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Fairness in the Family:
Implications for Parent-Adult Child Interactions

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ABSTRACT

This paper advances the hypothesis that transfers of contact/in-kind help and money between parents and an adult child reflect concerns for fairness and reciprocity, and may be interpreted as a 'gift exchange'. It is inspired by recent evidence from experiments that suggests that even strangers behave in accordance with concerns for fairness and reciprocity. The implications of this hypothesis for the relationship between parents' resources and frequency of contact/in-kind are contrasted with those of efficient exchange and family constitution models of intergenerational transfers. Empirical evidence from the British Household Panel Study provides stronger support for the gift exchange model than the efficient exchange or binding constitution models.

Contact with their adult children, as well as help from them, is usually valued by parents, and can be viewed as particular examples of 'services' from children to their parents that do not have good market substitutes (Cox, 1987). This contact/help comes at some cost to their children, at least at the margin. In advanced economies like Great Britain, parents are often observed making financial transfers to their adult children, but financial transfers in the opposite direction are rare. This paper advances the hypothesis that these transfers of services and money between parents and an adult child reflect concerns for fairness and reciprocity, and may be interpreted as a 'gift exchange', borrowing an idea of Akerlof (1982), which he applied to labour contracts. This hypothesis is inspired by recent evidence from experiments that suggests that even strangers behave in accordance with concerns for fairness and reciprocity. It has an implication for how parents' resources affect the transfer of services from adult children to parents, which differs from that derived from a model of family interactions based on the assumption that family outcomes are efficient, which we shall call the 'efficient exchange' model. It also differs from the prediction of a 'family constitution' model (Cigno 1993, 2000) when people are selfish, so that the transfers of money and services prescribed the constitution are binding. Empirical evidence from the British Household Panel Study provides stronger support for the gift exchange model than the efficient exchange or binding constitution models.

The first section of the paper summarises the relevant experimental evidence, and the second derives the empirical implications of the gift exchange, efficient exchange and family constitution models. Section 3 describes the data, and section 4 discusses statistical issues that arise because of the nature of these data. The fifth section discusses the empirical results regarding how parents' receipt of in-kind help from and contact with their adult children vary with parents' and children's economic resources. Section 6 presents corresponding results for financial transfers from parents to children, and the seventh section discusses how the impacts of parents' resources on transfers of services from children to parents operate through the choices of location of parents relative to children. Section 8 concludes.

1. Experimental Evidence

There is a growing body of evidence from experimental economics that a substantial proportion of people are concerned with the fairness of outcomes—they do not behave in the pure self-interested way of *homo economicus* (e.g see the surveys in Fehr and Fischbacher, 2002, and Fehr and Gächter, 2000). Fehr and Schmidt (1999), hereafter FS, show that if

some people care about equity, then the outcomes from a number of very different games are consistent with one another. The economic environment determines whether the fair types or the selfish types dominate equilibrium behaviour. FS found that a particular form of 'social preferences' is able to reconcile the experimental evidence from different environments. As these preferences are consistent with the behaviour of strangers who interact, they should be at least as relevant for family members.

Fehr, Kirchsteiger and Riedl (1993) introduced the 'gift exchange game' (GEG) to test Akerlof's (1982) approach to labour contracts. Their experiment was framed in 'goods market' terms (buyers, sellers, prices etc.), and the traders were anonymous. Here the GEG is discussed with reference to a parent and an adult child in order to foster continuity with what follows. In the first stage, the parent offers a transfer T, where $T \geq \underline{T} \geq 0$. The child can accept or reject T; if she accepts, then she provides a level of 'service' S to her parent, such as frequency of contact or help, where $\underline{S} \leq S \leq S^*$ and $\underline{S} > 0$. The payoff to the parent (the 'proposer') is $x_P = vS - T$, and that of the child (the 'responder') is $x_C = T - c(S)$, where v is the marginal value of the service and $c(S)$ is the strictly increasing service cost function. That is, the parent provides a gift of $T - \underline{T}$, and the child may respond by giving a gift of $S - \underline{S}$. Assume, as is conventional, that both the proposer and responder are rational and care about their return and that the proposer knows that the responder is rational and selfish. Then the sub-game perfect equilibrium of this game is for the child to accept whatever T that is offered, and to provide the minimum service level, $\underline{S}$. Anticipating this response, the parent offers the minimum transfer $\underline{T}$.

In contrast to this prediction, the experimental studies of the GEG cited in Fehr and Fischbacher (2002) generally find that there is a strong positive correlation between the mean T and the mean S. There is also evidence of individual heterogeneity among responders, with a substantial proportion behaving in a reciprocal manner, rewarding higher T with higher S, but another substantial fraction behaving selfishly, in the manner suggested by the sub-game perfect equilibrium. While many of these studies have competing responders, Fehr and Falk (1999) find that the results are similar when a proposer is randomly matched with one responder (their 'bilateral condition').[1]

The *social preferences* introduced by FS can account for this outcome, as well as those from many other games. These preferences assume that people experience a welfare

loss if they are worse off in material terms than their 'trading partner', and their welfare also suffers if they are better off. They take the form:

(1) $U_j(x_j) = x_j - \alpha_j \max[x_k - x_j, 0] - \beta_j \max[x_j - x_k, 0], j=P,C, j \neq k,$

where $\beta_j \leq \alpha_j$ and $0 \leq \beta_j < 1$. The second term on the right-hand side of (1) measures the utility loss from disadvantageous inequality, and the third measures the loss from advantageous inequality. If T is chosen in the GEG to satisfy $T > [v\underline{S} + c(\underline{S})]/2$, making $x_C > x_P$, inequity-averse children with sufficiently large β_C are willing to supply S at a level above $\underline{S}$. This is because children can reduce the inequality in outcomes by increasing S—they reciprocate the gift of $T\text{-}\underline{T}$ by one of $S\text{-}\underline{S}$. Note that each party's concern with inequity in private payoffs is very different from altruism, in which the altruist always values the beneficiary's utility positively.

An experiment using a representative sample of the German population (Fehr et al, 2002) provides further evidence for social preferences like those in (1). Members of this sample play a game similar in structure to the GEG, sometimes called the 'trust game'. Each player is endowed with the same amount of money (E), and the first mover (player A) can choose to give an amount x to the second player (B). The experimenter doubles the amount given, and after B is informed about the amount given, B can give an amount y to A, which is then doubled by the experimenter. Thus, the monetary returns of A and B are $\pi_A = E - x + 2y$ and $\pi_B = E + 2x - y$, respectively. In the absence of inequity aversion and with A's knowledge that B is rational and selfish, the sub-game perfect equilibrium is $x=0$, $y=0$; player B will not give A any money, and anticipating this A does not give any either. The experimental evidence contradicts this prediction. Only 17% of the A-players in the sample failed to transfer anything to player B, and three-fifths of them transferred 50% or more of their endowment (11% gave their entire endowment to B). Furthermore, A's transfer increased with the expected size of transfer from B, and B's transfer increased with A's actual transfer. These findings are consistent with the operation of social preferences akin to those in (1), particularly if A's uncertainty about B's preferences is taken into account.[2]

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[1] Fehr and Falk (1999) also find a positive correlation between T and S at the individual level for two-thirds of their sample, and they show that the positive T-S relationship continues to hold in a model with individual fixed effects.

[2] If B has a non-linear version of inequity-averse preferences, he/she would match what A gives dollar for dollar (i.e. $dy/dx=1$). If A knows that B had these inequity-averse preferences, he/she would give their entire endowment. With uncertainty about the nature of B's preferences and risk aversion, player A would give something less than his/her entire endowment, with the amount depending on the probability that B is selfish.

2. Models of Parent-Adult Child Interactions

The model suggested by the experimental evidence can be generalised somewhat. Let z_j be a person's private consumption. The parent's budget constraint is $y_P = T + z_P$, and the child's is $y_C + T = z_C$, where y_j is the person's income (endowment). Now x_j in (1) is taken to be person j's 'private utility', which is given by $x_P = A(S)z_P + v(S)$ for the parent and $x_C = A(S)z_C - c(S)$ for the child, where $v'(S) = dv/dS > 0$ and $c'(S) = dc/dS > 0$. This form of private preferences is a necessary and sufficient condition for the existence of *conditional transferable utility* (Bergstrom, 1989). Utility is transferable at a one-to-one rate through transfers of the private good, making it more reasonable to make the private utility comparisons in the social preferences given by (1). Recall that S represents services for which there is not a clear market substitute; thus we would expect that parents would be willing to sacrifice considerable consumption for these services. This suggests that the slope of the parent's indifference curves (dS/dz_P) should not be too steep. In the context of these private preferences, this slope is $-A(S)/[A'(S)z_P + v'(S)]$, and so they will be less steep if $A'(S) = dA/dS > 0$.[3] As we shall see in (3) below, $A'(S) > 0$ is also required for there to be positive income effects.

A seminal paper in the study of parent-adult child interactions by Cox (1987) assumed that outcomes are efficient. It is helpful for our later discussion to establish how families with the assumed private preferences would behave if they cooperated to achieve efficient outcomes. The parents and adult children may be selfish or have 'caring preferences';[4] with these private preferences it is easy to show that the efficient allocation is the one that maximises the sum of parent and child private utilities: $A(S)[y_P + y_C] + v(S) - c(S)$. That is, the efficient S satisfies

(2) $A'(S)[y_P + y_C] + v'(S) = c'(S)$.

Also at the optimum, $\partial x_C/\partial S < 0$; that is, higher services reduce the child's utility at the optimum—services are costly.[5] From the first order condition in (2), it follows that

(3) $\partial S/\partial y_P = \partial S/\partial y_C = -A'(S)/[A''(S)[y_P + y_C] + v''(S) - c''(S)]$,

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[3] The curvature of the indifference curves (derivative of the indifference curve slope with respect to S) is $[-(A'z_p + v')A' + A(A''z_P + v'')]/(A'z_P + v')^2$.

[4] Caring preferences take the form $W^j(x_P, x_C)$, $j = P, C$; such preferences are commonly used to represent 'altruism' (Becker, 1981).

[5] Note that S has the same effect on the marginal utility of the private good for both parent and child, $A(S)$.

where the denominator is negative by the second order condition. For $A'(S)>0$, higher joint family income increases the provision of S. We shall assume that this is the case in what follows.

The assumption of preferences that ensure transferable utility makes the choice of S independent of the income distribution between parent and child. This is not generally the case. Cox (1987) and Ermisch (2003, Ch.9) show that in a model with more general preferences it is possible that $\partial S/\partial y_C<0$, because higher child's income increases her bargaining power in family decisions, but that model also predicts $\partial S/\partial y_P>0$. While the theoretical analysis maintains the assumption of transferable utility, we return to the more general case in interpreting the empirical evidence.

2.1 Gift exchange: Child's decision

In the gift exchange game the child has the last word, and so we first determine how she responds to transfers from her parent. She chooses services S to maximise her social utility $U(x_j)$ subject to her budget constraint and the parent's transfer. The main analysis assumes that the parent's choice of T satisfies $T>T^*=[v(\underline{S}) + c(\underline{S})]/2A(\underline{S}) +(y_P-y_C)/2$ (so that $x_C>x_P$ at the minimum level of S). Note that this need not imply a particularly large T. For instance, this condition could be satisfied for $T=\underline{T}$ if $y_C> y_P + [v(\underline{S}) + c(\underline{S})]/A(\underline{S})$. The first order condition for the child's problem is

(4) $(1-\beta_C)c'(S) \geq \beta_C v'(S) + A'(S)[(y_C +T)(1-\beta_C) + \beta_C(y_P -T)]$

where the strict inequality holds at $S=\underline{S}$. Assuming an interior solution ($S>\underline{S}$), it follows from (4) that

(5) $\dfrac{\partial S}{\partial T} = \dfrac{(2\beta_c -1)A'(S)}{D}$

where $D = -(1-\beta_C)c''(S) + \beta_C v''(S) + A''(S)[(y_C +T)(1-\beta_C) + \beta_C(y_P -T)] < 0$ by the second order condition. Provided that $\beta_C<0.5$, equation (5) implies that $\partial S/\partial T>0$. This prediction is consistent with the experimental evidence that T and S are positively correlated. Note that if $A'(S)>0$, it is still possible for condition (4) to hold with equality in the absence of inequity aversion ($\beta_C=0$), and the positive relationship in (5) remains in these circumstances. If, however, $A'(S)=0$, as in the GEG experiment, then $\partial S/\partial T=0$, and in the absence of inequity aversion, the minimum S is chosen. This last case could be interpreted as a selfish child, and if the parent was aware of her selfish preferences, he would make the minimum transfer to her, which may be zero.

But the existence of *quadratic inequity aversion* would also imply $\partial S/\partial T > 0$ when $A'(S)=0$. It replaces $-\beta_C(x_C-x_P)$ in (1) with $-\beta_{C1}(x_C-x_P) -\beta_{C2}(x_C-x_P)^2/2$, where $0<\beta_{Cj}<1$, $j=1,2$. That is, the marginal utility loss from advantageous inequality increases with the private utility gap. Let $B=\beta_{C2}(x_C-x_P) + \beta_{C2}A(S)(y_C-y_P+2T)$ in this expanded model, where $B>0$ by the fact that $T>T^*$. Then the first order condition is the same as in (4) with $\beta_C=\beta_{C1}+\beta_{C2}(x_C-x_P)$, and

$$(6) \qquad \frac{\partial S}{\partial T} = \frac{A'(S)[2\beta_{C1}-1+2B]-2\beta_{C2}A(S)[c'(S)+v'(S)]}{D_Q}$$

where $D_Q<0$ by the second order condition. From (6) it follows that when $A'(S)=0$, $\partial S/\partial T= -2\beta_{C2}A(S)[v'(S)+c'(S)]/D_Q>0$. In general, because $B>0$, the effect operating through $A'(S)$ is moderated by quadratic inequity aversion. The parent takes equation (6) as a 'reaction function' in his choice of T, considered below.

For the purposes of testing the gift exchange hypothesis, two other comparative static results are of particular interest:

$$(7) \qquad \frac{\partial S}{\partial y_C} = \frac{A'(S)[\beta_{C1}-1+B]-\beta_{C2}A(S)[c'(S)+v'(S)]}{D_Q}$$

$$(8) \qquad \frac{\partial S}{\partial y_P} = \frac{A'(S)[-\beta_{C1}-B]+\beta_{C2}A(S)[c'(S)+v'(S)]}{D_Q}$$

The effect of higher income for the child is unclear for $A'(S)>0$, because of the ambiguous sign of the quantity in brackets in the first term on the right-hand side of (7). If $A'(S)=0$, higher child's income increases the provision of S, because of quadratic inequity aversion.

A higher parent's income has two opposing effects on S. On the one hand, it increases services (the first term on the right-hand side of (8)), because higher S increases the marginal utility of the private good, thereby tending to reduce inequality. But it also tends to reduce S because, with quadratic inequity aversion, a higher parent's income decreases the need to use services to reduce inequity. Thus, if the latter effect dominates, it is possible that $\partial S/\partial y_P<0$. Note that these effects would operate even if $T=0>T^*$, because of the child's attempt to achieve fairness in outcomes in a situation where the child's private welfare is higher than the parent's. That is, there may not be a 'gift exchange' *per se*.

In the absence of quadratic inequity aversion ($\beta_{C2}=0$), equations (7) and (8) produce qualitative (directional) predictions similar to those from the model that assumes efficient outcomes, given in (3). But, while $\partial S/\partial y_C>0$ and $\partial S/\partial y_P>0$, $\partial S/\partial y_C > \partial S/\partial y_P$ for $\beta_C<0.5$, which contrasts with (3). As we have seen, introducing quadratic inequity aversion makes it

possible that $\partial S/\partial y_P<0$, thereby producing a qualitative prediction that differs from the efficient exchange model, even the one that allows for more general preferences (Cox, 1987; Ermisch, 2003, Ch.9).

Does the concern for inequity produce an efficient provision of S? The first order condition in (4) is identical to the efficiency condition in (2) if and only if $\beta_C=0.5$. With this rather extreme form of inequity aversion, the child is indifferent between transferring a unit of utility to her parent and keeping it. In other cases, the outcome is inefficient. For instance, for $A'(S)=0$, equation (4) entails $c'(S) = \beta_C v'(S)/(1-\beta_C)$, in comparison with an efficiency condition of $c'(S) = v'(S)$. If $\beta_C<0.5$, then $c'(S) < v'(S)$ (i.e. S is under-provided), but it gets closer to the efficient level as β_C increases.

2.2 Gift exchange: Parent's decision

The parent chooses T to maximise his utility subject to the reaction function relating his transfers to the supply of services by the child, $S(T)$; that is, the parent knows that his child exhibits inequity aversion. Again, we focus on the case in which T is chosen in the range $T>T^*$. Then the first order condition is

(9)
$$[\alpha_P c'(S) + (1+\alpha_P)v'(S) + A'(S)[(2\alpha_P - 1)T - \alpha_P y_C + (1+\alpha_P)y_P]S_T$$
$$\leq A(S)(1+2\alpha_P)$$

where the strict inequality holds when $T=\underline{T}$, and $S_T=\partial S/\partial T \geq 0$ from the solution to his child's problem. At $T=\underline{T}$, the left-hand side of (9) increases with y_P and declines with y_C; thus, the chances of making a transfer above the minimum (which may be zero) increases with the parent's income and declines with the child's. Also, the larger the marginal value of services from the child (which have no close substitute) and the higher the child's marginal cost of providing them, the more likely that the parent makes a transfer above the minimum. If the child is selfish and the parent knows this, then $S_T =0$ and (9) implies that $T=\underline{T}$.

If there is a transfer above the minimum and if, for simplicity, $\partial S_T/\partial S \cong 0$, it follows from condition (9) that

(10) $$\frac{\partial T}{\partial y_C} = \frac{\alpha_P A'(S)S_T}{\Delta}$$

(11) $$\frac{\partial T}{\partial y_P} = \frac{-(1-\alpha_P)A'(S)S_T}{\Delta}$$

where $\Delta<0$ by the second order condition. For $A'(S)>0$ and $\alpha_P<1$, a higher child's income reduces transfers and a higher parent's income increases them, as in the case in which we

assume that outcomes are efficient. Adding quadratic inequity aversion to the model would reinforce these income effects on transfers.

The Appendix shows that unless $A'(S)>0$ a choice of $T<T^*$ leads to the child choosing the minimum service provision, $\underline{S}$, in which case the parent chooses the minimum transfer, $\underline{T}$. As $T \geq 0$, for $T<T^*$ it must be the case that the child's income is not 'too much' larger than her parent's: $y_C < y_P + [v(\underline{S}) + c(\underline{S})]/A(\underline{S})$. The Appendix shows that even if $A'(S)>0$, in order to obtain an interior solution ($T>\underline{T}$), the child's income must be large enough to satisfy $(y_C + T)(1+\alpha_C) > \alpha_C(y_P - T)$. The comparative static analysis for possible interior solutions with $T<T^*$ is given in the Appendix. It shows that $\partial S/\partial y_C>0$ and $\partial S/\partial y_P<0$. The latter prediction is not consistent with the efficient exchange model. Thus, the possibility that $\partial S/\partial y_P<0$ when $T>T^*$ and the prediction that this is the case when $T<T^*$ suggests an empirical test that can distinguish the present model from the efficient exchange model. Namely, a finding that $\partial S/\partial y_P<0$ would favour the present model of a 'gift exchange' between parents and adult children. The remainder of the paper discusses the evidence.

2.3 Family constitutions

If people do not have access to a capital market at sufficiently favourable terms, they would be better off in an extended family network of transfers including three generations at different stages of life (Cigno, 1993, 2000). In effect, there is a 'family constitution' that arranges 'loans' to its young members from its middle-aged ones and enforces repayment later when the young borrowers have become middle-aged and the middle-aged lenders have become old. It specifies the minimum amount that each middle-aged adult transfers to her children and the minimum amount she must transfer to her parent, subject to the provision that a person will receive nothing when she is old if she did not transfer the prescribed amount to her parents when she was middle-aged. It is a self-enforcing family constitution in the sense that it is in the best interests of every family member to obey it and to have it obeyed. If people are self-interested, then they only transfer the minimum amounts specified and they have children only because it is a form of investment that yields a better return (through the family constitution) than the capital market. The analysis is easily extended to allow for services provided by adult children that do not have perfect market substitutes, by specifying transfers in utility-terms; indeed, it is more likely that a self-enforcing family constitution can offer a higher return than the market in this case.

Transfers of services from selfish adult children to older parents should be *larger* for parents who are better off financially for two reasons. First, for a prescribed 'utility-transfer', monetary transfers have smaller marginal utility than services from children when parents are richer. Second, *family dynasties* (i.e. a series of generations) with more resources would prescribe larger transfers. In its simple form, fluctuations in the fortunes of particular generations would not produce changes in the transfers specified in the constitution. Thus, a finding that $\partial S/\partial y_P < 0$ is not consistent with the family constitution model when people are selfish. The constitution may contain a simple rule that a child is allowed to pay less than the prescribed amount to her parents if her income falls below a particular level (Cigno, forthcoming). In this case, we would find that $\partial S/\partial y_C > 0$ among those adult children who are unable to pay the prescribed amount, but we would still expect $\partial S/\partial y_P \geq 0$. In addition, with a family constitution binding selfish people, there would be no transfers from (permanently) childless adult children to parents, because they cannot benefit from the family constitution when they are older.

So far we have assumed that everyone is selfish. But someone who loves her parents may give more than the minimum amount to them prescribed by the constitution. The constitution is still needed as a defence against the possible appearance in one generation of a 'black sheep' who does not behave in a 'loving way' towards her parents (Cigno, forthcoming). Among those who pay more than the minimum amount, other motives for transfers, such as 'gift exchange' (inequity-averse preferences) or altruism, may operate. In other words, because a family constitution sets minimum standards of behaviour, a finding that $\partial S/\partial y_P < 0$ need not mean that there is no self-enforcing constitution; it just may not be binding for a large enough proportion of the population. This takes us back to the issue that the paper started with—what motives best account for variation in services provided by adult children to their parents?

3. Data

In the eleventh annual wave of the British Household Panel Survey (2001), information about frequency of contact with each parent was collected from respondents who had a living parent not residing with them. They were also asked about help given to and received from parents, and how long it would take to travel to the parent's residence. Similar questions about contact were asked of parents who had adult children living elsewhere (about the one

with whom they had most contact if more than one adult child was living apart from them), and they were also asked about help given to and received from children not living with them. These measures of contact and help correspond to 'services' in the theoretical analysis.

In order to focus on parents who are in the latter part of their life cycle, the parents' sample is restricted to those aged 60 and over, and the children's sample is restricted to those with at least one living parent aged 60 or older. The average age of the parent responding to the questions about contact and help is 72, 56% are female, 88% have grandchildren, 64% are married, 30% live alone, 76% are owner-occupiers, 22% have educational qualifications beyond 'A-level', 82% are retired, for 32% their health limits their daily activities and 20% have just one child living outside the parents' household. The average age of the adult child respondent is 44, while his/her mother is aged 72 on average, and 54% of them are women. Seventy-one per cent of these adult children are married, another 13% cohabit; 81% have at least one child and they average 0.9 dependent children. One-half have a qualification above 'A-level', 83% are owner-occupiers and in 35% of the cases their mother lives alone. Eighty-seven percent have a living sibling, and among these the average number of brothers and sisters is 2.5.

Table 1 shows the frequency of the parent's contact with the adult child (with whom the parent has most contact if more than one living elsewhere), and also the frequency of contact with their mother reported by adult children. Table 2 shows the types of help that parents report receiving regularly or frequently from children living elsewhere (they may receive more than one type), and also the children's reports of the types of help given regularly or frequently to their parents. Receiving lifts in their child's car, shopping and home maintenance and improvement are the most popular forms of help received by parents, but about one-half of parents receive no regular or frequent help from their children (according to either parents' or children's responses[6]). It is rare for children to provide regular or frequent financial help to their parents. Table 3 shows that contact with and help provided to parents decline with distance from parents.

With respect to financial transfers from parents to children, each parent is asked whether or not he/she provides frequent or regular financial help to adult children not living

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[6] Note that, for the most part, these are not the parents of the children interviewed and vice versa.

with her, and each child is asked if they receive such help. Overall, 17% of parents say they provide such help, and 11% of adult children say they receive it.[7]

4. Statistical issues

Testing the 'predictions' of the gift exchange, efficient exchange and family constitution models requires data on both parents' and adult children's economic resources when they live apart. Except for a small sample of relatively young adult children who can be matched with their parents in the BHPS (because they lived with them at sometime during the panel), we usually lack information on the income from one side of the 'service transaction'.[8] To illustrate the bias that may result, suppose we were trying to estimate $\partial S/\partial y_P$ using information obtained from parents; that is, we have information on y_P, but not y_C. Let the relationship suggested by equations (7) and (8) be linear: $S=\beta y_P+\delta y_C+e$, where e is a random variable capturing residual influences on S. The problem we face is that y_C is omitted from the equation that we estimate. As a consequence the OLS estimate of β is inconsistent: $\text{plim}\beta_{ols}=\beta + \delta[\text{cov}(y_c,y_p)/\text{var}(y_c)]$. Studies of intergenerational income mobility (Solon, 1992; Ermisch, Francesconi and Siedler, 2006) suggest that $\text{cov}(y_c,y_p)/\text{var}(y_c)\cong0.4$. In both the gift exchange model and the efficient exchange model with preferences more general than transferable utility, δ could be of either sign, and in the family constitution model $\delta\geq0$. Thus, the estimate of β could be biased in either direction, because of the omitted variable.

Three measures of 'economic resources' are used in the analysis, each of which is an imperfect indicator of resources available to parent or adult child. One is the logarithm of current 'equivalent household income', which is defined here as the monthly household income (in the month preceding the interview) of a person's household divided by the square root of household size. Another is current 'net financial wealth', which is financial assets less debts (other than mortgages) of the tax/benefit unit in which the person lived in 2000, as estimated from the BHPS wealth data by Banks et al (2002).[9] The third is the value of the person's house in 2001 for owner-occupiers, with tenants' value being set to zero. As

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[7] Note that this does not imply that 83% (89%) of parents will never make transfers; they may do so in the future or did in the past, or their transfers may be irregular and infrequent. Thus, the minority making regular or frequent transfers at present is not necessarily in contradiction to a theoretical model in which parents make some transfers to adult children.

[8] It is possible to match 563 mothers and 383 fathers to their adult children living apart from them. The average age of the children is 27. The correlation between the parent's and child's current equivalent household income is about 0.1.

[9] These data are available from the UK Data Archive, University of Essex.

expected, persons with higher current equivalent household income tend to have higher net financial wealth and higher house values, and house value is positively correlated with net financial wealth.[10]   As an alternative to house value, it is possible to use housing equity (obtained by subtracting mortgage debt from house value), but house value appears to be a better indicator of longer-term resources than housing equity, particularly for the adult children. This is born out by the higher likelihood values obtained below when using house value, particularly when modelling the children's responses.[11]

These three measures of resources are combined into one indicator of 'economic resources' using principal components analysis, which finds mutually uncorrelated linear combinations of the three measures that have maximal variance.   The first principal component, which accounts for the largest proportion of the variance, is taken as our indicator of economic resources. That it is sufficient, in this particular case, to use only the first component is suggested by the fact that the second and third characteristic roots of the correlation matrix are less than unity and close to one another.[12] This indicator has unit variance by construction, and so a unit change is interpreted as a one standard deviation change in economic resources. The 'factor scoring coefficients' combining the income, net financial wealth and house value indicators are estimated separately for the adult child and parent samples, but in each case they are, to the first decimal place, 0.4, 0.4, 0.5 respectively. While related to economic resources, educational attainments and homeownership may have separate impacts from resources, because, for example, they may affect the geographic location of the adult child relative to his/her parents, and so they are also included as explanatory variables in the analysis.

Frequency of contact is an 'ordered response', with the categories given in Table 1. As any particular aggregation of categories may be arbitrary, these are analysed using an ordered logit model. Let y_i be a latent variable for frequency of contact of the i-th individual, and $y_i = \beta x_i + u_i$, where x_i is a vector of attributes, β are parameters to be estimated and u_i has a logistic distribution. The probability that the i-th individual is in frequency-of-contact

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[10] For instance, in the BHPS 2000 wealth data, homeowners have a mean net financial wealth of £17,500 compared with £3,100 for tenants. Other data also indicate that owner-occupiers are much more likely to have other financial assets, particularly riskier investments, and they also have higher average levels of wealth (Banks and Tanner, 1999, Tables 5.2 and 5.5).

[11] The correlation between the principal component (see next paragraph) constructed using house value and that using housing equity is 0.99 for parents and 0.89 for children.

[12] A factor analysis approach, which makes weaker assumptions about the decomposition of the correlation matrix of the three variables, finds only one positive characteristic root, which indicates the presence of one

category j is given by $\Pr(c_{j-1}<y_i \leq c_j)=F(c_{j-1}-\beta\mathbf{x}_i <u_i \leq c_j -\beta\mathbf{x}_i)$ where c_{j-1} and c_j are 'threshold' parameters to be estimated and $F(.)$ is the logistic distribution function.[13] This model has the following property:

(12) $\ln[\Pr(y_i>c_j)/\Pr(y_i \leq c_j)]= \beta\mathbf{x}_i - c_j$

This shows that the log-odds of being in a frequency-of-contact category larger than j depends linearly on $\mathbf{x}_i$, with the impact of any element of $\mathbf{x}_i$ being the same irrespective of the particular category j. That is, β measures the proportionate impact of a variable on the odds-ratio associated with the j-th category. Distance between parent and child is modelled in the same way (i.e. y_i now indicates distance), and the categories are those given in Table 3. The other variables analyzed are dichotomous: whether or not a parent receives regular or frequent in-kind help from an adult child, and whether or not a parent provides regular or frequent financial help. Equation (12) then collapses to an ordinary logit model.

5. Parents' receipt of in-kind help from and contact with adult children

Among parents aged 60 and over with an adult child living apart from them, about one-half receive regular or frequent in-kind help from an adult child (i.e. at least one of the types of help listed in Table 2 other than financial help), according to the parent's or child's report. Table 4 shows the estimates of the parameters of the economic resources variable and the impact of having a grandchild; the other variables included in the model are indicated in the notes to Table 4. The standard errors of the parameter estimates are adjusted for multiple respondents from the same household, because, for example, spouses' decisions about contact with parents may be correlated in unknown ways.

The first row of Table 4, which does not condition on distance from their adult child with whom they have most contact, shows that parents with more economic resources are less likely to receive regular or frequent in-kind help from their adult children. The second row shows that, after controlling for how far the parent lives from her adult son or daughter, the impact of economic resources is smaller, and not statistically significant at the 0.05 level.[14] The fifth row indicates why the effect of economic resources declines when controlling for distance. It shows that a parent with more economic resources lives farther from the adult child with whom he/she is in most contact. Living closer substantially increases the

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factor in this set of three variables. The 'factor score' associated with it is correlated with the first principal component with correlation coefficient of 0.998.

[13] The parameters c_0 and c_n are minus and plus infinity respectively, where *n* is the number of categories; thus, *n*-1 threshold parameters need to be estimated.

probability of receiving regular or frequent in-kind help; for instance, the model in row 2 indicates that, compared to living an hour or more away, living within 15 minutes increases the odds of receiving regular or frequent help by a multiple of 6.4. Row 10 shows that children with more economic resources live farther from their parents.

The efficient exchange model predicts that more affluent parents would receive more in-kind help from and contact with their adult children, because the demand for 'services' increases with joint family resources. Relaxing the transferable utility assumption, the efficient exchange model also leads us to expect that help and contact increase with parents' resources because more resources also improve the parents' bargaining power (Cox, 1987; Ermisch, 2003, Ch.9). The negative effect of economic resources on receipt of regular or frequent in-kind help, perhaps even after controlling for distance, is not consistent with this prediction. Nor is it consistent with the binding family constitution model.

Can we explain this finding in the context of a broader efficient exchange model? The negative effect of parents' resources may reflect the availability of imperfect market substitutes for many of these types of in-kind help, which richer parents substitute for their children's help. It may also reflect, in part, the omitted variable bias discussed in the previous section, if higher children's resources reduce help ($\delta<0$). According to the more general efficient exchange model, more affluent children are less likely to provide in-kind help to parents if the bargaining effect of their income dominates the income effect, as the results in row 6 suggest.[15] Row 7 indicates that the negative effect of child's resources disappears when we control for distance.

But is it correct to control for distance? Other theories contend that distance between parent and child is chosen with possible provision of help to and contact with parents in mind (Konrad et al, 2002, and Rainer and Siedler, 2005). Also, in the family constitution model, distance is not an 'excuse' for failing to transfer the prescribed 'services' to older parents unless financial transfers compensate. But there is no evidence that compensation takes place—only 3% of parents receive regular or frequent financial transfers from their adult children and almost all (91%) of parents who receive financial help also receive in-kind help.

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[14] Also, mothers, parents who live closer to their child, who live alone, who have more children and whose health limits their daily activities are more likely to receive regular or frequent in-kind help.
[15] Note that neither the gift exchange nor the efficient exchange model provides an unambiguous prediction of the effect of child's income on in-kind help, and so a negative effect of child's income is consistent with both.

If, for these reasons, distance is endogenous, it should be excluded from the in-kind help and contact equations.

Higher parents' economic resources also reduce the frequency that the parent sees the child, the estimated impact being statistically significant in row 3 of Table 4, but not significantly different from zero when distance is controlled (row 4).[16] If, as suggested above, distance is endogenous, the negative effect in row 3 is not consistent with the efficient exchange model. In case of contact frequency, the imperfect market substitute rationale for a negative effect is less compelling. The evidence in row 8 indicating a negative effect of child's income on contact with his/her mother suggests that omitted variable bias may overstate the negative impact of parents' resources in row 3, but this bias is unlikely to be large enough to turn a positive effect into a negative one. Another possibility is that more affluent parents spend more time seeing friends and neighbours. In the BHPS, people were asked how often they talked to their neighbours and how often they meet friends or relatives not living with them. Similar analysis of these responses indicated that more affluent parents spoke less frequently with their neighbours than less affluent ones and met with friends and relatives as frequently.

The negative impacts of parents' economic resources on receipt of regular or frequent in-kind help and frequency of contact also are not consistent with the family constitution model when the self-enforcement constraints are binding, nor with predictions of the 'strategic bequest theory' of Bernheim et al. (1985). In that theory, parents threaten their child with disinheritance if he or she does not provide them with sufficient attention and help. The disinheritance threat may not be credible if there is only one child, because the parents are assumed to care for their child's welfare. But among families with two or more children the threat may be credible, and we expect attention and help to increase with 'bequeathable' wealth. That is not what is found when we construct a measure of total net wealth, which is the sum of net financial wealth and housing equity, and substitute it and current equivalent income for the economic resources variable. When the sample is confined to parents with two or more children, total net wealth has a significant negative effect on receipt of in-kind help, even after controlling for distance, and no significant impact on frequency of contact. The failure of the strategic bequest prediction may arise because, as Cigno (forthcoming)

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[16] Also, mothers see them more frequently than fathers, and frequency declines with the number of dependent children still in the parents' household.

points out, the children can counter the parents' strategy by agreeing to redistribute the bequests amongst themselves.

It is, however, possible to explain the negative effects of parents' resources on frequency of seeing their adult child and in-kind help received with the gift exchange model. As the discussion of equation (8) indicated, these negative effects are consistent with the gift exchange model when there is quadratic inequity aversion. Higher parents' resources reduce help from and contact with their child because they reduce the child's utility loss from advantageous inequality, thereby reducing the need to provide services in order to reduce inequity in welfare between parent and child.

The family constitution model predicts that selfish adult offspring who do not have children themselves would opt out of the constitution, because they would not benefit from in-kind or financial transfers in their old age. They would not provide help to their parents, neither in-kind nor financial, nor contact. Table 4 shows that, according to the children's responses, when we do not control for distance, adult children who have a child themselves are more likely to provide in-kind help to their parents and to have more frequent contact with them. Thus, this evidence is consistent with the family constitution model with predominately selfish children. According to the parents' responses, having a grandchild does not affect the receipt of in-kind help, but frequency of contact between parents and their children increases significantly if there is a grandchild (if we do not control for distance). The virtual absence of a 'grandchild effect' after controlling for distance reflects the tendency for parents with a grandchild to live closer to their children. This suggests adjustment in location by either parents or children when a grandchild arrives.

6. Financial transfers from parents to adult children

The other side of the gift exchange is the financial transfer from parents. In both the efficient exchange model and the gift exchange model we expect that the transfer increases with the parents' resources and declines with the child's resources. In the family constitution model with selfish parents, older parents would not make transfers to their children. Whether or not parents give (children receive) frequent or regular financial help is the dependent variable in two analyses, one using the parents' responses, the other the children's.[17] As noted above,

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[17] Again, because we only have data on one side of the transfer-service arrangement in each analysis, the estimated impact of parents' economic resources on the probability of providing regular or frequent financial help would be biased downwards if higher child's resources reduce transfers. Similarly, the estimated impact of child's resources would be biased upward if higher parents' resources increase transfers.

17% of parents report giving regular or frequent financial help to their adult children, and 11% of children report receiving such help. The estimated impacts of the parent's economic resources and the presence of a grandchild on regular or frequent financial help are shown in the first two rows of Table 5, and the estimated impacts of child's economic resources and a grandchild are shown in the third and fourth rows.[18] The estimates show that parents with more economic resources are more likely to provide regular or frequent financial help, and more affluent children are less likely to receive such help. This is consistent with both gift exchange and efficient exchange models.[19] Controlling for distance has little effect on the impacts of the parent's or child's economic resources on the probability of receipt (cf. rows 1 and 2, and 3 and 4). Table 5 also indicates that the presence of a grandchild makes it significantly more likely that adult children receive financial help from their parents according to the children's responses, but not according to the parents' responses.

There is further evidence consistent with a gift exchange interpretation of transfers and help/contact. The equations for financial help provided by parents and in-kind help received by them (or the chances of seeing their adult child weekly) are estimated jointly (assuming normality rather than a logistic distribution), allowing for correlation between their error terms. The parameter estimates are generally similar to those discussed above (taking account of the differences between a probit and logit model), and the error terms are correlated positively: a correlation coefficient of about 0.2 in the financial help/in-kind help pair of equations and about 0.10 in the financial help/weekly contact pair (irrespective of whether or not there are controls of distance). Thus, parents with unobserved attributes that make them more likely to make regular or frequent financial transfers to adult children are also more likely to receive regular or frequent in-kind help from children and to see them weekly.

7. Location and the impact of parents' resources

We have seen that parents' resources are negatively related to frequency of contact with their adult children and with the odds of receiving in-kind help from them, but these effects diminish or disappear when we control for distance between parents and adult children. This is because adult children with more affluent parents live farther away from them. Thus, the

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[18] The standard errors of the parameter estimates are adjusted for correlation between respondents from the same household (e.g. two parents may be reporting financial help to the same child).

[19] Also, fathers are more likely to provide financial help, and the probability of regular or frequent financial help increases with the number of grandchildren and declines with the number of dependent children in the parent's household (for those with more than one). From the children's perspective, homeowners, those in a partnership and those with more siblings are less likely to receive regular or frequent financial help.

effects of parents' resources on contact and in-kind help operate through their effect the children's location relative to their parents. The following analysis begins to address this issue by examining how parental income affects the distance that children move when they leave their parental home. A sample of young people who move away from their parents below the age of 30 in the first 12 waves of the BHPS is selected. The distance (in kilometres) of their move is related to income in their parental home other than their own income (mainly that of their parents), as well as their age, sex and household size. Table 6 shows that young people who leave higher-income parental homes move farther away. Children from higher-income families are more likely to move away to become full-time students in higher education, and many of these return to their parental home temporarily. But the strong effect of parental income on distance moved is still there when we control for whether or not they are a full-time student in the first year after leaving home (column 2), and when the sample is confined to those who were not a full-time student in the first year after leaving home (col. 3). In the latter two specifications, the income effect is smaller, but still relatively large—the distance-income elasticity is about 0.35. This suggests that parents' economic resources affect a person's location relative to their parents very early in their adult life.[20]

Where children live relative to their parents when their parents are aged 60 and over also depends, of course, on the extent of subsequent movement by both parents and children. The BHPS data indicate that each year 1.7% of people aged 18-50 (who have left their parents' home) move 60 kilometres or more. Furthermore, those who move such distances in the past are more likely to do so again. For instance, among those who moved 60 or more kilometres in the previous year, 17.2% do so again in the current year, compared with 1.5% among those who did not move 60 or more kilometres in the previous year.[21] As expected, longer-distance geographic mobility declines with age. For instance, among persons aged 60 and over, only 0.4% move 60 or more kilometres each year, and the corresponding movement rates for those aged 18-30, 30-40 and 40-50 are 4.5%, 1.2% and 0.7%. Thus, a not

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[20] We can examine how the distance at first departure from parents relates to how far they live from their parents at the 2001 wave of the BHPS. This sample is, of course, still quite young and may have only left the parental home a few years earlier. In any case, the coefficient (std. error) of log distance at the time of leaving home in an ordered logit for distance from a person's mother in 2001 (using the same categories as in Table 3) is 1.01 (0.05).

[21] Comparing those who moved 60 or more kilometres two years ago with those who did not, the movement rates are 13.7% and 1.5%. Also, the marginal effects (standard errors) in a simple probit equation for the probability of moving 60 or more kilometres associated with movement this distance in the previous year and two years ago are 0.128 (0.012) and 0.088 (0.011).

insignificant proportion of the British population appear to be sufficiently mobile to adjust their location later, either the parents or the adult children, but particularly the latter. Nevertheless, the more distant departure for young people from wealthier homes may have long-lasting impacts. They may be sufficiently 'forward looking' about their supply of future contact with and help to their parents in response to the parents' expected resources, or their first move may initiate a dynamic process that affects their location relative to parents in the longer-term.

8. Conclusion

Experimental evidence indicates that considerations of fairness and reciprocity are important in interactions between strangers, and we would expect that they also apply to interactions among family members. The paper has derived from a 'gift exchange model' a prediction about the impact of parent's resources on parents' frequency of contact with and help from their adult children. It is that parents with more resources *may* receive less contact and help, in contrast to the prevailing economic theories of family interaction, which predict a positive effect of parents' resources on contact/help. Analysis of family interactions among British family members in the early 21st century finds evidence consistent with the prediction of the gift exchange model. It supports the hypothesis that these interactions between parents and their adult children are governed by considerations of fairness and reciprocity. In particular, adult children respond to financial support from parents by more frequent contact and in-kind help because they are concerned about fairness in welfare outcomes between parents and children, perhaps reflecting 'guilt' in some measure. Put differently, adult children reciprocate 'gifts' from their parents by 'gifts' of their own. But even in the absence of transfers from parents, children use contact and help to reduce the inequity in welfare outcomes if their parents are worse off than them.

In contrast to the efficient exchange model of these interactions, the gift exchange model makes no assumption about the efficiency of family outcomes. Indeed, they are unlikely to be efficient, but they do produce levels of contact and help that are higher than would exist if children were selfish. It is also likely to be the case that some children are primarily selfish, and the model predicts that if, as is likely, parents are aware of this, then they make no monetary transfers to their adult children, because they anticipate no reciprocating behaviour by the children. But among other children known to be concerned

with inequity between parents and themselves, parents make transfers in anticipation of reciprocal contact with and help from their children.

The empirical analysis strongly suggests that the effects of parents' resources on contact and in-kind help operate through their effect on the children's location relative to their parents—more affluent parents live farther away from their children. Further analysis indicates that young people from higher-income parental homes move farther away when they leave home, suggesting that parents' economic resources affect adult children's location relative to them very early in their adult life. They may be sufficiently 'forward looking' about their supply of future contact with and help to their parents in response to the parents' expected resources, or their first move may initiate a dynamic process that affects their location relative to parents in the longer-term. This deserves further investigation.

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Table 1: Frequency that Child Sees his/her Mother or Father, Parents aged 60 and over

Frequency	Parent's Response[a]	Child's Response (Sees Mother)
Daily	20.9%	11.4%
At least once a week	48.6	41.1
At least once a month	14.2	18.3
Several times a year	11.6	19.8
Less often	3.9	7.5
Never	0.8	2.0
Total	**100**	**100**
Unweighted N[b]	1,586	2927

[a] Child with whom parent has most contact if more than one living elsewhere.
[b] The sample includes only original panel members interviewed in 2001 and temporary sample members living with them, not members of the ECHP and Scottish and Wales booster samples. Weighted using cross-section weights.

Table 2: Regular or Frequent Help from Children, Parents aged 60 and over

Percent Reporting:	Parent's Responses	Child's Responses
Getting lifts in their car	36.6	28.5
Shopping for you	25.2	22.2
Providing or cooking meals	15.1	10.5
Help with personal needs Like dressing, eating , bathing	1.6	3.1
Washing, ironing or cleaning	6.7	7.2
Dealing with personal affairs Like paying bills, etc.	10.7	15.6
Decorating, gardening, repairs	18.8	22.0
Financial help	3.1	6.0
None of these	45.5	49.7
Unweighted N*	**1586**	**2927**

* The sample includes only original panel members interviewed in 2001 and temporary sample members living with them, not members of the ECHP and Scottish and Wales booster samples. Weighted using cross-section weights.

Table 3: Distance to Child's Residence and Contact with / Help regularly or frequently provided to Parent, Parents aged 60 and over

	Pct. Who See Child at least weekly*	Pct. Who Telephone Daily*	Pct. who Receive In-kind help**
less than 15 minutes (N=1416)	93.5%	36.8%	64.1%
between 15 and 30 min. (N=636)	82.6	32.0	63.5
30-60 minutes (N=355)	62.8	19.5	60.0
More than one hour (N=796)	11.9	14.0	22.8
Total	**69.6**	**28.9**	**54.2**
Unweighted N[a]	1577	1577	1577

* Child with whom the parent has most contact.

** Regularly or frequently.

[a]The sample includes only original panel members interviewed in 2001 and temporary sample members living with them, not members of the ECHP and Scottish and Wales booster samples. Weighted using cross-section weights.

Table 4: Impacts of Economic Resources and Education on the Odds of Regular or Frequent In-kind Help from Adult Children to Parent and Frequency of Contact, BHPS 2001**

Dependent Variable	Economic Resources	Has grandchild
Parents' variables[a]		
1. Parent's Receipt of In-kind Help	**-0.209** (0.074)	0.076 (0.231)
2. Parent's Receipt of In-kind Help, distance contr.	-0.130 (0.081)	-0.131 (0.250)
3. Parent's Frequency of Seeing Child*	**-0.202** (0.062)	**0.516** (0.211)
4. Frequency of Seeing Child, distance controls*	-0.036 (0.063)	0.130 (0.214)
5. Distance from Child	**0.245** (0.080)	**-0.463** (0.227)
Child's variables[b]		
6. Parent's Receipt of In-kind Help	**-0.124** (0.050)	**0.279** (0.125)
7. Parent's Receipt of In-kind Help, distance contr.	0.002 (0.050)	0.194 (0.135)
8. Frequency of Seeing Mother	**-0.235** (0.045)	**0.276** (0.122)
9. Frequency of Seeing Mother, distance controls	-0.006 (0.039)	0.003 (0.117)
10. Distance from Parent	**0.354** (0.052)	**-0.334** (0.116)

*Contact with child with whom the parent has most contact.

**Statistically significant coefficients (at 0.05 level) in bold type and their asymptotic standard errors in parentheses, standard errors adjusted for clustering in households.

[a] Model includes the following other variables: Parent's sex, age age-squared, highest educational qualification; whether or not he/she is an owner-occupier; the parent's marital status (married, cohabiting other), whether or not the parent lives alone; whether or not there is only one child living child outside the household; whether or not the child is an only child; the logarithm of the number of children living elsewhere; the logarithm of the number of living grandchildren; whether or not the parent's health limits his/her daily activities; and whether or not the parent is retired.

[b] Models include the following other variables: Child's sex, age age-squared, highest educational qualification; whether or not he/she is an owner-occupier; the child's marital status (married, cohabiting other), mother's age (of father's if mother is not alive); the number of dependent children; whether or not the child is an only living child; and the logarithm of the number of living siblings.

Table 5: Impacts of Economic Resources and Education on the Odds of Regular or Frequent Financial Transfers from Parent to Adult Children, BHPS 2001*

Whose explanatory variables?	Economic Resources	Has grandchild
1. Parents' variables[a]	**0.335** (0.081)	0.150 (0.285)
2. Parents' variables,[a] distance controls	**0.354** (0.081)	0.137 (0.281)
3. Child's variables[b]	**-0.324** (0.122)	**0.496** (0.216)
4. Child's variables,[b] distance controls	**-0.277** (0.122)	**0.426** (0.217)

* Statistically significant coefficients (at 0.05 level) in bold type and their asymptotic standard errors in parentheses, standard errors adjusted for clustering in households.
[a]See corresponding footnote in Table 4.
[b]See corresponding footnote in Table 4.

Table 6: Distance moved upon leaving the parental home, BHPS 1992-2002*

Variable	Dep. Var. Ln(distance) 1	Dep. Var. Ln(distance) 2	Dep. Var. Ln(distance) 3
Log parental income$_{t-1}$ [a]	**0.605** (0.071)	**0.338** (0.064)	**0.367** (0.068)
Age	**-0.392** (0.215)	**0.428** (0.204)	**0.534** (0.234)
Age-squared	0.0052 (0.0047)	**-0.0102** (0.0045)	**-0.0122** (0.0051)
Female	-0.125 (0.102)	-0.107 (0.090)	-0.072 (0.107)
Household size$_{t-1}$	**-0.288** (0.045)	**-0.195** (0.040)	**-0.232** (0.045)
Living in Scotland or Wales	**-0.447** (0.149)	-0.267 (0.150)	-0.130 (0.153)
Full-time Student$_t$	--	**2.136** (0.119)	--
Constant	**5.545** (2.433)	-3.870 (2.288)	**-5.381** (2.645)
N	1281	1281	974
R^2	0.149	0.324	0.051

*Statistically significant coefficients (at 0.05 level) in bold type and their standard errors in parentheses, standard errors adjusted for multiple observations on some people:
N of people=1137 in columns 1 and 2, 906 in column 3.
[a] Household income other than young person's income.

Appendix

Child's decision: T<T*
If instead the *T* chosen by the parent satisfies *T<T** (so that $x_C<x_P$ at <u>S</u>), the first order condition is

(A1) $\quad (1+\alpha_C)c'(S)+\alpha_C v'(S) \geq A'(S)[(y_C+T)(1+\alpha_C)-\alpha_C(y_P-T)]$

where the strict inequality holds at S=<u>S</u>. If, for instance, A′(S)=0, as in the GEG experiment, then S=<u>S.</u> Also, if $(y_C+T)(1+\alpha_C) \leq \alpha_C(y_P-T)$ and A′(S)>0, then S=<u>S.</u> As the right hand side of (A1) is increasing in T when A′(S)>0, the chances that S><u>S</u> increase with T; they also increase with y_C and decrease with y_P. Even then the solution to (A1) may not identify a maximum. A sufficient condition is

$D_2 = -(1+\alpha_C)c''(S)-\alpha_C v''(S)+A''(S)[(y_C+T)(1+\alpha_C)-\alpha_C(y_P-T)] <0,$

which, for example, may not be satisfied when A″(S)=0 and v″(S)<0.

Thus, a corner solution at the minimum level of service is a likely outcome. If, however, there is an interior maximum (i.e. S><u>S</u>),

(A2) $\quad \dfrac{\partial S}{\partial T} = \dfrac{-(1-2\alpha_C)A'(S)}{D_2}$

(A3) $\quad \dfrac{\partial S}{\partial y_C} = \dfrac{-(1+\alpha_C)A'(S)}{D_2}$

(A4) $\quad \dfrac{\partial S}{\partial y_P} = \dfrac{\alpha_C A'(S)}{D_2}$

where $D_2<0$ from the second order condition. Let us again assume that A′(S)>0. Then if the child is particularly averse to disadvantageous inequality, such that $\alpha_C>0.5$, equation (A2) indicates that she will reduce services to her parent in response to higher transfers, but this may also be the circumstances in which there is not an interior maximum. Also, services increase with the child's income (eq. A3) and decline with the parent's (eq. A4). The latter relationship arises because the child can reduce inequality by reducing the marginal utility of the parent's income through a reduction in S. Adding quadratic inequity aversion to the model would reinforce these income effects.

Parent's decision: T<T*
If the parent chooses T<T*, his choice of T must satisfy

(A5) $\begin{aligned}&\{-\beta_P c'(S)+(1-\beta_P)v'(S)+A'(S)[(2\beta_P-1)T+\beta_P y_C+(1-\beta_P)y_P]\}S_T\\ &\leq A(S)(1-2\beta_P)\end{aligned}$

where the strict inequality holds at $T=\underline{T}$. Consider the case in which $A'(S)=0$. Then, from (A2), $S_T=0$, which implies $0 \leq A(S)(1-2\beta_P)$. The outcome is the same if the child chooses the minimum transfer, because that implies $S_T=0$. The right-hand side is positive for $\beta_P<0.5$, and so $T=\underline{T}$. For an interior solution, if it exists,, the comparative static analysis implies

(A6) $\quad \dfrac{\partial T}{\partial y_C} = \dfrac{-\beta_P A'(S)S_T}{\Delta_2}$

(A7) $\quad \dfrac{\partial T}{\partial y_P} = \dfrac{-(1-\beta_P)A'(S)S_T}{\Delta}$

where Δ_2 is negative by the second order condition. Thus, both higher parent's and child's income increase transfers, but the introduction of quadratic inequity aversion could make the impact of child's income negative.