

Family Altruism and Incentives

Roberta Gatti

In the presence of imperfect information and uncertainty, altruistic parents might use intergenerational transfers strategically to elicit effort from their children. As a result, gifts and bequests are less reactive to the income realizations of the children than the standard altruistic model of the family predicts. Ricardian equivalence holds in this setup whenever the non-negativity constraint on bequests is not binding.



Summary findings

Gatti builds on the altruistic model of the family to explore the strategic interaction between altruistic parents and selfish children when children's efforts are endogenous. If there is uncertainty about the amount of income the children will realize, and if parents have imperfect information, the children have an incentive to exert little effort and to rely on their parents' altruistically motivated transfers. Because of this, parents face a tradeoff between the insurance that bequests implicitly provide their children and the disincentive to work prompted by their altruism.

Gatti shows that if parents can credibly commit to a pattern of transfers, they will choose not to compensate children in bad outcomes as much as predicted by the

standard (no uncertainty, no asymmetric information) dynastic model of the family. Alternatively, parents may choose to forgo any insurance and offer a fixed level of bequest, to elicit greater effort from their children.

The optimal transfers structure that Gatti derives reconciles the predictions of the altruistic family model with much of the existing evidence on intergenerational transfers, which suggests that parents compensate only partially, or not at all, for earnings differentials among their children.

Moreover, Gatti shows that Ricardian equivalence holds in this setup, except when non-negativity constraints are binding.

This paper—a product of Macroeconomics and Growth, Development Research Group—is part of a larger effort in the group to understand intrahousehold resource allocation. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Rina Bonfield, room MC3-354, telephone 202-473-1248, fax 202-522-3518, email address abonfield@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. The author may be contacted at rgatti@worldbank.org. December 2000. (38 pages)

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1. Introduction

The dynastic model of the of family first introduced by Barro (1974) and Becker (1974) explains inter-generational transfers as arising from altruistic behavior. Parents care about the utility of their children and therefore use transfers to equalize marginal utilities from consumption among the members of the household. In this set-up, private transfers have been shown to neutralize most government inter-generational redistribution. This is the well-known Ricardian equivalence.

Because of these important policy implications, the altruistic hypothesis has received substantial attention in the empirical literature. In particular, most papers have tested its straightforward implication that gifts or bequests play a compensatory role in the family and are directed to the children with lower income.

The empirical support for the altruistic model has been mixed. For example, Tomes (1981) and Laitner and Juster (1996) find a strong negative relation between bequest or preference for bequest and recipient's income. Wilhelm (1996) and Menchik (1980) find instead that the majority of the decedents in their samples divide bequest equally among their children, while large income differentials or differences in gender among siblings make unequal division of bequest more likely.

In this paper we argue that looking for a strong correlation between bequests and recipients' income might lead to misleading inferences about altruism. In particular, we show that, once children's effort is explicitly made endogenous, it becomes clear that parental altruism can foster children's laziness: children might choose to work "too little" because they can rely on their parents' benevolence. If there is potential

for such behavior on the part of children, parents might try to protect themselves from the consequences of their own love and choose a pattern of transfers that differs from the one we would expect in a standard altruistic setting. In particular, altruistic parents might decide to use bequests to provide incentives to their children to work hard. If this is the case, bequests to children with low income will be relatively lower (when compared to the standard altruistic model) and bequests to children with high income relatively higher.

To analyze these issues, we model the interaction between an altruistic parent who chooses the amount of resources to transfer to her child and a selfish child who chooses how much to work. We assume that the child's income is stochastic and that the parent cannot perfectly monitor the child's effort. Uncertainty and asymmetric information introduce a role for insurance from the parent and a potential for shirking from the child.

We first consider the case when the parent cannot commit in advance to a particular level, or schedule, of bequests. In this case the parent will award bequests *ex post*, based on the realization of the child's income - no matter whether the realization was achieved by work or by luck. Here the parent offers a high degree of insurance to the child: a high bequest if the income realization is low, and a low bequest if income is high.

Next, we consider the case where the parent can commit to a schedule of bequests. If she can observe both effort and income realizations, she will simply offer full insurance but condition it on the child performing the effort level of the parent's choosing.

However, in the asymmetric information case, where she can observe income realizations but cannot observe effort choices, she might want to offer transfers strategically, so as to elicit more effort from the child - even if she has purely altruistic preferences which take into account the child's cost of effort as well as her labor income. As a result, the parent will reduce transfers to the child in bad occurrences and increase transfers in good occurrences: bequests will be less reactive to income and therefore provide less insurance than would be optimal, were effort observable.

It can be argued that a credible commitment to a bequest schedule conditional on income realizations is difficult to sustain. Instead, parents might more easily be able to commit to a single level of bequest. We show that even when the parent restricts her ability to provide insurance, she may still achieve a higher level of utility than in the no-commitment scenario and therefore opt for a single level of bequest, or for equally divided bequests when there is more than one child.

Exploring the interaction between asymmetric information and commitment suggests that the menu of transfers altruistic parents might choose is richer than the simple rule "give more to the child who is worse off". A parent who cares only slightly about her child might provide such low bequests as to have no effect on the child's behavior. A credible parent who is sufficiently altruistic may want instead to use transfers strategically and avoid full compensation in bad states of the world in order to provide her child with a "hard" budget constraint. On the other hand a very altruistic/rich parent will care so much about her child's utility or will be so wealthy that her child's shirking will not substantially affect her utility. In this case

the parent will want to use transfers to provide the child with full insurance.

Such a wide range of potential behavior suggests that taking the lack of correlation between transfers (bequests) and children's income realizations as evidence against the dynastic model of the family might be unduly restrictive, and that aiming empirical research at a deeper understanding of issues of moral hazard within the family could be highly rewarding.

The paper develops as follows. Section 1 lays out a theoretical background for the model and presents the standard altruistic model of the family. Section 2 reviews some relevant empirical testing of altruism in the family. Sections 3 and 4 develop the model and characterize the bequest patterns that parents might opt for under different assumptions on information and ability to make a credible commitment. Section 5 presents a simple numerical simulation of the model. Section 6 discusses Ricardian Equivalence in the context of the model and presents evidence from the numerical simulation. Finally, section 7 concludes.

2 Theoretical Background

2.1 The standard altruistic model

Here we will present a simple version of the model of the family first introduced by Barro (1974) and Becker (1974) to illustrate the role of intergenerational transfers in a dynastic family.

Consider the interaction between an altruistic parent and a selfish child. The parent has additively separable concave utility, U_p , defined in her personal consumption,

C_p , and in the consumption of the child, C_c . For simplicity, say

$$U_p = \ln(C_p) + \lambda \ln(C_c)$$

where $\lambda \in (0, 1]$ is the extent to which the parent cares about the child's utility.

The selfish child has utility

$$U_c = \ln(C_c)$$

The budget constraints for parent and child are $C_p \leq I_p - B$ and $C_c \leq I_c + B$ where I_i are fixed resources and B is the transfer from the parent to the child.

The parent will choose B so as to equalize her marginal utility from consumption to the child's marginal utility of consumption up to a factor λ . In other words, with operative transfers,

$$\frac{C_c}{C_p} = \lambda$$

so that the consumption of a family member turns out to be based on a collective budget constraint and the distribution of consumption within the family is independent of the distribution of individual incomes. Transfers take the form

$$B = \frac{\lambda I_p - I_c}{1 + \lambda}$$

and therefore are negatively related to the child's resources.

Both the negative relation between the amount of inter-generational transfers and the recipient's income, and the sensitivity of individual consumption to individual

resources of household members have been empirically tested to assess whether the altruistic model can be taken as an accurate characterization of the interaction among members of the household. A lack of sensitivity of transfers to recipients' characteristics and a significant response of individual consumption to individual income within the family have been interpreted as a rejection of the altruistic model (see next section for a survey of empirical studies on altruism).

The simple model described above does not involve a role for an endogenous choice of effort on the part of the child, and therefore misses an important part of the interaction between parent and child. This interaction is the subject of the next two sections.

2.2 Rotten Kid theorem

Becker's well-known Rotten Kid theorem (1974) introduces a role for strategic family interactions, and shows that under certain conditions, the child's actions will be optimal from the family's point of view, even though the child has no care for the welfare of anyone other than himself. As before, the parent's utility is a linear combination of the utility arising from her own consumption and that of the child, while the child's utility depends only on her own consumption

$$U_p = \ln(C_p) + \lambda \ln(C_c), \quad U_c = \ln(C_c)$$

Now the income of the parent, $I_p(e)$, and child, $I_c(e)$, are both endogenous, rather than exogenous, and specifically are both taken to be functions of the effort of the

child, e . Note that $I_p(e)$ and $I_c(e)$ both measure income net of cost of effort. The budget constraints therefore become

$$C_p \leq I_p(e) - B \quad \text{and} \quad C_c \leq I_c(e) + B$$

Consider the following interaction: first, the child chooses effort, then the parent chooses bequest. The child knows that the parent will, *ex post*, choose the bequest so as to maximize her utility given observed I_p and I_c , and that the bequest will take the form

$$B = \frac{\lambda I_p(e) - I_c(e)}{1 + \lambda}$$

The child then chooses e to maximize U_c . Substituting for B gives $U_c = \ln(\frac{\lambda}{1+\lambda}) + \ln(I_p(e) + I_c(e))$ and maximizing over e yields the condition

$$I'_p(e) + I'_c(e) = 0$$

Thus the rotten, selfish child chooses an effort level which optimizes joint family income.

2.3 A more general case with endogenous effort

The Rotten Kid theorem depends crucially on the assumption that the parent's income is a function of the child's effort. This may apply in some cases - where the

child lives with the parent, and the fruit of her labor is a common good, for example - but an intuitively more attractive treatment would take the parent's income as independent of the effort of the child. Moreover, the Rotten Kid theorem effectively ignores the cost of effort faced by the child.¹

Consider now the following example where the child has separable utility over consumption C_c and effort e . The child's budget constraint is $C_c \leq we + B$, where w is the wage and B is the transfer received by an altruistic parent. The child's utility can be written as

$$U_c = \ln(we + B) - \psi(e)$$

where $\psi(e)$ is convex cost of effort. As before, the parent is altruistic and her utility function U_p is separable in her personal utility from consumption and in the child's utility, which has weight λ . The parent's income, I_p , is exogenous.

$$U_p = \ln(I_p - B) + \lambda[\ln(we + B) - \psi(e)]$$

First, take the case where the parent is able to commit to a set level of bequest in advance. The child will then choose effort that equalizes the marginal cost and benefit of working. Effort will be such that: $\frac{w}{we+B} = \psi'(e)$. Knowledge of this reaction function informs the choice of bequest which the parent will promise the child.

Next, following the earlier examples above, let us consider the case where the

¹These points were first made by Bergstrom (1989).

parent chooses the bequest *ex post*, after observing the child's effort - perhaps because she lacks a credible commitment mechanism. Again, the bequest takes the form

$$B = \frac{\lambda I_p - we}{1 + \lambda} \quad (1)$$

and thus is negatively related to the child's effort and income. Knowing this reaction function, the child will choose effort to maximize U_c , yielding the first order condition for effort

$$\frac{\frac{\lambda}{1+\lambda}w}{we + B} = \psi'(e)$$

Compared to the case where the bequest is committed in advance, here the marginal benefit of one extra unit of effort is altered by a factor of $\frac{\lambda}{1+\lambda} < 1$. The fact that the bequest depends on the effort level modifies the marginal benefit of effort, but not its marginal cost, and therefore creates a distortion in the effort choice similar to a tax wedge. The lower effort chosen by the child will generally make the parent worse off than in the commitment case.

Building on this example, in Sections 4 and 5 we explore the interplay between endogenous effort choice of children and the pattern of parental transfers when there is a potential for distorted effort choices. We explore whether altruistic parents have an incentive to protect themselves from these distortions and engineer transfers to their children in a manner that departs from the behavior predicted by the standard altruistic model where parents fully compensate for poor economic performance of

their children.

In line with the usual formulation of the dynastic model of the family, we consider a single-headed household where the *pater familias* is altruistic. We also focus on a one-directional flow of transfers from the parent to the child, as implied by the assumption of a selfish child, and consistent with the vast empirical evidence showing that resources tend to flow from the old to the young.²

The model departs from the standard set-up in considering a world where parents have less than complete information on their children's effort, and study how parents set transfers under different hypotheses on their ability to pre-commit to a specific transfer scheme.³

Before turning to the model, we review the most recent empirical literature on altruism.

3 Empirical Tests of Altruism in the Family

The typical approach to testing altruism is to try to detect whether higher transfers are directed to the children with lower income in families with multiple children, as predicted by the standard formulation of the altruistic model of Barro (1974) and Becker (1974).

One of the first empirical studies is due to Tomes (1981). In a random sample of

²See the discussion in Becker (1981) p.302, and in Bergstrom (1996).

³Kotlikoff and Razin (1988) study transfers from an altruistic parent to a child whose ability is unobservable.

probated estates in the Cleveland, Ohio area in 1964-65, Tomes finds strong evidence that bequests are negatively related to recipients' income. He computes an elasticity evaluated at the mean inheritance of -0.92 suggesting strong evidence in support of the altruistic hypothesis.

Menchik (1980) uses instead data drawn from the probate records of the Inheritance of the Connecticut State Tax Department. His sample is particularly apt for the study of distribution rules of bequests, in that the law of Connecticut does not provide incentives to alter bequest patterns across children. The sample includes only estates of fairly wealthy people (\$40,000 or more in 1980 dollars) and also provides (not very reliable) information on the *inter vivos* gifts made by the testator. Menchik finds that, on a subsample of estates from families with two or more children of different sex, bequests are mostly shared equally among children. In 82 families with two children of opposite sex, in 60% of cases the children received exactly the same amount, and in 25% of cases the female received more. His finding is robust to the inclusion of information on *inter vivos* gifts. Menchik's results suggest that, in the majority of the cases, characteristics of the recipient do not influence the size of transfers received, thereby casting strong doubts on the compensatory role of bequests.

More recently, Laitner and Juster (1996) tested the altruistic hypothesis on data from a sample of 1064 fairly wealthy annuitants of the TIAA-CREF retirement system. The authors are able to couple information on family assets and demographics with answers to questions on the attitude of participants towards leaving bequests. Around 50% of the respondents maintain that leaving an estate is "quite" or "very

important". Only 21% of the people without children think that leaving an estate is important. Although the attitude of childless individuals is significantly different from that of people with children, the difference is narrower than would be predicted by the altruistic model.⁴

The questionnaire also provides information on how people rank the expected level of income of their children relative to their own. Using this information, the authors test whether parents who care about leaving bequests accumulate more assets when they expect their children to do relatively worse than themselves. The authors find that the subsample of the "caring" respondents do indeed accumulate more assets when their children are expected to have lower income, and they do so all the more, the worse is the expected performance of their children. The subsample of people who do not care about leaving an estate do not react in any significant way to the expected performance of their children.

On the Estate-Income Tax Match data set, Wilhelm (1996) is able to test the altruistic model of bequest using data drawn from the extreme upper tail of the wealth distribution - the average child's inheritance in his sample being \$238,000. He finds that 69% of decedents divide their estate exactly equally among their children. He also finds that large earning differentials make unequal division of wealth more likely, although bequests provide only a small compensation to children with low earnings: his fixed-effects estimates report that, in the subsample of parents who divide their bequests unequally, children whose earnings are \$1 below the within-family average

⁴Hurd (1987) finds no major differences in saving patterns of families with or without children.

receive around \$0.13 more than the average inheritance of their siblings.

The work reviewed so far concentrated on testing the hypothesis of altruistic behavior on bequest patterns. The work by Altonji, Hayashi, and Kotlikoff (1992) focuses on *inter vivos* transfers and uses data from the PSID to test the altruistic hypothesis in an ingenious way. They test whether own consumption of a family member is reactive to own resources, after controlling for the combined family resources. The authors find that own resources enter with a positive and significant coefficient when regressing food expenditure on a vector of demographics, own earnings, and a family fixed effect. Their result is robust also when the regression is restricted to the subsample of parents with income above the median and relatively poor children.

Their test strongly rejects the standard implications of the altruistic model that transfers are set so as to equalize marginal utilities within the family. In a sense, this result is not surprising, given the small amount of transfers going on in the PSID: most families might be at a corner for gifts to their children after that they paid for college tuition, which is not reported in the PSID data set.

In the following sections, we argue that the limited correlation (or lack thereof) between transfers and children's earnings/characteristics highlighted in the studies of Menchik (1980), Altonji et al. (1992), and Wilhelm (1996) is consistent with a model of pure altruism where children choose unobservable effort and parents use transfers strategically to limit children's shirking.

4 A Simple Model with Uncertainty

4.1 Preferences

Building on the model presented in Section 2, we now assume that the income of the child is stochastic, depending on the state of the world $s \in \{H, L\}$. The child can influence the state of the world by her effort choice. I restrict effort to be either high (e_h) or low (e_l), with disutility of effort $\psi(e_h) = c_h > \psi(e_l) = c_l$. High effort is costly but rewarding: if the child chooses $e_i = e_h$, she will have a high realization of income Y_H with probability π_h and a low realization of income $Y_L < Y_H$ with probability $(1 - \pi_h)$. If instead she chooses the low action, the probability that the income is high is $\pi_l < \pi_h$. To summarize,

$$Y_s = \begin{cases} Y_H & \text{with prob. } \pi_h \text{ and } Y_L & \text{with prob. } 1 - \pi_h & \text{if } e = e_h \\ Y_H & \text{with prob. } \pi_l \text{ and } Y_L & \text{with prob. } 1 - \pi_l & \text{if } e = e_l \end{cases}$$

To make the problem interesting, I assume that the high income realization can never be certain, i.e. $\pi_h < 1$.

The child has concave utility in consumption $C_{c,s}$ and separable disutility from effort. For simplicity, say

$$U_{c,s}(e_i) = \ln(C_{c,s}) - \psi(e_i)$$

The budget constraint of the child is

$$C_{c,s} \leq Y_s + B_s$$

where B_s is the transfer the child receives from the altruistic parent, and Y_s is her stochastic income.

The parent is altruistic and cares about her own personal utility from consumption $C_{p,s}$ and her child's utility (including the child's disutility of effort). We assume, as before, that the child's utility enters parental utility additively with weight $\lambda \in (0, 1]$. The parent's utility is

$$U_{p,s} = \log(C_{p,s}) + \lambda[\log(C_{c,s}) - \psi(e_i)]$$

with budget constraint

$$C_{p,s} \leq I_p - B_s$$

where I_p is fixed parental income.

In what follows, we consider the interaction between parent and child under different hypotheses on the parent's ability to observe child's effort and to commit to a specific course of action.

4.2 Full information with commitment

Let us consider first the benchmark case where the parent can observe the child's action and can credibly commit to a transfer path.

The timing of the interaction is as follows: the parent calculates in advance her expected utility under the low and high action to determine which action to elicit from the child. To do so, she takes into account the optimal bequest levels for her to provide in each case. The assumptions of perfect observability of effort and credible commitment allow her to dictate a choice of effort to the child under the threat of disinheritance.

In calculating her expected utility under each action and state of the world, the parent will choose bequest levels to maximize

$$\max_{B_s} U_{p,s} = \log(I_p - B_s) + \lambda[\log(Y_s + B_s) - \psi(e_i)]$$

subject to transfers B_s being non-negative.

The first order condition to this problem is

$$\frac{Y_s + B_s}{I_p - B_s} = \lambda + \mu_s(Y_s + B_s) \text{ for } s \in \{H, L\} \quad (2)$$

where μ_s are the multipliers appended to the non-negativity constraints on B_s .

(2) can be written in the more familiar form

$$\frac{C_{c,s}}{C_{p,s}} = \lambda + \gamma_s$$

where the non-negativity multiplier is redefined as $\gamma_s \equiv \mu_s C_s$.⁵

If the bequest is operative (non-zero), the parent equalizes the ratio of her marginal utility to the child's marginal utility from consumption across states, thereby providing full insurance against income fluctuations. Note that the level of effort does not enter the parent's first order condition, so that she will offer a bequest B_H in the high state of the world and B_L in the low state irrespective of the child's effort choice. Given $Y_H > Y_L$, it follows that $B_H < B_L$, i.e. that more resources are transferred to the child in the bad state of the world.

Knowing B_H and B_L , the parent can then calculate her full-information (*FI*) expected utility under the two choices of effort, according to

$$\begin{aligned} EU_p^{FI}(e_i) &= \pi_i \{ \ln(I_p - B_H) + \lambda [\ln(Y_H + B_H) - \psi(e_i)] \} \\ &\quad + (1 - \pi_i) \{ \ln(I_p - B_L) + \lambda [\ln(Y_L + B_L) - \psi(e_i)] \} \end{aligned}$$

Say the high action yields the higher expected utility for the parent, so

$$EU_p^{FI}(e_h) > EU_p^{FI}(e_l)$$

Then the parent will offer the child the following contract: if $e = e_h$, then $B = B_H$ if $s = H$ and $B = B_L$ if $s = L$; if $e = e_l$, then $B = 0$ in every state of the world.

⁵Note that $\gamma_s = 0$ whenever $\mu_s = 0$, so that redefining the multiplier is harmless.

The child will accept the contract as long as the threat is credible and the utility from complying with the parent's will is higher than the utility of being disinherited. In other words, the child will accept the contract, provided her individual rationality constraint is satisfied.

The child's expected utility from opting out of the family is

$$EU_c^{OUT}(e_i) = \pi_i \log(Y_H) + (1 - \pi_i) \log(Y_L) - \psi(e_i)$$

As long as $EU_c^{FI}(e_h) > EU_c^{OUT}(e_i)$, the child will accept the contract.

4.3 Asymmetric information without commitment: the discretionary regime

Consider now the case where the parent cannot observe the child's effort, but only her income realizations. Let us also assume that the parent cannot credibly commit to any transfer schedule ahead of time. We will call this case the "discretionary regime".

The timing of the interaction between parent and child is as follows: the child chooses unobservable effort, income is realized, the parent observes income, and finally chooses bequest levels.

Given the income realization, the parent will select transfers to maximize *ex post* utility

$$\max_{B_s} U_{p,s}(e_i) \equiv \ln(I_p - B_s) + \lambda[\ln(Y_s + B_s) - \psi(e_i)]$$

The first order condition for B_s is

$$\frac{Y_s + B_s}{I_p - B_s} = \lambda + \gamma_s \text{ for } s \in \{H, L\} \quad (3)$$

where γ_s is the modified multiplier appended to the non-negativity constraint.

It is not surprising that the first order condition for transfers is the same as in (2): both in full information and discretion, the *ex post* parent's optimal transfer schedule is the one that smooths her and her child's marginal utility ratios across states of the world.

What differs here is the ability of the parent to elicit the action from the child which yields her the higher expected utility. In fact, in the first stage of this game, the child, knowing how bequests will be awarded, calculates expected utility under the high and low action and chooses the more rewarding one. For some values of the parameters, it can happen that the child is *ex ante* made better off by choosing the low action, while the parent would be made better off by the high action. If this is the case, the high action is not incentive compatible and is not chosen by the child.

If the parent is able to observe effort and to credibly threaten disinheritance, she can resolve this conflict in her favor. In the next section we will show that, even when effort is not observable, the parent can engineer her transfers strategically so as to induce the choice of the high action and obtain higher utility, provided that she can credibly commit to a bequest schedule.

5 A Principal-Agent Perspective

In what follows, we first identify the instances where the parent would want the child to enact the high action but this is not incentive compatible for the child in the discretionary equilibrium. We then consider how, in the case where the parent cannot observe the child's action but can credibly commit to a transfer menu, the parent chooses bequests to offer in the low and high states, in order to elicit the desired action from the child.

We will deal with each issue in turn.

5.1 Conflict in the family, or when the principal-agent framework can be meaningfully applied

An interesting case arises when, under the discretionary regime, the parent's and child's preferred actions diverge - given the transfers structure, the child is better off by exerting low effort, while the parent is better off if the child works hard. Note that this divergence can occur even if the parent is motivated by pure altruism and does not put any paternalistic weight on the child working hard *per se*. In this case, a principal-agent framework can be meaningfully applied.

The conditions under which this conflict arises can be specified as follows.

The child chooses e_l in the discretionary regime (D) if

$$EU_c^D(e_l) > EU_c^D(e_h) \tag{4}$$

where $EU_c^D(e_i) = \pi_i \ln(Y_H + B_H) + (1 - \pi_i) \ln(Y_L + B_L) - \psi(e_i)$, and B_H and B_L

satisfy (3).

The parent prefers the high action in discretion if

$$EU_p^D(e_h) > EU_p^D(e_l)$$

i.e. if

$$\begin{aligned} & \pi_h \ln(I_p - B_H) + (1 - \pi_h) \ln(I_p - B_L) + \lambda EU_c^D(e_h) \\ & > \pi_l \ln(I_p - B_H) + (1 - \pi_l) \ln(I_p - B_L) + \lambda EU_c^D(e_l) \end{aligned}$$

or

$$(\pi_h - \pi_l) [\ln(I_p - B_H) - \ln(I_p - B_L)] > -\lambda (EU_c^D(e_h) - EU_c^D(e_l)) \quad (5)$$

The altruistic parent prefers the high action when the marginal benefit in terms of her personal utility of consumption weighted by $(\pi_h - \pi_l)$ is greater than the expected reduction in utility of the child weighted by λ .

Since $\pi_h > \pi_l$ and $B_H < B_L$ the *LHS* of (5) is positive. If the child herself prefers the high action to the low action in the discretionary equilibrium, the *RHS* of (5) is negative and the condition holds trivially - the parent's and child's interests are unambiguously aligned. But if the child prefers the low action in the discretionary equilibrium, (5) becomes a meaningful restriction.

Note that, if $EU_c^D(e_l) > EU_c^D(e_h)$ is satisfied with discretionary transfers, then $EU_c^D(e_l) > EU_c^{OUT}(e_h)$ - the individual rationality constraint - holds as well, due to the non-negativity of transfers, and the child has no incentive to opt out of the family.

5.2 The committed transfer scheme

Let us focus now on the case where (4) and (5) hold, i.e. the parent wants to implement the high action while the child would choose the low action, were the discretionary regime to prevail. Assume now that the parent, though unable to monitor the child's action, can credibly commit to a transfer scheme contingent on income realizations. This is a set-up analogous to that of familiar principal-agent models.

In order to prevent the child from enacting the low action, the parent must engineer the transfers so that choosing the low action becomes less appealing. Intuitively, she can achieve that by lowering the transfers in the low state (offering less insurance) and increasing transfers in the good state of the world (offering an incentive to work harder).

More formally, if the parent wants to elicit the high action, she will choose B_H^C , and B_L^C so as to maximize her expected utility

$$\begin{aligned} \max_{B_H, B_L} EU_p^C(e_h) = & \pi_h \ln(I_p - B_H) + (1 - \pi_h) \ln(I_p - B_L) \\ & + \lambda [\pi_h \ln(Y_H + B_H) + (1 - \pi_h) \ln(Y_L + B_L) - e_h] \end{aligned}$$

subject to the incentive compatibility constraint of the child

$$EU_c^C(e_h) \geq EU_c^C(e_l)$$

where $EU_c^C(e_i) = \pi_i \ln(Y_H + B_H) + (1 - \pi_i) \ln(Y_L + B_L) - \psi(e_i)$. The superscript C indicates the “commitment regime”.

The first order conditions for this problem are

$$\frac{Y_H + B_H}{I_p - B_H} = \lambda + v \frac{\pi_h - \pi_l}{\pi_h} + \gamma_H \quad (6)$$

$$\frac{Y_L + B_L}{I_p - B_L} = \lambda - v \frac{\pi_h - \pi_l}{1 - \pi_h} + \gamma_L \quad (7)$$

where v is the multiplier associated with the incentive compatibility constraint and γ_s are the modified non-negativity multipliers. As is standard in this type of problems, the parent (principal) will want to keep the child (agent) indifferent between the high and the low action. As a result, $v > 0$.⁶

With $v > 0$, the first order conditions imply that $B_H^C \geq B_H^D$ and $B_L^C \leq B_L^D$, with the sign of equality holding when transfers are not operative.

Conditions (6) and (7) have an intuitive interpretation: in order to elicit the high action the parent must give up some insurance and therefore choose a more

⁶If it were the case that $v = 0$, transfers under commitment would be the same as in the discretionary regime. Given our assumptions, the child would then be better off by choosing the low action (and the parent would be made worse off by it) implying a violation of the incentive compatibility constraint.

“compressed” pattern of transfers than the one she would choose with full information and commitment - when no moral hazard issue arises - and in the discretionary regime where the parent gives way to the child. In other words, bequest levels are less reactive to differences in income realization in good and bad states of the world. Similarly, we would also expect bequests to react less to earning differentials within families with more than one child.

5.3 A single committed bequest

Finally, suppose the parent cannot credibly commit to a schedule of bequests which responds to income realizations, but is able to commit to a single level of bequest. For example, a child might not find credible a promise of partial insurance, believing that the parent would yield to the temptation to revert to the full discretion bequest levels once the income realizations were known; but the same child might instead believe a parent who promises to give a set level of bequest - particularly if the promise is to give the same bequest to all children. Another interpretation of this outcome is that the parent might face computational costs which cause her to prefer commitment to a single bequest level rather than to a schedule.

This adds a further restriction to the analysis of the previous case: that $B_H^C = B_L^C = B^{SC}$, where SC stands for “single level committed” bequest. This restriction must result in the parent being worse off than under the full commitment variant above, but - as will be clear from our numerical example - may still result in greater expected utility for the parent than the discretion option.

In terms of the empirical implications of this setup, to the extent that opting for a single level of bequest is a more viable commitment alternative for parents, observing equal bequests in families where children have different income patterns would not necessarily imply a rejection of altruistic behavior.

6 A Numerical Example

A numerical illustration can help shed light on transfer patterns under discretion and commitment when there is uncertainty on the child's income realization and asymmetric information.

Consider the model as it was developed in Section 5 and the following values of the parameters: $\pi_h = 0.8$, $\pi_l = 0.2$, $I_p = 30$, $Y_H = 20$, $Y_L = 5$, $\psi(e_h) = 1$, $\psi(e_l) = 0.5$.

Table 1 reports the relevant information for different values of λ . Columns 2 and 3 show the transfers that the parent would choose *ex post* in the high and low state, B_H^D and B_L^D . The non-negativity constraint on bequests is biting for both B_H and B_L for $\lambda = 0.1$, and for B_H alone for $0.2 \leq \lambda \leq 0.6$. Columns 4 and 5 show the resulting expected utility for the child under high and low effort. The child's preferred choices are shown in bold. Columns 6 and 7 show the parent's expected utility under high and low effort, again with their preferred outcome in bold.

For low levels of λ , $0.1 \leq \lambda \leq 0.3$, both the child and parent have higher expected utility under high effort, so no conflict of interest arises. Here the parent does not care enough about the child to grant a bequest sufficient to influence the child's effort choice. Nor does a conflict of interest arise for $0.8 \leq \lambda \leq 1$, when the parent gives so

much weight to the child's interest that this over-rides the disutility from giving up her own consumption caused by the high levels of bequest. As a result, both parent and child prefer the low action.

However, for $0.4 \leq \lambda \leq 0.7$, the child is better off with exerting low effort while the parent would want her to choose high effort, and a conflict of interest results. In other words, under discretion, the child is able to call the shots, and will choose the low action, forcing the parent to accept a lower expected utility than she would want. Charts 1 and 2 show the same information graphically.

Table 1: Discretion

λ	B_H^D	B_L^D	$EU_c^D(e_h)$	$EU_c^D(e_l)$	$EU_p^D(e_h)$	$EU_p^D(e_l)$
0.1	0	0	1.72	1.39	3.57	3.54
0.2	0	0.83	1.75	1.51	3.75	3.68
0.3	0	3.08	1.81	1.77	3.92	3.85
0.4	0	5.00	1.86	1.94	4.11	4.03
0.5	0	6.67	1.89	2.06	4.29	4.23
0.6	0	8.13	1.91	2.16	4.48	4.44
0.7	0.59	9.41	1.95	2.24	4.68	4.664
0.8	2.22	10.56	2.06	2.32	4.88	4.89
0.9	3.68	11.58	2.09	2.38	5.08	5.13
1	5.00	12.50	2.15	2.43	5.30	5.37

Chart 1: Expected utility of child, discretion case

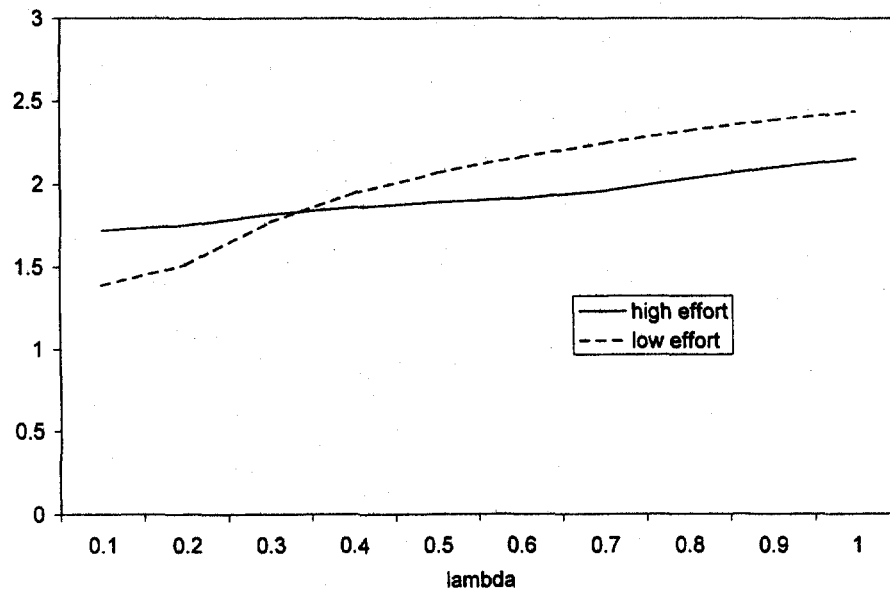


Figure 1.1:

Chart 2: Expected utility of parent, discretion case

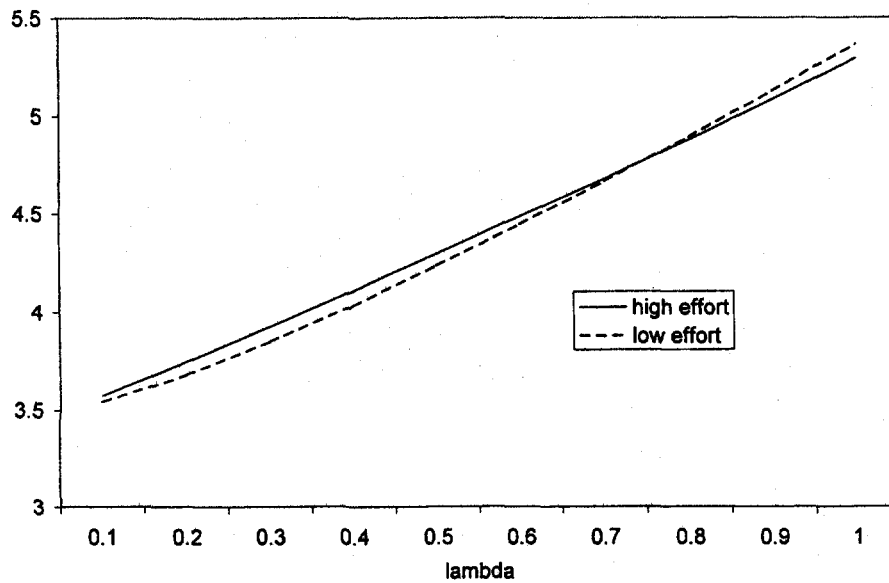


Figure 1.2:

Results in table 2 highlight how the parent can resolve this conflict of interest in her favor if she is able to commit to a bequest menu in advance. The first section reports bequests and expected utility levels of the child and parent if the parent can commit to a schedule of bequests conditional on income realizations. B_H^C and B_L^C solve the problem set up in Section 5 and are the transfers that maximize the parental expected utility for different values of λ . Moreover, for the relevant range of λ ($[0.4, 0.6]$), the spread between B_H^C and B_L^C is lower than the spread between B_H^D and B_L^D and the level of bequest reacts to income realization less than under discretion and thus provides less insurance. This happens in order to keep the child's incentive compatibility constraint satisfied.⁷

The parent's expected utility under the high action, reported in column 6, is lower than (or equal to) the expected utility under the high action in discretion (table 1, column 6), but is now always attainable, because the high action is incentive compatible for the child.

The parent will opt for the commitment regime only if she gains higher expected utility than under discretion: these cases, for $0.4 \leq \lambda \leq 0.6$, are shown in bold. For example, even though under discretion the parent would have preferred the high-effort outcome to the low-effort outcome for $\lambda = 0.7$, she does not choose to commit, because her expected utility with the low action under discretion exceeds the reduced high-effort utility she would get under commitment.

⁷Note that this is not the case for the range $0.1 \leq \lambda \leq 0.3$, where, even under discretion, the child herself prefers the high action.

Table 2: Commitment

λ	bequest schedule					single bequest		
	B_H^C	B_L^C	$EU_c^C(e_h)$	$EU_c^C(e_l)$	$EU_p^C(e_h)$	B^{SC}	$EU_c^{SC}(e_h)$	$EU_p^{SC}(e_h)$
0.1	0	0	1.72	1.39	3.57	0	1.72	3.57
0.2	0	0.83	1.75	1.51	3.75	0	1.72	3.75
0.3	0	3.08	1.81	1.77	3.92	0	1.72	3.92
0.4	0	3.69	1.83	1.83	4.11	0	1.72	4.09
0.5	0	3.69	1.83	1.83	4.29	1.26	1.81	4.26
0.6	0.01	3.70	1.83	1.83	4.47	2.72	1.91	4.45
0.7	1.93	4.53	1.92	1.92	4.66	4.10	1.99	4.65
0.8	3.63	5.27	2.00	2.00	4.86	5.38	2.06	4.85
0.9	5.14	5.93	2.06	2.06	5.06	6.53	2.11	5.06
1	6.50	6.52	2.11	2.11	5.27	6.53	2.11	5.27

Chart 3 illustrates the parent's choice between discretion and commitment.

The second section of table 2 reports bequest levels arising when the parent is able to commit in advance only to a single level of bequest. Here the parent obtains lower (or equal) expected utility than when she can commit to a schedule, but for $0.4 \leq \lambda \leq 0.6$, she still obtains higher utility than under discretion (table 1, last column). She would therefore choose this option if it were all that was available to her.

Chart 4 graphs the bequest patterns arising under the different hypotheses on the

Chart 3: Expected utility of parent, commitment vs discretion

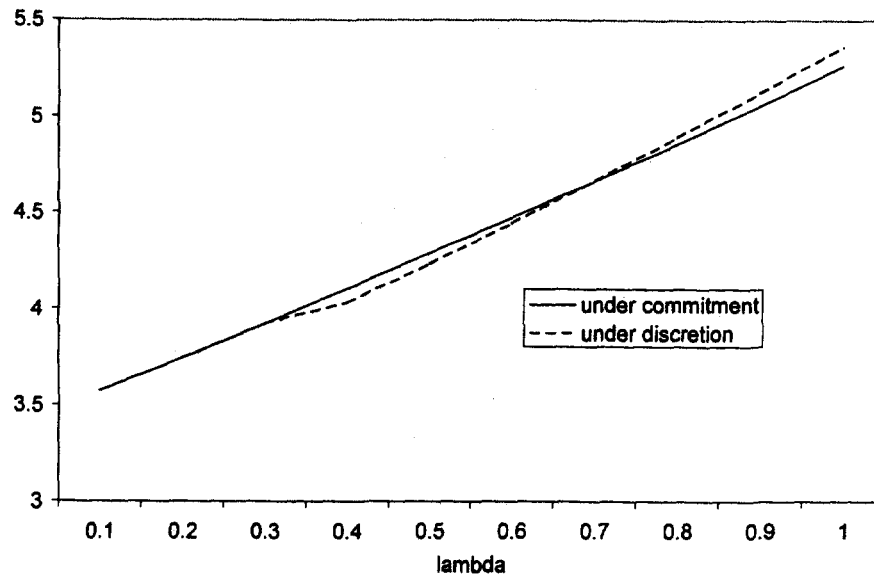


Figure 1.3:

ability to commit.

The solid lines show the bequests resulting in the discretion case. The gap between the bequests awarded in the low and high income realizations reflects the insurance provided to the child by the altruistic parent, subject to non-negativity constraints. The dotted lines show the bequests arising under commitment: compared to the discretion case, bequests are reduced for the low income realization and increased for the high realization. This represents the reduction in insurance necessitated to prevent the child from choosing the low action. Finally the dashed line shows the single level of committed bequest which maximizes the parent's utility under high effort, again subject to the requirement that the child does not prefer the low effort choice. Here the parent is offering no insurance at all.

Chart 4: Bequests under commitment and discretion

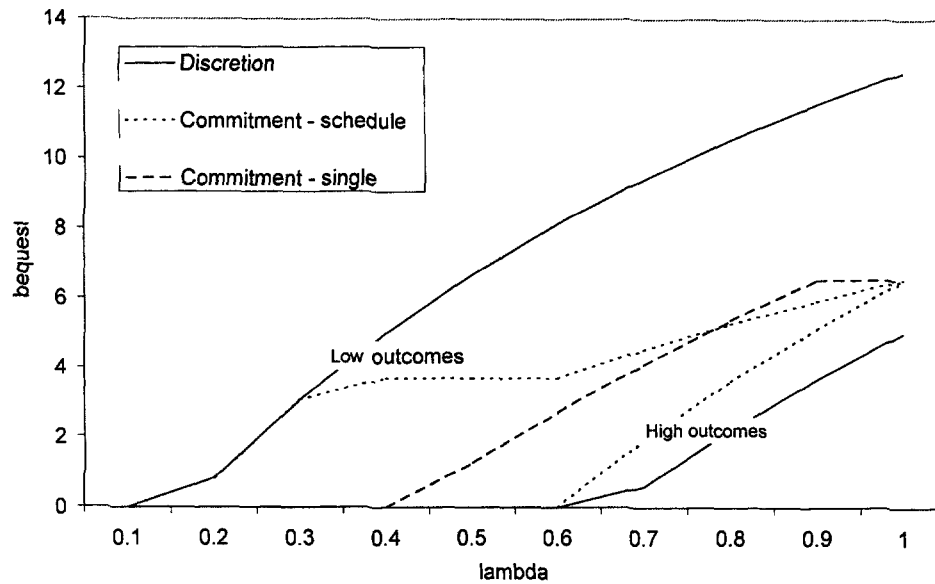


Figure 1.4:

7 Ricardian equivalence

The stark implication of the standard altruistic model of the family for the effectiveness of redistributive policies - summarized in the well known tenet of Ricardian equivalence - have drawn much attention in the theoretical and empirical literature.

In the typical Ricardian experiment, the government issues one-period debt to the current generation and plans to retire the debt at a later date by raising lump sum taxes from future generations. In the standard altruistic model, when faced with the resource transfer implemented by the government, parents re-adjust their bequest levels to equalize marginal utilities from consumption within the family. As a result,

bequest flows undo the public transfer, which therefore does not produce real effects.⁸

It is interesting to see whether Ricardian equivalence holds in the altruistic model of the family once we allow for endogenous child effort and uncertainty. A priori we expect that Ricardian equivalence should follow in most cases. In particular, in the case of commitment, Ricardian equivalence should hold as long as the government transfer does not modify the incentive compatibility constraint.

We can easily see the effects of a Ricardian-like transfer in our setup by going back to the numerical example. Let's assume that the government transfers 1 unit from the young to the old, thereby raising parental income, I_p , and lowering child's income in the high state, Y_H , to 19 and income in the low state, Y_L , to 4.

In the discretion case, the parent chooses to fully compensate the child *ex post* and, by doing so, she re-equilibrates marginal utilities across the family in the high and low state. Because of this, bequest levels increase by exactly 1 in both states and completely offset the transfer of resources initiated by the government. In other words, Ricardian equivalence holds. This of course will happen only if transfers are operative.

The case of commitment is not conceptually dissimilar from the discretionary case. Nonetheless, the presence of the non-negativity constraint on bequests and the additional incentive compatibility constraint complicate somewhat the results.

Again, in most cases in which bequests are operative before the government transfer, bequests increase by one unit to offset the government action. However, for

⁸Barro(1974) discusses the conditions under which the result holds.

$\lambda = 0.4$ and $\lambda = 0.5$, when bequests in the high state are constrained to be zero before and after the government transfer, bequests in the low state increase by less than 1. This is because of the incentive compatibility constraint: were bequests to rise by as much as 1, the child would face in the low state too strong an incentive to shirk, and would therefore choose the low effort action, to the detriment of the parent. In other words, because the non-negativity constraint on the high-state bequest is binding, the incentive compatibility constraint prevents the bequest in the low state from rising enough to fully offset the government action.

In the case of single bequest, bequest increases by 1 whenever positive. This is not surprising, as Abel and Bernheim (1988) had already shown that Ricardian equivalence goes through in a deterministic altruistic model where the bequest is constrained to be equal across children with different endowment.

We should conclude that, in principle, Ricardian equivalence holds in the altruistic model with endogenous effort and uncertainty. Nonetheless, it is important to note that, non-negativity constraints might be, as in the standard model, an important reason for the failure of the equivalence and for governmental transfers to have real effects. Moreover, in the case of commitment, non-negativity constraints combined with the conditions for incentive compatibility make it such that the government transfer does not translate one-to-one into an increase in bequest even in the state of nature with operative transfers.

Table 3: Ricardian Equivalence Experiment

	Bequest with commitment				Single bequest	
	before		after		before	after
λ	B_H^C	B_L^C	B_H^C	B_L^C	B_H^{SC}	B_H^{SC}
0.1	0	0	0	0	0	0
0.2	0	0.83	0	1.83	0	0
0.3	0	3.07	0	4.07	0	0
0.4	0	3.692	0	4.25	0	0.74
0.5	0	3.692	0	4.25	1.25	2.25
0.6	0.012	3.697	1.012	4.697	2.72	3.72
0.7	1.93	4.53	2.93	5.53	4.10	5.10
0.8	3.63	5.27	4.63	6.27	5.38	6.38
0.9	5.14	5.92	6.14	6.92	6.53	7.53
1	6.49	6.51	7.49	7.51	6.53	7.53

8 Conclusion

We have shown that once we allow a role for asymmetric information and for endogenous effort choice on the child's side, the altruistic model of the family is compatible with diverse patterns of inter-generational transfers. In particular, if parents are able to commit in advance to a transfer schedule, we find circumstances in which they might not fully compensate poor economic performance of their children, in order to elicit more effort from them. Such partially compensatory behavior on the part

of parents is consistent with the findings of various recent empirical studies, such as Wilhelm's (1996) and Altonji et al. (1992) that had put into discussion the ability of the standard altruistic model to realistically characterize family behavior.

We also discussed that, if parents find it difficult to adhere to a credible bequest schedule which responds to income realizations, they might choose to commit to a single level of bequest. In this case, parents completely forego the insurance that they otherwise could have offered the child in exchange for ensuring that the child does not shirk in her effort choice. This would point to bequests being divided exactly equally among siblings, as emerges from Menchik's (1980) empirical work.

It therefore becomes clear that most tests of the dynastic model of the family are actually tests of the joint hypotheses of altruism and discretionary behavior on the part of parents and that incorporating issues of moral hazard into empirical tests of bequest patterns could be very insightful. To the extent that moral hazard plays an important role in the family, we would expect parents to be more willing to transfer resources that provide actual insurance to their children when luck can be more easily disentangled from effort - for example, when such occurrences as disability or illness take place.

This analysis relies on the hypothesis that parents can credibly commit to bequest actions in advance. Per se, such a commitment is not time consistent. However, it is not unrealistic to think that parents build credibility and, thus, ability to commit to some transfer pattern, either through repeated financial interaction with their children or through setting behavioral examples in other areas of interaction with

their offspring. In particular it seems likely that a promise of equal bequests for all children might more easily be found credible. It may even be that society has built up a “norm” of equal bequests through the repeated play of what at first sight is the ultimate one-shot game.

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