not leave bequests underinvest in the human capital of their children.

The second part of the paper, in Sections 3 and 4, expands the basic analysis in a novel way by incorporating parental influences over the preferences of children. This analysis recognizes that parents have the greatest influence over the preference formation of their children during childhood. Section 3 shows that parents may also want to affect their children's preferences so that the children will help out their elderly parents if the parents need help. Even altruistic parents might be willing to manipulate children's preferences in ways that lower the utility of children if elderly parents are made sufficiently better off.

Manipulating young children's preferences so that they will care more about the welfare of their parents may be a crucial commitment device between parents and children. Since enforceable contracts that require young children to agree to help out their elderly parents are not possible, parents may need to induce help from their children, especially when they are not rich or do not receive social security benefits from the government.

The third part of the analysis deals with the interaction between children's support of elderly parents and the amount middle-aged parents invest in the human capital of children. Section 3 shows that the amount invested in children depends on whether children are expected to help out their elderly parents. Younger parents invest more in their children's human capital if they expect children to support them when they are elderly. As a result, children as well as parents may benefit when parents manipulate the preferences of children to make them willing to help out their parents when needed.

This possible mutually beneficial consequence of parental investment in children's human capital becomes clear in Section 6, where children are assumed to be altruistic toward their parents—perhaps because the parents induced the altruism—while parents might be completely selfish. A new result, the "Rotten Parent Theorem," shows that if children are altruistic toward their parents, then even selfish parents will make the optimal investment in their kids' human capital. Parents will be more than compensated for these investments because their kids will repay them with sufficiently large support when the parents are old.

Evolutionary forces are usually taken to imply that parents are more altruistic toward their children than vice versa. Our theory is nevertheless consistent with an evolutionary interpretation, as children may be altruistic toward parents precisely because this altruism may induce the latter to make sufficiently greater investments in children and thereby raise their genetic fitness.

The fourth part of the analysis covers a couple of other implications. Support from children is especially valuable when elderly parents experience large shocks to their health, life expectancy, and return on their assets. In Section 7, we show that the gain from manipulating children's preferences depends on whether support from children is greater when elderly parents need the support the most. This section shows that the various risks faced by elderly parents may add significantly to the value of having children, especially when parents do not have good access to health insurance or government benefits. We also show that support from children lowers their net cost, which in turn induces parents to have more children. The fact that support from children is particularly valuable when social security systems are absent, as in many poor countries, helps explain why families traditionally have had many children.

2. Savings for Old Age, Bequests, and Human Capital Investments in Children

This section presents a model of parental saving, bequests, and investments in the human capital of children in which parents cannot alter children's preferences. Assume three periods of life: childhood, middle age, and old age. There is no uncertainty (until Section 7), so that everyone lives in good health for all three periods and dies at the end of old age. Adults have children at the beginning of middle age, which means that parents and children overlap when children are young and parents are middle-aged, and also when children are middle-aged and parents are old (cf. Figure 1). Adults only work when they are middle-aged, so that they have to plan ahead for their consumption in old age when they have no earnings.

During middle age, individuals may also receive bequests from their parents who die. They spend their earnings and any bequests on their own consumption, saving for old-age consumption, investing in the human capital of their children, and possibly also on saving to leave bequests to their children. The investment by middle-aged parents in the human capital of their children is the only source of the children's earnings when they become middle-aged. We model this investment in a simple fashion, but the main results hold more generally.

The preferences of young adults are assumed to depend not only on their consumption at middle and old age, but also on a measure of the "utility" they get from their children. A simple formulation is

$$V(I_p) = u(C_m) + \beta u(C_o) + \beta a U_c(I_c), \tag{1}$$

where we assume $u' > 0$, $u'' < 0$, $U_c' > 0$ and $U_c'' < 0$. The function V gives the utility of the parents, I_p and I_c are the total resources of parents and children, C_m and C_o denote the consumption of parents at middle and old age, β is the discount factor on future utility, a is the degree of altruism toward children, and U_c gives the "utility" of children.[1] The altruism coefficient, a, is zero for the selfish parents considered in Section 6. Parents maximize their utility, subject to various investments and consumption constraints, given their resources I_p.

Parental resources equal the sum of their earnings at middle age, E, and the bequests they receive from their parents, b_p. We model earnings in a simple way by assuming earnings equal the income earned on human capital H, as in

$$E = rH = rF(y, X), \tag{2}$$

[1] U_c may but need not equal V. By allowing the children's utility function to differ from that of their parents, we account for possible biases in the perception of children's utility by parents or for a change in preferences over time. All we require for the following results to go through is that U_c and V are twice continuously differentiable and concave.

where r is the market-determined rental price on a unit of human capital, and F is the production function for human capital that depends on the money parents spend on investing in children (y) and other determinants of the human capital of children (X), such as children's abilities, and parental human capital. We assume $F_y > 0$, $F_{yy} < 0$, and F_y is very large when y is small.

Basically, these assumptions mean that small investments yield very high returns and that there are diminishing returns from increasing the resources invested in children with fixed brains and fixed other genetic characteristics. Diminishing returns may not hold in all regions of F, but we assume they hold in the relevant regions because it becomes more and more difficult to continue to add knowledge and information to children through increased spending on their human capital acquisition. The Inada condition that F_y gets large as y gets small has the important implication that all but completely selfish parents invest at least a little in their children.

Since earnings during middle age are given by equation (2), it follows that $\frac{\partial E}{\partial y} = R_y = rF_y$ and $\frac{\partial R_y}{\partial y} = rF_{yy} < 0$. If for the present we assume that children do not help out their elderly parents, the budget constraint of parents at middle age is $C_m + y + k = I_p = E_p + b_p$, where k is the saving of middle-age adults, y and k are assumed to be in the same units as C, and b_p is the bequests, if any, that parents receive from their parents. An important assumption is that parents cannot leave debt to their children, so that $b_p \geq 0$.

Parental consumption at old age is determined from the budget constraint

$$C_o + b_c = R_k k, \tag{3}$$

where R_k denotes the rate of return on k, and $b_c \geq 0$ is the bequests left to children. We assume that R_k is given to each parent, since it is determined in a competitive market. Special cases would include the situation, as in some poorer nations, where there is no good asset that can be accumulated to provide old-age consumption. In that case $R_k \leq 1$, or even zero.

Substituting equation (3) for k into the middle-age budget equation and assuming $R_k \neq 0$, we get the lifetime budget constraint

$$C_m + \frac{C_o}{R_k} + y + \frac{b_c}{R_k} = I_p. \tag{4}$$

Parents choose the C's, y, k, and b_c to maximize V, subject to the budget constraint in equation (4), the production function of human capital, and the determination of earnings in equation (2). We do not (yet) impose a steady state. That is, parents' choices of how

much to consume and to invest in their children may differ from those of their own parents (see Section 4 and Appendix B for a discussion of steady state behavior). The first order conditions (FOC) for C_m and C_o are the usual ones for optimal consumption over the lifecycle:

$$u'_m = \mu \quad \text{and} \quad \beta u'_o = \frac{\mu}{R_k}. \tag{5}$$

The FOC for y is

$$\beta a U'_c R_y = \mu = u'_m = \beta R_k u'_o. \tag{6}$$

As long as parents have some degree of altruism toward their children, $a > 0$, they invest positive amounts in the children's human capital, since the marginal rate of return on these investments is very high for small investments.[2]

The FOC for b_c is an inequality because of the assumption that $b_c \geq 0$:

$$\beta a U'_c \leq \frac{\mu}{R_k}, \tag{7}$$

where $<$ implies $b_c = 0$. By using the FOC in equation (5), we can write the FOC for bequests to children as $aU'_c \leq u_o$, with $<$ implying $b_c = 0$. The interpretation of this condition is straightforward. Parents do not want to leave bequests to their children if the marginal utility of consumption to parents at old age exceeds the utility that they get from the increase in their children's utility from a small bequest to them. Under these conditions, parents would like to leave negative bequests—that is debt—to their children, but they are unable to do this. Clearly, parents will not leave bequests if the degree of altruism, a, is very small, or if the marginal utility of consumption at old age is high because they have not accumulated many assets to consume in old age.

The FOCs for investments in the human capital of children and for bequests to children together imply an important relation between the equilibrium marginal rate of return on investment in children's human capital and the rate of return on capital. Substituting the FOC for bequests into equation (6) gives

$$\frac{R_y}{R_k} = \frac{u'_o}{aU_c} \geq 1, \tag{8}$$

with $>$ implying $R_y > R_k$, and $b_c = 0$. If $b_c > 0$, however, then $R_y = R_k$. Stated in words, parents only leave bequests to their children when the marginal rate of return on investing in

[2]The analysis in this paper relies in large part on first order conditions. Due to concavity of the utility and production functions, first order conditions will, unless otherwise noted, be necessary and sufficient.

the children's human capital equals the market return on capital. For as long as the marginal return on human capital investments exceeds the return on capital, both parents and children are better off if parents put all their "bequests" to children in the form of human capital investments in children and none in the form of other capital. In particular, if capital markets are very limited, so that R_k is very small, parents will only invest in the human capital of their children and will not leave any bequests.

Bequests are zero, however, when the marginal utility parents get from their own consumption is at least as large as the marginal utility they get from children's consumption. Parents then do not want to increase their investments in children any further because their own consumption gives them greater utility than they get from further investments in children. This is why the marginal return they get from investments in the human capital of children does not fall to equate the marginal return they get from investing in market capital, i.e. $R_y > R_k$.

Parents are more likely to be at the point where $b_c = 0$ and $R_y > R_k$ when they are less altruistic to children—the coefficient a is smaller. They are also more likely to be there when parental income is lower, since lower-income parents reduce not only their own consumption but also that of their children by investing less in the children. The first statement follows from the middle part of equation (8) decreasing in a. To see the second statement note that equation (6) implies that lower income parents spend less on y, which raises R_y, and hence the LHS of equation (8). In other words, this analysis explains why bequests are concentrated among high-income families (see Table 4) and why investments in the human capital of children are lower among low-income families.

We have not discussed other determinants of the production of human capital beyond parental investments. Considerable evidence suggests that production of human capital also depends on the abilities of children and the human capital of their parents. Both theory and evidence indicate that abilities of children and parental human capital are higher for parents with greater incomes. This implies that high-income families have to invest possibly a lot more in the human capital of their children than low-income families before the marginal rate of return on these investments equals the return on market capital. It is possible then that high-income families would be the ones leaving zero bequests to their children because investments in their children's human capital are so productive.

This is where the evidence on actual bequests becomes important. Since in all countries bequests are concentrated among high-income families (see some evidence in Table 4), this analysis then implies that marginal rates of return on human capital investments in children must equal the return on other assets for high-income families. However, the essentially zero bequests among many middle-income and virtually all lower-income families indicate that

marginal returns on human capital invested in children for these families are higher than returns on other assets, perhaps because their returns on other assets are much lower than the returns to higher-income families.

3. Efficient Investment in Children and Parental Influence Over Child Preferences

Investments in human capital are not efficient as long as the equilibrium value of R_y is greater than R_k. Both parents and children would be better off if children could borrow in the capital market to finance additional investments in their own human capital until $R_y = R_k$. However, there are serious limits on the ability of young children to borrow, including legal prohibitions, partly because they could be taken advantage of, and also because the future human capital of the children is very poor collateral for loans.

To insure that they consume enough at old age and invest enough in children, many parents would like to contract debt that would be the obligation of children. In effect, these parents would like to leave negative bequests to their children. Although throughout much of history children were responsible for the debts left by their deceased parents, they are no longer legally responsible in essentially all countries. When parents cannot leave debt to their children to help finance old-age consumption, they either have to save enough, including pension and social security benefits, or they have to count on enough support from their children. How can parents become confident that their children will help them out when they become old if children cannot make a binding commitment to help?

One way to insure support is for parents to influence the preferences of children during child-rearing ages, so that adult children are made to be concerned about their elderly parents, and would help out if parents needed help. It is natural to consider the influence of parents over the formation of child preferences, since preferences are most influenced when children are young, and parents have the greatest influence over young children (see various papers by Heckman and coauthors, such as Heckman 2008). Economists gave little attention to the formation of preferences until rather recently, but a growing number of studies are now considering this issue (see, e.g., Becker 1996, Guttman 2001, and Bronnenberg et al. 2012). The analysis that follows in this and subsequent sections is a development and sizable extension of the analysis sketched out in Becker (1993). Also note that some evolutionary biologists consider the manipulation of child preferences by parents. For example, Trivers (2011, p. 81) argues that "parents are selected to mold their offspring into being better people (more altruistic, less selfish) than they are inclined to act on their own."

The challenge for any analysis of the influence of parents over children's preferences is that it is generally costly for parents to affect these preferences. It may take time, effort, and money for parents to hard wire into young children feelings of altruism, guilt, reciprocity,

or other attitudes toward their parents in order to make adult children willing to help out parents if they need help. Moreover, since most parents are concerned about the well-being of their children, they would take into account whether their influence over children's preferences raises or lowers the children's utility.

Throughout this paper we use the language of parents "shifting" child preferences. An alternative language is that parents change the levels of variables entering given child preferences. No matters of substance are involved, and using the phrases "shifting," "manipulating," or helping to "form" preferences conveys more clearly what parents are doing.

To model parental influences over child preferences in a simple fashion, assume that parents spend resources, z_c, to influence these preferences.[3] Parents can create altruism, guilt, feelings of reciprocity, or other attitudes that induce children to help out their parents when they are elderly. Parents might create altruism of children, a_p, by spending z_c through the function $a_p(z_c)$, with $\frac{da_p}{dz_c} > 0$. Altruistic children become willing to support parents, where $s_c(a_p, W)$ is the support given to elderly parents as a function of the children's degree of altruism, with $\frac{ds_c}{da_p} > 0$, and where W are other determinants of child support. The utility function of children would then become

$$U_c = U_c(I_c - s_c, a_p). \tag{9}$$

By substitution we can write s_c as a function of z_c, i.e. $s_c(z_c)$, with $\frac{ds_c}{dz_c} = \frac{ds_c}{da_p}\frac{da_p}{dz_c} > 0$. (See Appendix A for a micro-model justifying this assumption.)

To altruistic parents, expenditures that raise a_p directly lower parental utility if teaching children to be altruistic works through inducing "guilt," which lowers children's utility, whereas greater a_p raises parental utility if a_p represents "caring" that raises children's utility. For instance, parents might teach children to be altruistic by spending extra time with them, which would not only increase s_c but also have a direct positive effect on U_c. To simplify, however, we will mainly ignore the intermediate good a_p and assume that z_c affects children only by inducing them to increase support of their parents, and that this lowers children's utility. That is, we assume

$$U_c = U_c(I_c - s_c), \quad \text{with} \quad \frac{dU_c}{dz_c} = \frac{\partial U_c}{\partial s_c}\frac{ds_c}{dz_c} = -\frac{\partial U_c}{\partial I_c'}\frac{ds_c}{dz_c} < 0, \tag{10}$$

where $I_c' = I_c - s_c$.

Parents who do not want to leave bequests may try to influence children's preferences

[3]Sociologists have long been interested in the question to what degree socialization of core values depends on familial influences. Using survey data and simple multivariate regression techniques Bengtson (1975), for instance, finds low to moderate family transmission effects.

since they would like support from children in their old age. Parents who do leave positive bequests, however, have no interest in affecting children's preferences in ways that lower the utility of children in order to induce children to support them. For they would end up spending resources z_c in order to induce transfers that they do not want and hence would return these transfers to the children in the form of larger bequests.

Parents now maximize their utility function with U_c given by equation (10), where $\frac{ds_c}{dz_c} > 0$ and the parental budget constraint is

$$C_m + \frac{C_o}{R_k} + y + z_c + \frac{b_c}{R_k} = I'_p = I_p - s_p + \frac{s_c}{R_k} + b_p. \tag{11}$$

According to equation (10) s_p, is fully determined by the parents of these parents and perhaps other variables in the parents' generation, so parents take s_p as fixed when maximizing their utility. Correspondingly, the FOC for z_c, the optimal expenditure on influencing children's preferences, is given by $\beta a U'_c R_z \geq \mu \left[\frac{R_z}{R_k} - 1\right]$, where $R_z \equiv \frac{\partial s_c}{\partial z_c}$ and with $>$ implying $z_c = 0$. This equation shows clearly that a necessary condition for parents to want to change their children's willingness to support their elderly parents is that $R_z > R_k$. If that were not true, then parents would prefer to increase their accumulation of capital rather than to spend real resources trying to change their children's preferences. This implies that parents have more incentive to induce children to help them out when capital markets are not well developed, that is, when R_k is low.

The return on investing in making children more supportive, given by the effect of z_c on s_c, or by R_z, may depend on other variables as well as parental investments. For example, there may also be social interactions, so that children are induced to be more supportive of their elderly parents when children in other families are more supportive of their own parents. Social interactions generally imply large induced responses in behavior to shocks that are common to all members of the same "peer" group.

Parents who leave bequests do not want to spend resources on making their children more willing to help them out in old age. For if $b_c > 0$, it follows that

$$\beta a U'_c = \frac{\mu}{R_k}, \tag{12}$$

which together with the FOC for z_c implies that $\frac{R_z}{R_k} \geq \frac{R_z}{R_k} - 1$. This last inequality means that $z_c = 0$ when $b_c > 0$.

Since bequests are generally strongly concentrated among higher-income families, lower-income families have the greatest incentives to influence their children's preferences to induce them to help out when the parents are old. Such a greater "closeness" of lower-income families

reflected in their children's willingness to help their parents is endogenously determined by the incentives of lower-income parents to *create* "closeness" with their children in order to add greater financial security to parental old age. Parents who expect to leave bequests have much less incentive to create closeness.

Parents spend resources to increase support by children when the marginal utility of consumption to elderly parents exceeds the marginal utility they get from additional consumption by the children. By inducing more help from children, they narrow the gap between the marginal utilities of their own consumption and the children's consumption. However, they never eliminate this gap completely. For by using equation (5) to substitute for μ in the FOC for z_c, we obtain a condition that implies $aU'_c < u'_o$.

It does not pay to fully eliminate the gap between the marginal utilities from children's consumption and from parental consumption at old age essentially because spending on z_c uses parents' real resources to hurt children and help parents. If these marginal utilities were equal, it would pay for parents—that is, it would raise their overall utility V_p—to reduce z_c at least by a little and raise k in return.

For simplicity of presentation we assume that parents only spend goods on children, both when investing in their human capital and when influencing their preferences. In fact, however, parents spending time with children is extremely important, perhaps especially when influencing children's preferences. Mothers and increasingly fathers spend considerable time with children, in particular when the children are younger. They teach them various forms of knowledge and impart greater values and aspirations. These values include a concern about family and the well-being of siblings and parents, both in the present and in the future, when parents are elderly and need help.

Time budgeting studies show that parents, especially educated parents, spend considerable time with their children. For example, college graduates spend on average about 16.5 hours per week with their children, whereas high school graduates spend only 12.1 hours per week with theirs (Guryan et al. 2008). Unfortunately, these data do not allow one to distinguish time spent investing in a child's human capital from time spent influencing children's values and preferences.[4]

4. Steady States and Alternative Explanations

We have so far considered only a single parent–child pair and analyzed the determinants of investment in human capital and old-age support for this pair. Since the relation between

[4]Interestingly, Ramey and Ramey (2010) show that after three decades of decline, parental time spent on child care began to rise dramatically in the mid-1990s, especially among college-educated parents. The authors attribute this finding to increased competition for college admissions—a form of human capital investment.

parents and children implies a dynamic process over time, we explore the stability of this process. We take a partial equilibrium approach, where R_k, r, and $F(\cdot)$ all remain constant over time. Investment in children, y, is positively and uniquely related to parental income, I_p, until I_p becomes large enough so that y reaches its efficient level. As I_p rises further, y remains at this efficient level. (All proofs appear in Appendix B.)[5]

One can perform various comparative statics exercises off the steady-state equilibrium. For example, starting from a steady state, an increase in the return on human capital, r, would increase both y and I_p in the new steady state. An increase in the return on capital, R_k, would lead to a new steady state with greater savings and increased old-age consumption compared to middle-age consumption, and investments in children's human capital would increase as well.

To evaluate other explanations for why children support elderly parents, the steady state equilibrium is a convenient place start. One view is that children support parents because children look at what their parents did. If their parents supported their own parents—the grandparents of the children—then the children support their parents. That could produce an equilibrium where children support their parents. However, the same analysis implies that another steady state equilibrium exists where children do not at all support their parents because the parents did not support the grandparents. These two extreme equilibria show why this is not a promising way to explain why support of elderly parents is common throughout the world.

Equilibrium behavior may on the surface look the same as when children support parents solely because their parents supported their grandparents. However, the true mechanism may be that parents spend resources to *induce* support by their adult children, which in turn may influence the grandchildren to support their own parents.

Still another explanation is that children support elderly parents because they feel social pressure from other families. The problem with this approach is that it requires a convincing explanation of how this "norm" or pressure about support of elderly parents by children develops. If all families in a community were endogenously creating support from their children, a norm might develop that would raise support. Without the foundation of an endogenous creation of children's willingness to support elderly parents, however, this norm might not be stable.

All rich countries, and many poorer countries, have government-provided retirement and health benefits for the elderly. The usual connection is that social security reduces private

[5]Starting from any level of I_p, over time y approaches a unique stationary value. So does I_p if there are no bequests. Since support from children, s_c, is uniquely related to I_p and y, s_c also becomes stationary as y does. In particular, $s_c = 0$ when y is at its efficient level.

savings to support consumption after retirement. We assume that, too. But we also note that parental altruism, how social security payments are financed, and other factors complicate the analysis of the effects of social security on savings. In our analysis, parents save in two ways: through accumulating assets and by influencing their children to help them out in old age. If social security reduces savings, it would reduce not only asset accumulation, but also support of elderly parents by their children. It would also moderate the extent of the children's "guilt" (or caring) about their parents because middle-aged parents would spend fewer resources on trying to induce children to be willing to support them generously during old age.

Over time, as countries have developed, private health and life insurance and public social security payments to the elderly have substantially replaced children's support of elderly parents. Health and life insurance tends to be more efficient than children's support of parental risks because of the advantages of pooling over many families in market insurance systems.

5. Parental Influence over Child Preferences and Investments in Children's Human Capital

We showed that parents who do not leave bequests underinvest in the human capital of their children. This is because the FOCs for y and b_c together imply that when $b_c = 0$, $\beta a U_c' \frac{R_y}{R_k} = \frac{\mu}{R_k} \geq \beta a U_c'$, or $R_y \geq R_k$. If parents who do not leave bequests influence children's preferences so that they help out when their parents are old, then this affects the optimal investment by parents in their children's human capital. For equation (8) implies that $\frac{R_y}{R_k} = \frac{u_o'}{aU_c'}$. As parents induce their children to provide greater support, they lower the marginal utility of their own consumption at old age relative to the marginal utility they receive from the children's consumption. These changes lower the right-hand side of this equation, which then requires a lower left-hand side. That is, as parents induce children to provide greater support, they *at least* partly compensate the children by investing more in their human capital.

Therefore, among families that do not leave bequests, parents' influence on children's preferences raises parental investments in their children's human capital. We showed earlier that altruistic parents who can leave debt to their children would make the efficient investment. Thus, in effect, we have shown that influencing the preferences of children so that they support their elderly parents is a partial substitute for leaving negative bequests or debt to children.

Parents would not try to influence the formation of children's preferences unless that raised parental utility. Suppose $R_z \gg R_k$, so that changing the preferences of children is much more productive for parents than saving for old age, perhaps because capital markets are undeveloped and R_k is quite low. Under these conditions, parents would tend to raise

z_c and lower k as long as the marginal utility to parents of higher children's consumption was less than the marginal utility to parents of their own old age consumption. They would continue to do this until either became zero or the marginal utility to parents of children's consumption rose enough relative to the utility to parents from old-age consumption (at which point parents would not want to incur the additional costs required to raise the children's giving even further).

Therefore, this analysis gives an endogenous explanation of why historically, and even today in many countries (see Table 3), elderly parents have relied on support from their children. It is often more efficient for parents to spend resources to change children's preferences so that they become willing to help out their elderly parents than it is for parents to save much for their old age.

The direct effect of parental increases in z_c may be to lower children's utility since children are induced to spend part of their wealth on their parents (as in equation (10)). On the other hand, the expectation of support from the children induces parents to invest more in their children's human capital. This increased investment raises children's utility. Could the induced increase in the human capital of children have a sufficiently positive effect on children's utility so that it dominates any negative effect from being induced to support their parents? That is, could children also be made better off when parents induce them to help out?

The answer is "yes," children as well as parents may gain from the ability of parents to influence children's preferences to provide old-age support. In the simple model of parental influence on children's preferences, children's net income, and hence their utility, would rise if the induced increase in their human capital exceeded the induced spending on elderly parents. Whether parental influences over children's preferences make the children as well as their parents better off depends on the shapes of the investment and utility functions. The next section gives an example where both children and parents are made better off because children help out their elderly parents.

Usually, evolutionary forces are taken to imply that elderly parents are much more altruistic to their children than vice versa. After all, children are their descendants and carry the genes of parents, whereas parents lose their ability to procreate as they age. Even Trivers (2011), who recognizes that parents might manipulate their children to make them altruistic, is thinking mainly of altruism toward siblings and other relatives: "Parents are selected to manipulate their offspring to serve parental interests. [. . .] A key variable is offspring's degree of altruistic and selfish tendencies, insofar as these affect other relatives" (p. 85). However, evolutionary theory would also be consistent with children being altruistic toward their parents if this altruism induces the latter to make sufficiently greater investments in children

and thereby raises their genetic fitness.

Our analysis implies not only that parents manipulate child preferences to make children care about their parents, but also that children might be made caring through the selection implied by evolutionary forces. Yet, an important difference between endogenous determination of child caring is that the manipulation approach is flexible enough to imply much less caring under certain circumstances. In particular, altruistic middle-aged parents who anticipate leaving bequests to their children will not invest in manipulating children's preferences in ways that lower children's utility. Similarly, the development of government-financed social security for retirees will reduce the gain to parents from manipulating children's preferences. Purely evolutionary models of children's altruism are not sufficiently flexible to adjust to such different circumstances.

6. Rotten Parents and Efficient Investments in Kids

The well-known Rotten Kid Theorem (see Becker 1974 and Bergstrom 1989) argues that, under transferable utility and other conditions, even selfish children with altruistic parents only take actions affecting parents if these actions raise the overall utility of their parents. The reason is that higher parental utility induces them through a positive wealth effect to sufficiently increase their transfers to children in order to make the children better off, net of the cost of the actions by the children. However, this theorem does not imply that even selfish children would automatically help out their elderly parents in need without the parents altering their children's preferences to make the children more caring.

The reason that the Rotten Kid Theorem does not operate in our analysis of parental investments in children is because altruistic parents move first—by investing in their young children—and selfish children move last, by possibly later helping out their elderly parents (see Hirshleifer 1977 on the importance of "the last word"). Since parents would not expect selfish children to help them out when they are elderly and in need of help, they may not make the efficient level of investments in children's human capital.

However, under certain conditions the "Rotten Parent Theorem" holds, which does imply optimal parental investments in children. This theorem becomes clear when the assumptions we have been making about selfishness and altruism are partially reversed, that is, when children are altruistic to parents (possibly because parents made them altruistic) and parents are selfish. Reasoning along similar lines as in the Rotten Kid Theorem, even selfish parents have then an incentive to make the efficient investment in their children's human capital. For if the well-being of parents is a normal good to altruistic children, an increase in children's utility through greater parental investment in the children's human capital would induce the children to increase the utility of the parents as well, net of any expenditures by the parents

on investments in their children's human capital. As long as parental well-being is a normal good to children, even children with low (but strictly positive) a will always more than repay their parents and hence receive optimal investments in their human capital.

Even selfish parents make the optimal investment in their altruistic children's human capital because children have "the last word." That is, parents invest first when the children are young, and the children only later repay the parents when the children are adults and the parents are old. This is exactly analogous to the situation involved in the Rotten Kid Theorem, where selfish children go first with costly actions that raise the income of their altruistic parents, and parents later more than compensate the children for these costs. What follows is an example that illustrates how both parents and children may be made better off with parental investments in altruistic children.

Assume that parents are selfish and not concerned about the welfare of their child, but they can invest z_c to make children altruistic. Parental utility is given by

$$V = \log(C_m) + \beta \log(C_o) + a(\overline{z}_c)\, \beta \log\left(\overline{C}_o\right) \tag{13}$$

and subject to the budget constraints at middle and old age: $C_m + y + z_c + k + s_p = I(\overline{y})$ and $C_o = R_k k + s_c$, respectively. Here, s_p denotes the resources that middle-aged parents transfer to their own elderly parents, and $s_c \geq 0$ are the transfers that parents correctly expect to be forthcoming from their children (conditional on investing y in the child's human capital). Taking the investment and savings decisions of the previous generation (i.e. $\overline{y}$, $\overline{z}_c$, and $\overline{k}$) as given, parents optimize over C_m, k, s_p, z_c, and y.

In order to keep the example as simple as possible, we assume that $R_k = \beta = 1$ and that $I(y) = 2\sqrt{y} + 1.5$. The "production function" for children's altruism is given by

$$a(z_p) = \begin{cases} 1 & \text{if } \; z_c \geq .5 \\ 0 & \text{otherwise} \end{cases}. \tag{14}$$

With these assumptions in hand, the first order conditions for consumption at middle age and savings become

$$\frac{1}{C_m} = \mu \quad \text{and} \quad \left(1 + \frac{ds_c}{dk}\right)(k + s_c) \leq \mu, \tag{15}$$

with $<$ implying $k = 0$. Investments in children's human capital and support of elderly parents are determined by

$$\frac{ds_c}{dy}(k + s) \leq \mu, \quad \text{as well as} \quad \frac{a(\overline{z}_c)}{\overline{k} + s_p} \leq \mu. \tag{16}$$

A steady state must have $s_c = s_p$, $\overline{y} = y$, $\overline{z}_c = z_c$, $\overline{k} = k$, and $\overline{C}_m = C_m$. After substituting in the equations above and rearranging, it is straightforward to verify that optimal consumption, savings, and investment levels equal $C_m^* = 2$, $k^* = 0$, $y^* = 1$, $z_c^* = .5$, and $s_p^* = 2$. Also, $C_o = 2$, $\mu = .5$, $\frac{ds_c}{dk} = \frac{ds_p}{dk} = -1$, and $\frac{ds_c}{dy} = 1$.

In this example parents do not save for old age because savings crowd out support from children one for one. Instead, parents invest in the child's human capital until $R_y = R_k$, and they teach the child to be caring, $a\left(z_p^*\right) = 1$. The altruistic child then more than repays them when the parents are elderly. That is, $y^* + z_c^* < s_c$.

By contrast, consider the case when children cannot be taught to be altruistic. Selfish children ($a_c = 0$) would never support their elderly parents ($s_p^* = 0$), and the selfish parents have no incentive to invest in their child's human capital ($y^* = 0$). Steady state income would, therefore, equal $I(0) = 1.5$, which parents would split equally between middle and old age, i.e. $C_m^* = C_o^* = .75$. Not only does this entail suboptimal human capital investments, but every generation receives less utility from their own consumption than when parents can count on their children for old age support. Clearly, both children and parents are better off when parents are able to manipulate children into being altruistic.

7. Uncertainty and the Value of Child Support

We have shown that parents greatly value the support they receive from children if they obtain a high enough rate of return on their spending to induce that support. In determining the effective return on help from children, uncertainty about parental old-age income and health would be important. This uncertainty raises returns from inducing children to help out when their parents need help. Elderly parents may gain a lot from being able to rely on children for old age support when their assets yield a lower return than expected, when parents live unusually long, or when they are in unusually bad health.

Therefore, children's concern about the well-being of parents may be a valuable asset in the overall portfolio of assets that protect parents against the many risks of older age. This would be particularly valuable if the distribution of the risk on children's willingness to help parents were only weakly correlated with the health, life expectancy, and other risks of elderly parents. This is likely to be the case with the uncertainty over how caring kids turn out to be when they are adults. Returns on children's human capital and other children' assets are also not likely to be strongly correlated with the health and returns on assets of their elderly parents.

Ignoring the utility parents obtain from children, standard results in modern asset pricing theory imply that the relevant expected rate of return on investments in making children

caring, R_z, satisfies (see, e.g. Cochrane 2005, chapter 1)

$$(17) \qquad \mathrm{E}\left(R_z\right) - R_k = -R_k \,\mathrm{Cov}\left(m_o, R_z\right),$$

where R_k denotes the risk-free rate on savings, and the second term on the right-hand side is the covariance between the marginal rate of substitution between parental consumption at old and middle ages, m_o, and returns on investments in children.

If children help out more when a negative shock to their elderly parents raises the marginal utility of parental consumption at old age, then the covariance term above will be positive, and the appropriate discount rate on support from children might be below the risk-free rate of return. This explains why parents often place a high value on help from children, even though that help does not occur until decades after parents may have invested in making their children more caring.

The analysis in this paper predicts that the role of children in diversifying the assets of elderly parents contributed to the demand for children in the past and in poorer nations at present. However, children would have become less valuable in helping to protect the elderly against the risks of old age after social security and health insurance became common. This substitution of government and market protection for support by children may have contributed greatly to the large fall in fertility since the beginning of the twentieth century.

8. The Number of Children

The assumption that each family has only one child allowed us to concentrate on parental human capital investments in children and parental efforts to induce children to support their elderly parents. We can build on this analysis to consider how many children parents want to have and how that is affected by whether adult children support their elderly parents.

With identical children, the cost of each child would be

$$(18) \qquad MC_c = v + y + z_c - \frac{s_c}{R_k} = v + y - z_c\left[\frac{R_z}{R_k} - 1\right],$$

where v is the fixed cost of having each child. Thus, the cost of having a child depends on v and also on variables chosen by parents: human capital investments per child, y, support from each child, s_c, and investments in making each child more willing to support elderly parents, z_c. The importance of these endogenous variables brings out the interaction between the quantity and quality of children.

As has been emphasized in the literature on fertility in developing countries, support by children of elderly parents encourages fertility by reducing the net cost of children (see e.g., Schultz 1997). Others have argued, however, that such support cannot be an important

influence on fertility choices since it occurs thirty or more years after most parental spending on children. Then, even if the annual interest rate were low, the total discount over such a long number of years, given by R_k, would be large, and hence the discounted value to parents of support by children when the parents are old would be very low. We have shown that uncertainty over R_k and other variables could greatly alter this conclusion.

Even without uncertainty, support by children might still be important, despite a high value for R_k, if the amount of support by children was also "large." This is obvious from equation (18), since we have shown that $R_z > R_k$. If R_z were much larger than R_k, and if z_c were reasonably large, old age support by children would greatly lower the net cost of children, even if the market discount rate between middle and old age were quite large.

Old age support from children might make a particularly large contribution to lowering the net cost of children in less-developed countries. In these countries, elderly parents are less likely to leave bequests to children and are more dependent on old age support from their children. As a result, investments in making children more caring, given by z_c, may be large relative to the cost of children, given by $v + y$. If R_z were much larger than R_k, which is likely in countries with poor capital markets, the net cost of having a child might be rather small after subtracting the value of old age support from children. This would encourage families to have relatively many children.

9. Concluding Remarks

This paper considers various types of interactions between parental investment in the human capital of their children and children's support of elderly parents. The main contribution of the paper is to consider the links between parental influence over the preferences of young children, parental investments in children's human capital, and old age support of parents.

It may pay for parents to spend resources to "manipulate" the preferences of children so that the children are willing to help out elderly parents in need of help. The return on this "investment" in shaping child preferences is determined by how much support it induces from grown children. We show that parents invest more in the human capital of children when they expect greater old age support, even when this support is induced by manipulation of kids' preferences.

Although parental manipulation of child preferences per se may lower children's utility (while raising that of their parents), children are compensated by the induced increase in their human capital. As a result, manipulation of child preferences may end up helping children as well parents; that is, it may be Pareto-improving. We give an example of the "Rotten Parent Theorem," where both parents and children are made better off when altruistic children support their selfish, elderly parents because the expectation of such support induces

sufficient increases in parental investment in children's human capital.

Various other implications also follow from parental manipulation of child preferences. Parents save less for their old age and consume more during middle age when they can rely on their children to help them out when in need of help. Moreover, parents tend to have more children when they expect a high return on manipulating child preferences to support parents in old age. This is especially valuable as insurance against various risks of old age, including bad health and living unusually long.

References

Alam, M. (2006). *Ageing in India: Socio-Economic and Health Dimensions*. New Dehli: Academic Foundation.

Altonji, J. G., F. Hayashi, and L. Kotlikoff (2000). "The Effects of Income and Wealth on Time and Money Transfers between Parents and Children" (pp. 306–357) in A. Masson and G. Tapinos (eds.), *Sharing the Wealth: Demographic Change and Economic Transfers between Generations*. Oxford: Oxford University Press.

Becker, G. S. (1974.) "A Theory of Social Interactions." *Journal of Political Economy*, 82, 1063–1093.

——— (1993). "Nobel Lecture: The Economic Way of Looking at Behavior." J*ournal of Political Economy*, 101, 385–409.

——— (1996). *Accounting for Tastes*. Cambridge, MA: Harvard University Press.

Bengtson, V. L. (1975). "Generation and Family Effects in Value Socialization." *American Sociological Review*, 40, 358–371.

Bergstrom, T. C. (1989). "A Fresh Look at the Rotten Kid Theorem." *Journal of Political Economy*, 97, 1138–1159.

Biddlecom, A., N. Chayovan, and M. B. Ofstedal (2002)." Intergenerational Support and Transfers," (pp. 185–229) in A. I. Hermalin (ed.), *The Well-Being of the Elderly in Asia: A Four-Country Comparative Study*. Ann Arbor, MI: University of Michigan Press.

Bronnenberg, B. J., J.-P. Dubé, and M. Gentzkow (2012). "The Evolution of Brand Preferences: Evidence from Consumer Migration." *American Economic Review*, 102, 2472–2508.

Camero, L., and D. A. Cobb-Clark (2001). "Old-Age Support in Developing Countries: Labor Supply, Intergenerational Transfers and Living Arrangements." IZA Discussion Paper No. 289.

Cochrane, J. H. (2005). *Asset Pricing*. Princeton, NJ: Princeton University Press.

Guryan, J., E. Hurst, and M. Kearney (2008). "Parental Education and Parental Time with Children." *Journal of Economic Perspectives*, 22, 23–46.

Guttman, J. M. (2001). "Self-Enforcing Reciprocity Norms and Intergenerational Transfers: Theory and Evidence." *Journal of Public Economics*, 81, 117–151.

Heckman, J. J. (2008). "The Role of Income and Family Influence on Child Outcomes." *Annals of the New York Academy of Sciences*, 1136, 307–323.

Hirshleifer, J. (1977). "Shakespeare vs. Becker on Altruism: The Importance of Having the Last Word." *Journal of Economic Literature*, 15, 500–502.

Hurd, M. D., and J. P. Smith (2001). "Anticipated and Actual Bequests," in (pp. 357–392) D. A. Wise (ed.), *Themes in the Economics of Aging*. Chicago: University of Chicago Press.

International Labor Office (2010). *World Social Security Report 2010*. Geneva, Switzerland.

Lee, Y.-J., and Z. Xiao (1998). "Children's Support for Elderly Parents in Urban and Rural China: Results from a National Survey." *Journal of Cross-Cultural Gerontology*, 13, 39–62.

Piketty, T. (2001). *Les Hauts revenues en France 20e siècle: inégalités et redistribution 1901–1998*. Paris: B. Grasset.

Piketty, T., G. Postel-Vinay, and J. L. Rosenthal (2004). "Wealth Concentration in a Developing Economy: Paris and France, 1807–1994." CEPR Discussion Paper 4631.

Ramey, G., and V. A. Ramey (2010)."The Rug Rat Race." *Brookings Papers on Economic Activity*, Spring 2010, 129–176.

Schultz, T. P. (1997). "Demand for Children in Low Income Countries," (pp. 349–430) M. R. Rosenzweig and O. Stark (eds.), *Handbook of Population Economics, Vol. 1A*. Amsterdam: Elsevier.

Trivers, R. L. (2011). *The Folly of Fools: The Logic of Deceit and Self-Deception in Human Life*. New York: Basic Books.

Appendix A: Inducing Children to Provide Old Age Support

This appendix provides a simple model to illustrate how parents can induce children to provide old age support, s, by spending resources, z, to make children altruistic. That is, we provide a micro-model justifying the assumption that $\frac{ds}{dz} > 0$.

Let parents' utility function be given by

$$V = u(C_m) + \beta u(C_o) + a_p(z_p) U_p(C_{op} + s_p) + \beta a_c U_c(I_c - s_c). \tag{19}$$

As above, C_m and C_o denote agents' own consumption at middle and old age, β is the discount factor, a_c is the degree of altruism toward children, and U_c gives the "utility" of children. C_{op} is the old-age consumption of agents' own parents, and a_p is the (induced) altruism toward these parents. We assume that $u' > 0$, $u'' < 0$, $U_c' > 0$, $U_c'' < 0$, $U_p' > 0$, and $U_p'' < 0$. Moreover, $a_p' > 0$, $a_p'' < 0$, and $a_p(0) = 0$. The last assumptions imply that agents do not care about their own parents unless they have been made altruistic, i.e. $z_p \geq 0$, and that investments in inducing altruism are subject to diminishing marginal returns. Taking the decisions of the previous generation as given, individuals maximize their utility, subject to the various investments and consumption constraints and subject to the budget constraint in equation (11).

To see how the previous generation's choice of z_p affects the support that individuals provide to their elderly parents, consider the FOC with respect to s_p:

$$a_p(z_p) U_p'(C_{op} + s_p) \leq \mu. \tag{20}$$

Clearly, $s_p = 0$ unless parents manipulate children into becoming altruistic, i.e. unless $a_p(z_p) \geq 0$. Altruistic children, however, will help out their elderly parents when in need, i.e. when C_{op} is sufficiently low, and differentiating equation (20) at an interior solution with respect to z_p shows that $R_z \equiv \frac{ds_p}{dz_p} > 0$, as claimed in the main text.

Appendix B: Steady States

Here, we consider the steady states of our workhorse model in Sections 2 and 3. In any such steady state, successive generations invest equally in children's human capital and expect the same amount of old age support, i.e. $s_c = s_p$ and $y_c = y_p$. Throughout the analysis we assume that $U_c = V$ and $rF'(y) \leq R_k$ for y large enough. That is, parents are altruistic toward their offspring, and human capital investments do not always yield a higher return than savings. Moreover, to ensure that V is well defined and that bequests do not continue to grow, we assume as sufficient conditions that u is bounded, $a\beta < 1$, and $a\beta R_k \leq 1$.

Existence In order to demonstrate that there always exists at least one steady state, let T denote the mapping from parental resources, $I_p' = rF(y_p) - s_p + b_p$, to child income I_c'. As the system of first order conditions admits a unique solution for each level of income, agents with the same resources will choose the same levels of s_c and y_c. It, therefore, suffices to show that the

mapping from I'_p into I'_c exhibits a fixed point at which $I'_c = I'_p$, i.e. $T(I'_c) = T\left(I'_p\right)$.

First, consider some I'_p large enough for parents to leave positive bequests, i.e. such that the first order condition for b_c holds with equality. Since $a\beta R_k \leq 1$, it follows from equation (7) and concavity of V that $T\left(I'_p\right) \leq I'_p$. Hence, in Figure 2 there exists some point at which T lies weakly below the 45°-line.

Now, consider the case in which $I'_p = 0$. Since by assumption parents cannot leave their children with negative net resources, we have that $T(0) \geq 0$. That is, T lies weakly above the origin. As long as u and F are twice continuously differentiable, the solution to the first order conditions for y_c, z, and b_c will be continuous in I'_p. Hence, T is a continuous function of I'_p, and the Intermediate Value Theorem implies that there exists some level of resources, $\overline{I}$, for which $T\left(\overline{I}\right) - \overline{I} = 0$. This guarantees the existence of a fixed point and hence a steady state.

Uniqueness Clearly, whenever $T(0) = 0$ there exists a trivial steady state in which parents have no income and do not invest in y_c. However, such a trivial steady state does not always exist. To see that T might lie strictly above the origin, suppose that R_z gets very large for small z. If agents are able borrow at rate R_k, then even the poorest altruistic parents would invest a strictly positive amount in the human capital of their child, since $rF(y) \to \infty$ as $y \to \infty$. The support forthcoming from children, i.e. s_c, would more than compensate these parents for their spending on z and y, and it would be sufficient to repay any small loan. In this case old age support from children constitutes a Pareto improvement, as discussed in Sections 5 and 6. More importantly for our purposes, in any nontrivial steady state y_c and s_c are uniquely determined.

To see this, recall the first order condition for y_c. If $U_c = V$ and $I'_c = I'_p$, then it must be the case that $a\beta R_y = 1$. As F is strictly concave, there is at most one $\overline{y}$ for which this condition holds. Hence, the only possible nontrivial steady state entails $y_c = \overline{y} > 0$.

In order to show that $\overline{s}$ must be unique as well, define y^* such that $R_y = R_y$. If $\overline{y} \geq y^*$, then $\overline{s} = 0$, since parents who leave bequests would not find it optimal to spend resources to manipulate children into supporting them in old age. The fact that parents' optimization problem admits a unique solution for each I'_p, together with y_c being strictly increasing in parental resources until $y_c = y^*$, guarantees that there also exists exactly one $\overline{s}$ if $\overline{y} < y^*$.

Although $\overline{y}$ and $\overline{s}$ are determined uniquely in any nontrivial steady state, this is not necessarily the case for consumption and bequests. If $a\beta R_k = 1$, then the first order condition for b_c implies that parents who are rich enough to leave bequests would choose b_c such that $I'_p = I'_c$. Hence, any level of resources greater than $I^* \equiv rF(y^*)$ is a steady state, and consumption as well as bequests will depend on initial conditions. If $a\beta R_k < 1$, however, then the same first order conditions implies $I'_c < I'_p$. In this case, there will be a unique nontrivial steady state with zero bequest and inefficient human capital investments.

Stability & Dynamics Although any high-enough level of resources constitutes a steady state if $a\beta R_k = 1$, these states are not stable (in the sense that the system would not converge back to the initial steady state after some small shock), for stability requires that the transformation function

T cuts the 45°-line in Figure 2 from above. Hence, the only candidate values for stable steady states are $y_c = 0$ and $y_c = \overline{y}$.

Even if the (trivial) steady state with $y_c = 0$ exists, it will not be stable. To show this we demonstrate that the transformation function lies strictly above the 45°-line for small levels of parental income, where $I'_p = \epsilon > 0$. Suppose that $T(0) = 0$. Due to the Inada condition on F, even very poor parents would always invest a little bit into the human capital of their children, as long as $a > 0$ and $\epsilon > 0$. This implies that the first order condition for y holds with equality. Substituting $V'\left(I'_p\right)$ into the FOC for y and rearranging gives

$$a\beta R_y = \frac{V'(\epsilon)}{V(T(\epsilon))}. \tag{21}$$

Since $y_c \to \epsilon$ as $\epsilon \to 0$, we have $R_y \to \infty$, and that $a\beta R_y > 1$ for sufficiently small ϵ. The strict concavity of V then implies that $T(\epsilon) > \epsilon$, as desired. This means that parental resources grow in response to any small positive shock, thereby moving away from the trivial steady state.

In fact, as Figure 2 illustrates, starting from any strictly positive I'_p, successive generations accumulate resources until parental income reaches $\overline{I}$ (at which point parents invest $\overline{y}$). If $a\beta R_k < 1$, then T cuts the 45°-line from above, and $\overline{I}$ is the unique, globally stable steady state.

Figure 1: Timing

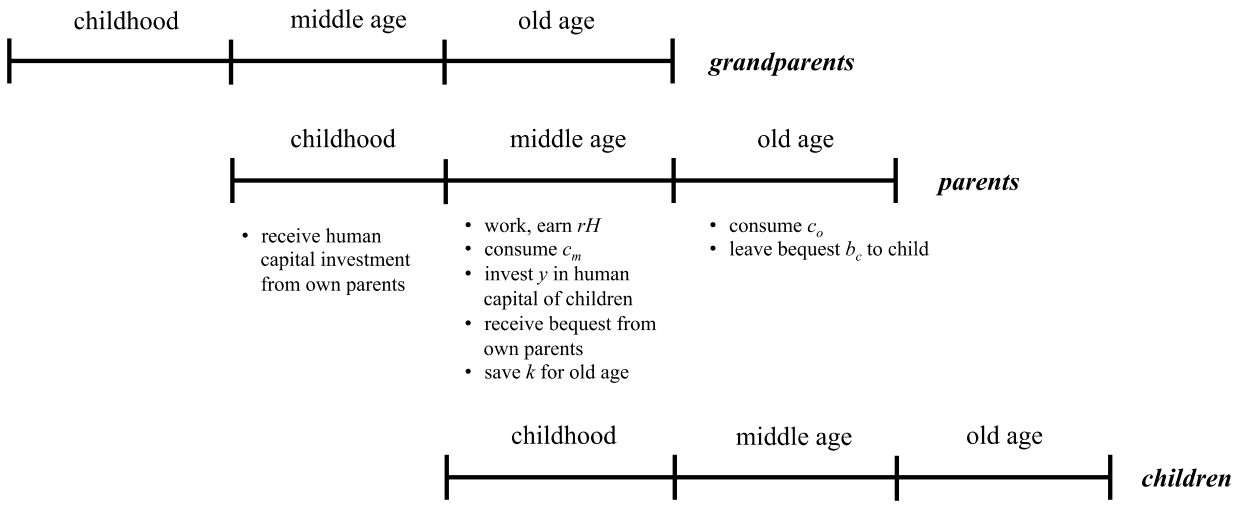

Figure 2: Steady State Dynamics

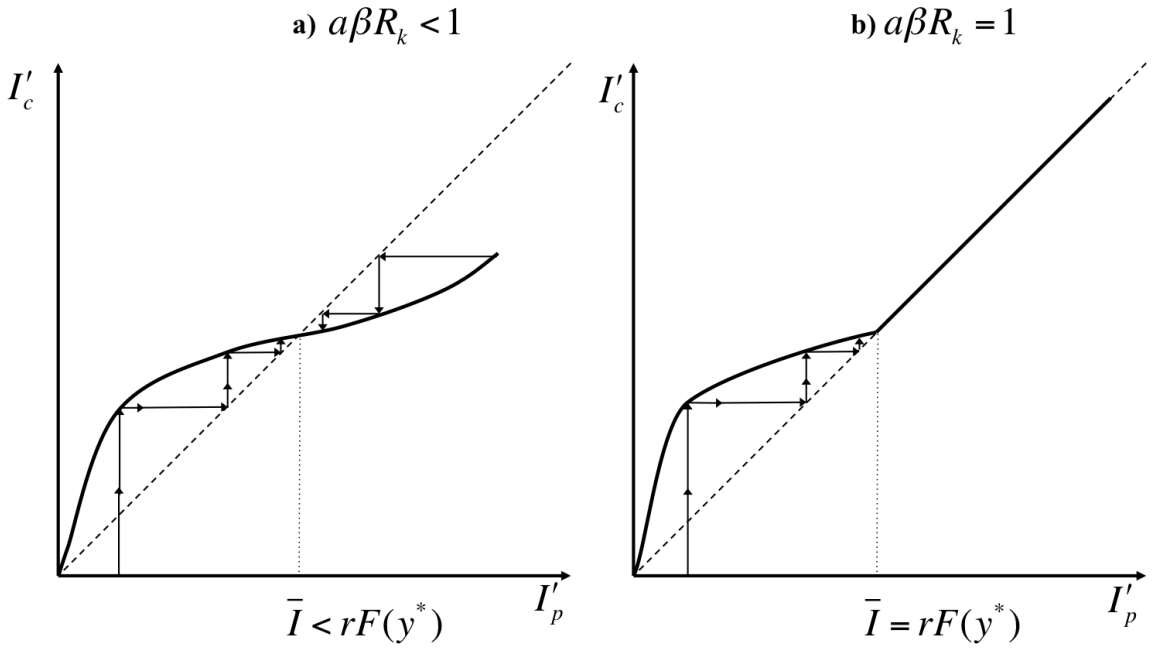

Table 1: Fraction of Decedents Leaving Negligible Bequests

Place, Time	*Percentage*
United States, late 20th century	30
11 European countries, early 21st century	23
France, late 20th century	43
France, early 20th century	70
Paris, early 19th century	90
Paris, late 19th century	81

Sources: Based on SHARE data, Hurd and Smith (2001), Piketty (2001), and Piketty et al. (2004).
Notes: Entries denote the share of actual decedents who left bequests smaller than $10,000 (in 2007 USD). The eleven European countries are Switzerland, Sweden, Denmark, Germany, Greece, France, Italy, Spain, Netherlands, Austria, and Belgium.

Table 2: Fraction of Elderly Population Receiving a Pension

Place	*Percentage*
World	40
North America	76
Western Europe	92
Central Eastern Europe	87
Latin America and Caribbean	50
Asia and Pacific	31
Africa	18

Source: International Labor Office (2010)

Table 3: Fraction of Elderly Parents Receiving Transfers from Their Children

Country	*Percentage*
Switzerland	14
Spain	15
Italy	15
Netherlands	19
France	21
Austria	23
Denmark	23
Sweden	24
Greece	27
United States	29
Germany	30
China, urban	49
Indonesia	58
Taiwan	67
China, rural	73
India	80
Philippines	83
Thailand	83
Singapore	89

Notes: Entries denote the share of parents who report receiving monetary or time transfers from their children. Children living with their parents are not automatically classified as providing help.
Sources: Based on Altonji et al. (2000), Lee and Xiao (1998), Biddlecom et al. (2002), Cameron and Cobb-Clark (2001), Alam (2006), and authors' analysis of SHARE data.

Table 4: Subjective Bequest Probabilities by Wealth of Household

Country		*Percentage / Probability*
United States		
Wealth Decile:	1st	25
	3rd	56
	5th	73
	7th	81
	9th	83
14 European Countries		
Wealth Decile:	1st	37
	3rd	47
	5th	53
	7th	59
	9th	75

Sources: Based on SHARE data, and Hurd and Smith (2001).

Notes: For the US the entries reflect AHEAD respondents' average subjective probability of leaving a bequest exceeding 10,000 USD by decile in the wealth distribution (Hurd and Smith 2001). In case of the European countries, entries reflect the share of respondents who expect to leave a bequest exceeding 50,000 EUR for sure. The fourteen European countries included are Switzerland, Sweden, Denmark, Germany, Greece, France, Italy, Ireland, Poland, Czech Republic, Spain, Netherlands, Belgium, and Austria.