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Motives for parental money transfers in Europe

by

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DISCUSSION
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Motives for parental money transfers in Europe*

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Abstract

We find a high prevalence of Europeans giving equal financial transfers to their adult children, regardless of siblings' income differences. This behaviour is sharply different from previously documented for American counterparts and it is not predicted by any conventional model on family transfers. We build a model to explain the motives for European parental transfers which includes concern with fairness and leaves altruism as an additional motive. We show that, in contrast to the prediction of the pure altruism model, parents do not offset income inequality among their children but decide to give equal transfers in order to be "fair". However, the parents might start to give larger transfers to poorer children if the siblings' income inequality becomes unbearable from the parent's view. We find evidence for this behaviour using simulations for parameter's distributions and also microeconomic data of 9 European countries from the Survey of Health, Aging, and Retirement in Europe (SHARE).

JEL classification: D19, D64, J18.
Keywords: intergenerational transfers, exchange, altruism, fairness.

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1. Introduction

In a broad sense, there are two competing approaches to explain monetary and time transfers within the family: altruism and exchange. If the family members are linked by altruism, then their actions are driven by the concern of the well-being of each other. This approach was originated by Becker (1974) and Barro (1974) who stressed one of the most important (and strongest) implications of the altruistic regime: the neutrality result. It means that a non-distortionary intergenerational redistribution policy is neutralized when the family is linked by altruism. For instance, an increase in the income of the younger generation as result of a decrease in income taxes and financed by a reduction on the pensions of the elderly can be neutralized by the parents who, in turn, lower the transfers to their children. Contrary, in the exchange approach (Bernheim et al, 1985 and Cox, 1987) there is no crowding out of the redistribution policies. In this regime the parents give financial transfers to their children as a sort of payment for the time (or services) received from them in the form of help, visits, etc. Thus, an increase in the child income raises the price for the child service and might raise the corresponding payment, which does not neutralize the redistribution policy. Therefore, finding of motive for transfers is an important issue as it allows us to evaluate to which extent the redistribution policies can be crowded out or reinforced. In general, under altruism, the child income and the transfer amount are negatively related; while in the exchange setting, this relation should be positive. Regularly it is found that the neutrality result does not hold and hence some authors have discarded the altruism as the motive to give transfers[1]. However, this is not sufficient to rule out altruistic motivations in favour of exchange. There are facts such as imperfect information of parents about income and labour opportunities of their descendants under which the neutrality prediction does not necessarily hold (McGarry, 1999; Villanueva, 2002 and Feinerman and Seiler, 2002). In this matter, Laferrere and Wolff (2006) and Arrondel and Masson (2006) offer a comprehensive review of the literature on family transfers. Cox & Fafchamps (2008) also present a review on transfers but with a focus beyond the income effects on transfers.

Many studies show that transfers are given disproportionately to children while bequests are mainly equally shared. Always with US data, in Dunn and Phillips

[1] In Cox (1987), Cox & Rank (1992), Cox & Jakubson (1995), Cox et al (1998), Altonji et al (1997) and Arrondel & Laferrere (2001), altruism is rejected. In the first four studies, exchange is accepted as the motive for making transfers.

(1997), Wilhem (1996), McGarry (1999) and Norton & Van Houtven (2006), more than 80% of the families intended to give equal inheritances. By contrast, only 17.7% of the mothers from Light and McGarry (2004) give equal transfers to their adult children. Using the Health and Retirement Study dataset (HRS), McGarry (1999) finds that 6.4% of the households give equal transfers to their adult and non co-resident children, and this percentage is 7% in McGarry & Schoeni (1995). With the same dataset for years 1992-2002, we can infer from the results of Hochguertel and Ohlsson (2008) that between 4.8% and 12.5% of households give equal transfers to their children, although these figures include children of any age and residing or not in the same home with the parents. Since the majority of parents make equal division of states among their children, considerable research has been devoted to understand this fact, overlooking the explanation for equal transfers. However, information from the "Survey of Health, Aging, and Retirement in Europe" (SHARE) shows striking results which could not be explained by the standard approaches from the literature on transfers. The prevalence of equal transfers between siblings is remarkably higher in Europe than in US (see table 1).

The existence of equal transfers might be caused by a social norm that stipulates to treat children equally. In behavioural economic experiments, fairness is a norm that commonly emerges (see Camerer and Fehr, 2004; Fehr and Schmidt, 2002) from the interaction among individuals. Interestingly, the greater preference of the Europeans for more equality with respect to the Americans might help to understand the found results (see Alesina et al, 2004). Beyond the traditional income effects explored in the family transfer literature, we argue that parents may treat their children equally regardless of the differences of income among siblings. Thus, the parents do not offset income inequality among their children by giving larger transfers to poorer children, but decide to give equal transfers in order to be fair. However, the parents may start to give larger transfers to the poorer children (such as is predicted by the altruistic regime) if the income inequality among siblings becomes unbearable from the parent's view.

We contribute to the study of family transfers by incorporating new elements such as the parental concern with fairness derived from a social norm and the degree of income inequality among siblings. We do not intend to rule out or accept altruism as the motive to give transfers, but use it as an additional motive for transfers. Indeed, our theoretical model does not predict full intergenerational nor intra-generational

neutrality results such as the standard model of altruistic transfers. As we will see in the next section, the societies with a stronger concern with fairness and lower income inequality among siblings show a larger prevalence of equal transfers. In these types of societies the redistribution policies can still be effective. To support our findings, we use microeconomic data from SHARE for 9 European countries about the relationship between the prevalence of equal transfers and income differences among siblings. The paper is organized as follows: section 2 presents the model for parental transfers, the implications for the neutrality results and simulate the model; section 3 describes the data and the regression analysis and discusses the results; and finally, in section 4 we conclude.

2. Theoretical framework

We focus our attention on monetary transfers which go from parents to non co-resident adult children, while the transfers of time services go from children to parents. In the next sections we develop a model for parental transfers considering heterogeneity on altruism, concern with fairness and siblings' income inequality.

2.1 The model

Each family is composed of one parent and two children[2]. The parent is altruistic towards her children, so that the child utility levels enter in her own utility function. Thus, the parent wants to equalize marginal consumption between her and her children by adjusting transfers adequately. Since children generally show different income levels, it is expected that each child receives a different amount of transfer. However, the parent faces a trade-off. On the one hand, she wants to equalize marginal consumption by giving unequal transfers, but on the other hand she also wants to be fair by giving equal transfer amounts regardless of siblings' income differences[3]. Nevertheless, such desire has a limit because giving equal transfers precludes the parent to improve income distribution among her children by equalizing

[2] We assume that the father and mother behave as a unit, so we do not account for any couple decision making process.

[3] In terms of Kolm (2006), parents may give equal transfers because they have a constraint to be fair. This constraint may have its origin in a social norm that dictates to treat all siblings equally. This is the justification used by Lundholm & Ohlsson (2000) who argue that giving unequal bequests damages parent's reputation.

marginal consumption, which in turn, hurts the parent[4]. Furthermore, equal transfers imply loss of utility for the parent, which might become unbearable eventually.

Therefore, the parent maximises the following utility function and chooses the optimal values for the transfers T_j and child services S_j (help, companionship, visits, etc) of each child j:

$$U = \ln(C_p) + \ln(1 + S_1 + S_2) + \beta\left[\ln(C_1) + \ln(1 - S_1) + \ln(C_2) + \ln(1 - S_2)\right] - \gamma(T_2 - T_1)^2 + \gamma X \qquad (1)$$

Subject to:

$$C_p \le I_p - T_1 - T_2 \qquad (2)$$

$$C_j \le I_j + T_j \qquad j = 1;2 \qquad (3)$$

$$0 \le S_j < 1 \qquad j = 1;2 \qquad (4)$$

$$T_j \ge 0 \qquad j = 1;2 \qquad (5)$$

$$X = \begin{cases} 0, & if \quad T_1 \ne T_2 \\ 1, & if \quad T_1 = T_2 \end{cases} \qquad (6)$$

$$I_p, I_1, I_2 > 0 \; ; \; 0 < \beta < 1 \; ; \; \gamma \ge 0$$

C_p is the parental consumption, C_j is the consumption of the child j (j=1,2), I_j denotes the pre-transfer income and β is the parameter for parental altruism; the larger this parameter, the more important the child's wellbeing is for the parent. The last two expressions in the right side of equation 1 account for the dissatisfaction of the parent when she gives unequal transfers and for her tolerance on the utility losses. We can understand $\gamma(T_2 - T_1)^2$ as a constraint of the parent to be fair. The parent prefers to give equal transfers in order to be fair, so that giving unequal transfers reduces her utility. The parameter γ measures the size of the concern with fairness; naturally if γ=0, the parent has not any concern in being fair and the parental utility would be the traditionally used in a pure altruism setting. Since giving equal transfers implies loss of utility with respect to giving unequal transfers, the expression γX refers to the maximum loss of utility the parent is willing to bear. To understand this point, we can reformulate the maximization problem (1)-(6) as the comparison

[4] The altruistic nature of the parent determines that in the optimum, she equalizes marginal consumption between her and her children by giving larger transfers to the poorer child. Thus, giving equal transfers to the children who have different income levels causes utility losses.

between the indirect utilities when the parent gives unequal (V^u) and equal transfers (V^e):

$$V = Max\{V^u; V^e + \gamma\} \qquad (7)$$

where:

$$V^u = \ln(I_p - T_1 - T_2) + \ln(1 + S_1 + S_2) + \beta[\ln(I_1 + T_1) + \ln(1 - S_1) + \ln(I_2 + T_2) + \ln(1 - S_2)] - \gamma(T_2 - T_1)^2 \qquad (8a)$$

$$V^e = \ln(I_p - 2T) + \ln(1 + S_1 + S_2) + \beta[\ln(I_1 + T) + \ln(1 - S_1) + \ln(I_2 + T) + \ln(1 - S_2)] \qquad (8b)$$

T is the optimal value for equal transfers. 8a is always larger than 8b evaluated at optimal values (assuming equation 5 is not binding) and the condition to give equal transfers is $V^e + \gamma \geq V^u$; therefore γ also indicates the maximum bearable utility loss of giving equal transfers instead of giving unequal transfers. This is just the other side of the coin: a parent who is more concerned with fairness (higher γ) is also willing to tolerate a larger utility loss for giving equal transfers.

The way the services enter in the optimization problem is made for simplicity and also reveals the fact that the parent obtains utility from services, while the opposite occurs to children. Due to the logarithmic form assumed for the utility functions, the consumption level of each child should be identical at the optimum when γ is zero. This means that the parent is able to offset child income inequality by giving unequal transfers to perfectly equalize consumption. However, recall that the parent also wants to give equal transfers to fulfil her desire of fairness. Doing so, the child consumption levels will be different and hence some degree of inequality on siblings' consumption appears.

The parent solves the optimization problem in two stages; firstly she finds the optimal values of transfers and time services that maximize V^u and V^e, and secondly she chooses to give equal or unequal transfers according to equation 7. In the first stage, the first order conditions for T_j are:

$$\frac{1}{I_p - T_1 - T_2} = \frac{\beta}{I_1 + T_1} + 2\gamma(T_2 - T_1) \qquad (9)$$

$$\frac{1}{I_p - T_1 - T_2} = \frac{\beta}{I_2 + T_2} - 2\gamma(T_2 - T_1) \qquad (10)$$

and for T is:

$$\frac{1}{I_p - 2T} = \frac{\beta}{2}\left(\frac{1}{I_1 + T} + \frac{1}{I_2 + T}\right) \qquad (11)$$

The analytical expressions of the optimal results for the value of transfers are complex. Instead, we are more interested to find the partial derivatives of the transfers with respect to the incomes, which are developed in the appendix. The partial derivatives are:

$$\frac{\partial T_j}{\partial I_p} > 0; \quad \frac{\partial T_j}{\partial I_j} < 0; \quad \frac{\partial T_j}{\partial I_k} = \begin{cases} > 0 & if \quad 2\gamma C_p^2 < 1 \\ < 0 & if \quad 2\gamma C_p^2 > 1 \end{cases} \quad for \quad j \neq k = 1,2 \qquad (12)$$

$$\frac{\partial T}{\partial I_p} > 0; \quad \frac{\partial T}{\partial I_j} < 0 \qquad (13)$$

We observe that the transfer amount increases with the parental income; likewise, there is a negative relation between the transfer and the income of the child who receives the transfer. So far, these results are in line with a pure altruistic setting. In contrast, our results differ when we observe the intra-generational derivatives (which only apply to unequal transfers). In a pure altruism setting (see Laferrere and Wolff, 2006), $\partial T_j / \partial I_k$ should be positive because the increase of the income of one child reduces his transfer, so that the parent can give more resources to the other child. In our results, $\partial T_j / \partial I_k$ can also be positive when γ is small enough, i.e. when the parent is not very concerned with fairness. In a pure altruistic setting, an increase of the income of child k lowers the transfers he receives and leads to widen the difference with respect to the transfer of child j. However, in our setting, the parent can reduce the transfer to the child j (instead of increase) in order to shorten the difference between the transfer amounts, and hence fulfil her constraint on fairness.

We present in the appendix the results for corner solutions. Like other transfer models (e.g. Cox, 1987), we compare the marginal utility of consumption of one child with that of his parent when there is not a transfer, i.e. when the consumption of each party is composed only of his own income. The transfer occurs when the marginal

utility of consumption of the child is larger than parent's. Only under this condition, the parent finds optimal to make a transfer. Thus, we can define the latent variable $z^* = \partial U/\partial C_j - \partial U/\partial C_p$ for child j and set that $T_j > 0$ when $z^* > 0$ and zero otherwise. The parental income and sibling's income positively affect the latent variable that determines the decision to transfer, which is quite intuitive. A richer parent has more means to give a transfer to her child, while a richer sibling frees resources that can be devoted to the other child. In this regard, Laferrere and Wolff (2006) argue that the transfers are substitutes when there are many recipients. Finally, the own income of child j inversely affects the latent variable, which also is intuitive.

Concerning to the services supplied to parents, it is easily observable from the first order conditions of S_1 and S_2 that $S_1 = S_2 = (1-\beta)/(1+2\beta)$, which holds for both unequal and equal transfers. Therefore, the amount of services is independent of the level of transfers and incomes, which contrasts sharply with the implications of the exchange regime[5]. We concentrate our attention on the monetary transfers.

We can observe the probability of giving equal or unequal transfers by using a latent variable approach. Define $t^* = V^e + \gamma - V^u$ as a latent variable for which the parent gives equal transfers if $t^* > 0$, otherwise the parent gives unequal transfers. It is instructive to observe how the probability of giving equal transfers is affected when there are changes in the difference between sibling's income and in the parameter values. Define $\theta = I_j - I_k$ as a measure for income inequality between the siblings of a family such that $I_j > I_k$ and maintain one of the incomes fixed. In the appendix we show that $\partial t^*/\partial\theta < 0$. Therefore, the probability of giving equal transfers is lower in the families that exhibit more siblings' income inequality. This can be interpreted as that the parent wants to give equal transfers in order to obey her fairness, and hence she does not relieve income inequality between her children. However, when this inequality widens, the parent starts to give unequal transfers.

The parameters for altruism and concern with fairness have different effects on the latent variable. In the appendix, we show $\partial t^*/\partial\gamma > 0$. This result accords with the intuition that a parent who is more worried in being fair, is more likely to allocate equal transfers. In contrast, the altruism can affect the latent variable positively and

[5] Like the case of the basic model of an altruistic parent and her child in Laferrere and Wolff (2006), our model neither predicts an unambiguous relation between the income of the child and his services provided to his parent.

negatively. In the region of low values of altruism the latent variable increases with the value of the altruistic parameter and hence the probability of giving equal transfers increases; the opposite occurs in the region of high values of altruism (see appendix). For low values of altruism, the gains of parental utility come mainly from reductions in the term $\gamma(T_2 - T_1)^2$ of the equation 1, so that the parent tries to shorten the transfer's gap when the altruistic parameter increases. Hence, it is more likely that the parent transfers equal amounts to her children. On the other hand, for high values of altruism the parent losses more utility when she is not able to give different transfer amounts. When the altruistic parameter is larger, the well-being of the children accounts for a greater part of the parent's utility. And according to the first order conditions we observe that the parent maximizes her utility and that of her children by giving unequal transfers. Hence, the probability of giving equal transfers diminishes when the altruistic parameter is larger. We can conclude that the level of altruism is not very informative about the existence of equal transfers in the family because a given level for the latent variable (and its corresponding probability) can be compatible with two different values of the altruistic parameter. In other words, we might expect that the relation between altruism and the probability of giving equal transfers is a U inverted type.

In sum, the model predicts a positive relation for i) the transfer amount and the parental income, ii) the probability of giving a transfer and the parental income, and iii) the probability of giving a transfer and the sibling's income; and a negative relation for iv) the transfer amount and the child's income, and v) the probability of giving a transfer and the child's income. The model does not predict an unambiguous relation between the amount of the transfer and the sibling's income; however, if the parent is concerned enough with fairness, the relation might be negative, which contrasts with the implication of a pure altruism setting. Regarding the results for the probability of giving equal transfers, the model predicts a negative relation with the siblings' income inequality and a positive relation with the concern with fairness; and there is not an unambiguous relation for the relation with altruism.

Due to the complexity to find the analytical solutions for the optimal values of the model, we calibrate the model in section 2.3 by simulating distributions of the parameters. Furthermore, the above-mentioned results are tested in the econometric section by using the database SHARE. Since one of the main objectives to study the

transfers within family is to analyse the effects of redistribution policies, the next section presents the implications of our model on the neutrality results of redistribution policies. And similar to the derivatives of the model, we also perform simulations and test the neutrality results.

2.2 Implications for the neutrality results

If a policy dictates to take one Euro from one child and give it to the parent, the parent neutralises such policy by increasing her transfer to the child by one Euro exactly. This is, essentially, the neutrality result for redistributive policies between generations (Becker, 1974 and Barro, 1974). The intra-generational neutrality result states that if one Euro is taken from one child and given to the other, then the parent neutralises it by adjusting her transfers accordingly.

The optimal transfers depend on the family members' incomes: $T_i = \mathrm{T_i}(\mathrm{I_1}, \mathrm{I_2}, \mathrm{I_p})$. Take total derivatives with respect to the incomes of two members, maintaining the other constant, and make the exercise taking one Euro from one child and giving it to the other, or taking one Euro from the child and giving it to the parent such that dI_1=-dI_2, dI_1=-dI_p or dI_2=-dI_p accordingly. The next four expressions are formed:

$$\begin{bmatrix} \frac{dT_1}{dI_1} & \frac{dT_2}{dI_2} \\ \frac{dT_1}{dI_p} & \frac{dT_2}{dI_p} \end{bmatrix} = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \end{bmatrix} \times \begin{bmatrix} \partial T_1/\partial I_1 & \partial T_2/\partial I_2 \\ \partial T_1/\partial I_2 & \partial T_2/\partial I_1 \\ \partial T_1/\partial I_p & \partial T_2/\partial I_p \end{bmatrix} \qquad (14)$$

The neutrality results appear when each of the preceding expressions is equal to -1, and this is the case in a pure altruism setting. For Laferrere and Wolff (2006) $dT_j/dI_j = -1 = \partial T_j/\partial I_j - \partial T_j/\partial I_k$ and $dT_j/dI_p = -1 = \partial T_j/\partial I_j - \partial T_j/\partial I_p$ are the intra-generational and intergenerational neutrality result, respectively, for $k \neq j = 1,2$. This means that the parent fully replaces, by adjusting her transfers, the Euro that the Government took from one child and gave to the other; and gives back the Euro she received from her child. These results neutralize the redistributive policies both between and within generations. In General, the hypothesis of the neutrality result is rejected when it is tested and some authors consider it as a proof against the

importance of the altruism as the motive to give transfers in the family (which is too strong). Based on this regular finding, the exchange approach (Bernheim et al, 1985 and Cox, 1987) appeared as an alternative explanation. In such approach, there is a participation constraint under which the child offers his time services to his parent only if he is compensated enough with the parental transfer. The child receives transfers as a "payment" for his time, so that the exchange is the motive that determines, at the margin, the amount transferred. Under this setting there is no crowding out of the redistribution policies, as is the case in the neutrality result.

However, we consider it is unnecessary to make assumptions of the sort of the participation constraint within the family to establish that the neutrality results do not hold. If the parents are concerned with being fair, as in our model, the neutrality results do not hold. In the appendix we show that $dT_i/dI_p > -1$ and $dT_i/dI_i \neq -1$[6]. Intuitively, a parent who is concerned with fairness will not fully compensate a change of the income of her children because she also suffers when the difference between the transfers to her children enlarges. Therefore, the redistribution policies still have room to be effective, depending on the characteristics of the distribution of parameters β, γ and θ[7]. In the next section we consider heterogeneous families that have different values for those parameters, and compute the probability of giving equal transfers and the size of the neutrality results.

2.3 A numerical example to account for heterogeneity on altruism, concern with fairness and sibling's income

The parent of each family has a different value of β and γ, so that (β, γ) defines the type for the parent. Likewise, each family exhibits a different degree of sibling's income inequality θ. Assume β, γ and θ are drawn independently from continuous distributions $b(\beta)$, $g(\gamma)$ and $h(\theta)$[8]. Thus, using parameter values drawn from the preceding distributions, we can "observe" the latent variable t^* and compute

[6] The results also are coherent with the case of equal transfers and are presented in the appendix as well.

[7] Similarly, Mitrut & Nordblom (2007) consider that the social norms of duty and reciprocity govern transfers rather than an altruistic income distribution, which also weaken the idea of the crowding-out of public policies.

[8] $b(\beta) = \dfrac{\beta^{a-1}(1-\beta)^{b-1}}{B(a,b)}$; $g(\gamma) = \dfrac{k}{\lambda}\left(\dfrac{\gamma/100}{\lambda}\right)^{k-1} e^{-(\gamma/100\lambda)^k}$; $h(\theta) = \dfrac{m}{\delta}\left(\dfrac{\theta}{\delta}\right)^{m-1} e^{-(\theta/\delta)^m}$.

the proportion of the population that give equal transfers. This setting helps us to compare different outcomes in societies that differ on the distribution of altruism, concern with fairness and siblings' income inequality. For instance, if the cdf's of θ are $H_1(\theta)$ and $H_2(\theta)$ such that $H_1(\theta) \geq H_2(\theta)$ for all θ in the support $\left[0, \bar{\theta}\right]$ (i.e. society 1 is less equally distributed), and all other things equal; then the proportion of population giving equal transfers in society 1 is lower than in society 2. Likewise, a larger part of families gives equal transfers in a society where its members are more concerned with fairness. This can easily be observed by computing the latent variable t^* using the distributions of footnote 8. The results of this exercise are in table 2. In the first simulation[9], we observe that 34.3% of the parents give equal transfers. If we allow a more equal distribution of siblings' income by modifying the distribution's parameters accordingly, then the fraction of parents giving equal transfers increases to 52.1% (second column). The third simulation shows the effect of an increase of the concern with fairness among the population. In that situation, the parents can tolerate larger differences between the incomes of their children, so that more of them (59%) are prompted to give equal transfers. In the last column, we consider the parents becoming less altruistic. Since β was concentrated in high levels, the reduction of the altruistic feeling causes a raise of 3.1% in the probability of giving equal transfers. All these results accord the implications of our model.

The results regarding the influence of the siblings' income distribution and the concern with fairness on the prevalence of equal transfers are remarkable. A larger portion of parents give equal transfers in a society with low income differences among siblings and whose members are more concerned with being fair. The opposite happens in a society less concerned with fairness and with child incomes more unequally distributed. We presume that some European countries may be examples for the first type of society while the US may be closer to the second type. This could explain the small fraction of parents giving equal transfers in US and the higher prevalence of equal transfers in Europe (see table 1).

The neutrality results are computed for each family, and the average is reported in table 3. As in our predictions, the intergenerational result is larger than -1 for both children. The parent gives back between 0.35 and 0.49 of the Euro that she previously received from the child 1. The size of the neutralization is bigger when the

[9] We assume that I_2 is fixed and also $I_2 < I_1$.

Euro is taken from the poorer child (child 2), which ranges from 0.70 to 0.81. The intra-generational result can be negative or positive from child 1's view but only negative from the view of child 2. When the Government transfers one Euro from the richer child to the poorer one, the parent can reduce the total amount of her total transfers and obtain more utility by increasing her own consumption. In doing so, it is possible that the parent decreases (instead of increase) the transfer to the richer children if she is concerned enough with fairness. This is the reason why dT_1/dI_1 can be positive (see the appendix). In contrast, if the Government transfers one Euro from the poorer child to the richer one, the parent has to remedy this increase in child income inequality by transferring more money to the poorer child, regardless of the level of γ. The size of neutralization for this case ranges from 0.30 to 0.48. These effects contrast notably with the implications of a pure altruism setting where the crowding out is perfect. Therefore, a redistributive policy can be effective under the features of our model.

Although the preceding simulations help us to observe how the model works in a context of heterogeneity and allow us to overcome the difficulty to find analytical solutions, the use of microeconomic data might give more insights on the behaviour of European families with regard to parental transfers. Thus, we take advantage of SHARE -a new European dataset with rich information on parental transfer's characteristics- to find econometric support for the model. The next section is devoted to the econometric analysis.

3. Data, empirical strategy and results

3.1 The data

We use the first wave of SHARE released 2.0.1 which has representative and comparable information from standardised surveys applied to people over 50 years old in Israel and 11 European countries: Austria, Germany, Sweden, The Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland and Belgium. The interviews were taken between April and October 2004. Variables are at individual, household and couple level. In total, SHARE includes 45,051 respondents distributed in 21,336 households[10]. There are key questions regarding frequency, type and amount of time

[10] See Börsch-Supan et al (2005) and in Börsch-Supan and Jürges (2005) for detailed information on the dataset and methodology.

and monetary transfers (over 250 euros) given or received during the last year. It is also possible to identify the family relation between the recipient and provider. Likewise, there is detailed information regarding parents' demographic variables, but partial information for children.

We drop observations in which it is not possible to identify the gender, age and number of children of the respondent, or the household income is missing or zero. Due to our interest in European countries, we delete observations from Israel. The cases from Switzerland are also dropped because we cannot impute labour income for children[11]. Since individual characteristics of children matters for the analysis of transfers, we create a new dataset which includes all respondents' children; thus, each child is one observation. When two respondents live in the same household and are couple, we include their children only once.

Like other studies, children living in the same household with their parents or less than 18 years old are not included. We agree with the reasons pointed by McGarry (1999) under which transfers to children aged less than 18 might be due to legal obligations, while in the case of co-resident children, it is difficult to quantify the value of shared food and housing. We also drop children in retirement or early retirement, and those permanently sick or disabled. The former were deleted because it is not possible to impute incomes for them and the latter are not considered because they are not able to offer time transfers to parents. Due to the theoretical insights we intend to prove, our dataset only includes those children who have at least one sibling. After all these selections, the dataset contains 22,813 observations of children[12]. The definition and computing of variables that enter in the analysis are explained in table 4 while the means and standard errors are reported in table 5.

Similarly to other datasets based on middle age interviewees, in SHARE there is no direct information for children's income. However, we can impute this variable by introducing some child demographics into the earnings equation estimated with other dataset. This equation is estimated for each country, and broken by gender, with information from the European Community Household Panel database (ECHP, wave

[11] Belgium is not considered because currently there is an error in the processing of the education variable for respondents' children, so that we could not impute children's labour income.
[12] In SHARE, the demographic information for children is registered up to four children. However, it represents 94.3% of total respondents' children in our sample.

8, year 2001)[13]. Other authors also impute earnings to solve the lack of information either for children or for parents. For example, assuming that children and parents live near each other, Cox (1987) and Cox and Jakubson (1995) use the average income of the metropolitan areas where children live to approximate the parental income. Cox and Rank (1992) use earnings functions estimated with the same dataset that contains child information to impute parental income at the standardized age of 45. McGarry (1999) uses the mid points of child income intervals, answered by the parents, to impute child income. Although it would be desirable to correct the earnings equations for sample selection, there is not enough demographic information in SHARE for respondents' children. However, as suggested by Harmon et al (2003) in their analysis on the returns to education in European countries, some sample bias could exist but this appears not to be large.

3.2 Empirical strategy

As in other similar studies, we first analyse the probability that a child receives a transfer from his parent. The dependent variable is a latent variable z_i*. However, we only observe z_i which takes the value of 1 if the latent variable is z_i*>0, i.e. the child j receives a transfer from his parents, and 0 otherwise. The model is:

$$z_j^* = \sum_{k=0}^{K} \beta_k X_{kj} + \varepsilon_j \qquad z_j = \begin{cases} 1 & if\ z_j^* > 0 \\ 0 & otherwise \end{cases} ; \qquad (15)$$

X_{kj} includes the characteristics of the child and his parents. Assuming ε_j is normally distributed with zero mean, we estimate a probit equation. According to the theoretical model, we should expect a positive effect of the parental income and sibling's income on the probability of giving a transfer. Likewise, the effect of the child's own income should be negative. Secondly, we use a type I Tobit model regression to test the derivatives implied in the theoretical model. The dependent variable is the amount of transfer in euros (divided by the purchasing power parity

[13] The ECHP is a dataset widely used in economic research and according to some examinations shown in Börsch-Supan et al (2005), it has similar distributions to those of SHARE in key concepts like employment, income, education and health. We construct the dependent variable (log of hourly labour income) using the yearly net wage and the variables that enter into the country-gender regressions also are measured in SHARE, i.e. age and its square, marital status and education level. The results (not reported but available at request) perform well and the estimated incomes per country show a ranking similar to other studies (e.g. Brunello et al, 2007).

ratio, ppp) received by child j (T_j) and the explanatory variables are the same that enter into the probit regression:

$$T_j = \sum_{k=0}^{K} \beta_k X_{kj} + E(\mu_j \mid T_j > 0) \qquad (16)$$

μ_j is the error term, which is assumed to be normally distributed. Although some studies use a type II Tobit model (Cox, 1987; Cox & Rank, 1992 and Arrondel & Laferrere, 2001 are some examples) we favour a type I model. This type of model is also used by Schoeni (1997), Hochguertel & Ohlsson (2008), Sloan et al (2002) and Cigno et al (2004)[14]. The estimated coefficients are conditioned on transfer amount censored at zero value; thus the results must be interpreted as conditioned on positive transfers. Since the dataset includes observations of siblings who share common familial characteristics, it is adequate to consider clustering for the estimation of robust standard errors. Thus, in the variance-covariance matrix, all siblings from the same family are treated as a particular cluster.

As third regression model, we run a probit model for the probability of giving equal transfers. In this case, the unity of analysis is the household. The dependent variable takes value 1 if the parents give equal transfers to all their children, and zero otherwise. The expected results of this regression model are fully described in the theoretical model. Similar to McGarry (1999), we only consider households where the parents make at least one transfer to one of their children. The author argues that zero transfers to all children do not mean a desire to treat all of them equally.

3.3 Results

Tables 6 and 7 show the results for the decision and amount of transfer. As expected, parental and child income are significant and positively and negatively affect the decision to transfer, respectively. Likewise, the income of the sibling increases the probability of receiving a transfer, which suggests that child and sibling's income are substitutes. The results are the same in the Tobit regression. The

[14] We favour a type I model because of the characteristics of our data and dependent variable. The transfers are censored at zero when the parent does not make a transfer; however, our dataset contains the full characteristics of the parents who provide (or not) transfers to their children. We take advantage of this fact by using the full sample such as it is recommended in Wooldridge (2002).

magnitude of the effects of income variables in the transfer probability is not too high. An increase of 10,000 Euros in the yearly income of the parent, child or sibling affects the probability of receiving a transfer by 0.3%, -2.1% and 0.49% respectively. The same boost in the parental income positively affects the amount transferred by 183 Euros, while such increase in child income reduces the transfer amount by 860 Euros. Recall from section 2.2 that neutrality results hold when the corresponding subtraction of derivatives is equal to -1. Clearly, neither intergenerational neutrality result (-0.086-0.018=-0.104) nor intra-generational result (-0.086-0.053=-0.139) hold; we reject at large significant levels that they are not different from -1.

Education and health status are also significant variables. More educated and healthy parents can give larger transfers and with more probability, which is quite intuitive. The level of education of the child increases the probability to receive transfers from parents. McGarry (1999) argues that schooling of child is viewed as a proxy for permanent income and thus, holding current income constant, a higher permanent income suggests the child is more liquidity constrained and therefore has a greater probability to receive a transfer. Likewise, McGarry (1999) and Cox & Rank (1992) point out that education may include effects of past transfers: parents who were generous in the past with the expenditures on child education are also generous in the present with transfers[15]. Age of children is negatively related to the probability and amount of transfers. This result accords with the fact that children belonging to earlier stages of life-cycle are more liquidity constrained and need more financial support from their parents.

In our sample, a married child has less possibility to receive a transfer and also receives smaller amounts of transfers. A priori, the final effect of child's marital status is not clear; a spouse can raise the family income, bringing to the household her own resources, or decreases the income per capita if she does not bring any income. In the first case, the probability of receiving a transfer would decrease while in the second case it would raise. Furthermore, having a spouse implies another set of parents who could help with more transfers. The gender of the child does not matter statistically in the chances to receive a transfer. The number of children (or grandchildren from the parents' view) enters significantly and positively in the probit and Tobit regressions,

[15] Due to the cross-sectional nature of the data, it is not possible to account for past transfers. Furthermore, given the scarcity of information for children in the dataset, there are not child's demographic variables available that are correlated with schooling but not with the decision and amount of transfers, so that we could not find adequate instruments.

which is understandable since an additional grandchild exerts extra expenses and reduces income per capita in the child's home. The regressions show that the coefficient for number of siblings is negative and significant. Siblings may be seen as competitors to receive transfers and it is clear that the more siblings the lower probability to get a transfer and the lower amount.

The variables *hours of help, contact with parents* and *distance from parental home*, are proxies for the child services S_j that we described in the theoretical framework. In particular, the variable most related to child service is *hours of help* but it is not significant in any regression. Contrary, the frequency of contact with parents and the distance between child and parental home are both positive and significant[16]. Recall from our theoretical implications that there is not an exact relation between transfers and child services.

Table 8 shows the results for the probability of giving equal transfers. The unit of analysis is the household, thus the variables related to children are expressed in relative terms. For instance, the variable for children income is the positive difference between the maximum and minimum value of the incomes of children belonging to the same family. Only for the variable *distance from parental home*, we use a ratio between the maximum and minimum value instead of difference in order to control for important country differences in territory size. The variable of main interest is the difference between siblings' income, i.e. the θ from our theoretical framework. This variable is significant and negative, which accords with our predictions: the larger the siblings' income inequality, the lower the probability of giving equal transfers. For example, an increase of 1,000 euros in the difference between yearly child incomes reduces the probability of giving equal transfers by 0.94%. The difference in the values of *contact with parents* among siblings is significant but not in *distance from parental* and *hours of help*. There is not a clear picture about the effects of child services on the probability of giving equal transfer, but apparently larger differences in contact frequency shown by children may drive parents to reduce the probability of giving equal transfers.

[16] Cox & Rank (1992) consider that the distance between child and parental home is a *proxy* for the provision of child services, since services are more costly to offer when the child lives further from his parent's home. They find that distance negatively affects the decision to give transfers, and argue that this finding lends support to the idea of transfers being governed by exchange motives. However, we find a positive relation, which is not expected in the exchange regime.

According to our model, there is not a linear relation between the parent's altruism and the probability of giving equal transfers. We argued that a given probability of giving equal transfers may be compatible with two different degrees of altruism. In the survey there is not a variable that can measure the parental altruism itself, but we found a proxy measured for the sample of persons who completed the self-administered questionnaire of SHARE. Individuals who participated in such questionnaire were asked how much they agree with the next statement: "parents' duty is to do their best for their children even at the expense of their own well-being". The responses range from 1=strongly agree to 5=strongly disagree. In figure 1, we consider that 1 is the highest value for the altruism of one person and 5 is the lowest. Although the evidence is not conclusive, the non-linear relation depicted in figure 1 suggests that a given probability of equal transfers is compatible with different levels of altruism. We do not include the proxy for altruism in our precedent regressions because the sample would be considerably reduced[17], and self-selection problems might appear due to the nature of the drop-off questionnaire.

It is worth to mention that our results, particularly on the decision to transfer may be due to or influenced by income shocks suffered by the children before the date of the survey application; but nevertheless the cross-sectional nature of the data does not allow us to account for those past shocks[18]. Furthermore, we find that our results can be comparable to those that use American data. For instance, the coefficient of variation of the parental income in our sample is rather similar to that of McGarry (1999) and McGarry & Schoeni (1995) who use the HRS and AHEAD datasets. Although it would be ideal to measure the percentage that the transfers represent with respect to the child's income in the studios made with European and American data, there is only available and comparable data for parental income. And we find that the proportion of the transfers with respect to the parental income is similar. Thus, differences between European and American parents with respect to their transfer

[17] It may reduce the sample from 1,552 to 1,075 observations. The coefficient of this proxy is not significant when it is included (linearly or non-linearly) in the last probit regression. Furthermore, this variable is not highly correlated with the other covariates.

[18] The only available variable potentially related to an income shock is the current employment (unemployment) status of the child; but its inclusion in the first two regressions, as a dummy variable indicating that the child is unemployed, does not change the results. The coefficient was positive and significant in both cases.

behaviour do not necessarily rely on sample design differences or on sharp income variability[19].

4. Conclusion

According to the survey of Health, Aging, and Retirement in Europe (SHARE, release 2.0.1) we observe that there is a high prevalence of Europeans giving equal financial transfers to their adult children, regardless of siblings' income differences. This behaviour is not predicted by any conventional model on family transfers. We intend to explain this conduct by modelling parental transfers as altruistically and fairly determined. We include explicitly a parameter for the parent's concern with fairness. For fairness, we understand equal transfers to each sibling.

In our model the type of the parent is defined by her degree of altruism and concern with fairness. Likewise, children show different levels of income, so that we can build a measure for income inequality among siblings within family. We argue the parents do not relieve income inequality among their children (as in the pure altruism model) and decide to give equal transfers in order to fulfil a constraint to be fair. However, the parents might start to give larger transfers to the poorer children if the income inequality among siblings becomes unbearable. Contrary to the pure altruism model, the intra-generational and intergenerational neutrality results of the redistribution policies of our model do not hold, and therefore there is still room so that such policies are effective. This aspect coincides with the results from other altruistic-based models that have relaxed the Becker-Barro's neutrality results. Applying simulations, the predictions of our model are still valid when we add heterogeneity (by simulating) in the parental parameters of altruism and concern with fairness, and in the sibling's income inequality for each family. Furthermore, European microeconomic data from SHARE allows us to find evidence for a negative effect of sibling's income inequality on the probability of giving equal transfers. Finally, almost all partial derivatives from our model find support on the econometric results for the corner and interior solutions.

[19] The coefficient of variation for the parental income in our sample is 0.88, whilst it is 0.85 and 0.90 in McGarry (1999) for the HRS and AHEAD datasets, respectively. This is 1.09 in McGarry & Schoeni (1995). The proportion of the transfers with respect to the parental income is 0.07 in our sample and in McGarry & Schoeni (1995).

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Tables and Figures

Table 1
% of households where children receive equal transfers*

Country	%	N
Austria	29.1	134
Germany	25.2	210
Sweden	42.4	396
Netherlands	31.1	212
Spain	12.5	40
Italy	27.3	88
France	32.8	183
Denmark	40.0	160
Greece	14.6	158
Total	31.8	1,581

*Calculated for parents with at least two children and conditional on the existence of at least one child receiving transfers.
Source: SHARE-Release 2.0.1. Own calculations.

Table 2
% of parents giving equal transfers

Parameter values for:		#1	#2	#3	#4
Altruism	a	4	4	4	2
	b	2	2	2	2
Concern with fairness	k	0,5	0,5	0,5	0,5
	λ	0,3	0,3	0,5	0,5
Child income inequality	m	3	3	3	3
	δ	80	20	20	20
% of parents giving equal transfers		34.30	52.10	59.00	62.10

Each simulation contains 1,000 draws. I_p=100; I_2=20.

Table 3
Neutrality results

		#1	#2	#3	#4
Intergenerational result	dT_1/dI_p	-0.35	-0.49	-0.46	-0.38
	dT_2/dI_p	-0.81	-0.70	-0.70	-0.77
Intra-generational result	dT_1/dI_1	0.17	-0.06	-0.02	0.07
	dT_2/dI_2	-0.48	-0.32	-0.30	-0.36

Each simulation contains 1,000 draws. I_p=100; I_2=20.

Table 4
Definitions of variables

Variable	Description
Parents	
Male	If respondent and her spouse are alive or the only one alive is the male it takes value 1, otherwise is 0.
Married and living with couple	It takes value 1 if the respondent is married or living with a couple, 0 otherwise.
Age	It takes the age of the male if the respondent lives with a couple, otherwise it takes the age of the respondent herself.
High school	It takes value 1 if the respondent has a high school degree (ISCED-97, 3 & 4). If the respondent lives with a couple, we choose the education of the male.
Higher education	It takes value 1 if the respondent has a higher degree (ISCED-97, 5 & 6). If the respondent lives with a couple, we choose the education of the male.
At least one parent in bad health condition	It takes value 1 if the respondent or her spouse is in bad or very bad health condition, 0 otherwise.
Number of members of Household	It measures the number of members in the household of the respondent.
HH income (in 10,000s)	It measures the household income of respondent. It is expressed in 10,000s euros.
Children	
High school	It takes value 1 if the child has a high school degree (ISCED-97, 3 & 4)
Higher education	It takes value 1 if the child has a higher degree (ISCED-97, 5 & 6)
Married and living with couple	It takes value 1 if the child is married or living with a couple, 0 otherwise.
Age	It takes the age of the child.
Male	It takes 1 if the child is male, 0 otherwise.
Yearly ppp labour income	Imputed from ECHP-wave 8 data set. Expressed in purchasing power parity level.
Yearly labour ppp income of siblings	Mean of yearly ppp labour income of the siblings.
Number of siblings	Indicates the number of siblings of the child.
Number of children	Indicates the number of children of the child.
Hours of help given to parents	Hours of any kind of help received from children in the last 12 moths, adequately computed from frequency reports.
Contact with parents	It measures the daily frequency of contact of respondent with her children. The code variable is converted into days as follows: 1)Daily =365; 2)Several times a week =182; 3)About once a week=52; 4)About every two weeks=26; 5)About once a month=12; 6)Less than once a month=6; 7)Never=0.
Distance from parental home	It measures the distance into kilometres between the respondent's home and that of her children. The code variable is converted in kilometres as follows: 1)In the same household=0; 2)In the same building=0; 3)Less than 1 kilometer away=0.5; 4)Between 1 and 5 kilometers away=2.5; 5)Between 5 and 25 kilometers away=15; 6)Between 25 and 100 kilometers away=62.5; 7)Between 100 and 500 kilometers away=300; 8)More than 500 kilometers away=500; 9)More than 500 kilometers away in another country=500.
Others	
Transfer amount	It indicates the amount in Euros (at least 250 euros) that the respondent gave to her child in the last 12 moths.
Country dummies	It takes 1 for the country, 0 otherwise.

Table 5
Statistics for variables in sample

Variable	N	Mean	Std. Dev.
Dependent variables			
Transfers received from parents	22813	0.142	0.349
Amount of Transfers (ppp Euros)	2856	2893.200	9510.532
Equal transfers	1581	0.318	0.466
Parental Characteristics			
Male (in couple)	22813	0.658	0.474
Married and living with couple	22813	0.678	0.467
Age (male in couple)	22813	67.019	9.784
High school (male in couple)	22626	0.281	0.450
Higher education (male in couple)	22626	0.173	0.378
At least one parent in bad health condition	22813	0.147	0.354
Number of members of HH	22813	1.973	0.840
HH ppp income (in 10,000s)	22813	4.147	4.734
Child characteristics			
High school	22513	0.459	0.498
Higher education	22513	0.311	0.463
Married or living with couple	22703	0.675	0.468
Age	22813	38.260	9.459
Male	22813	0.493	0.500
Yearly labour income (ppp Euros)	22675	12635	8048
Yearly labour income of siblings (ppp Euros)	21389	12791	6875
Number of siblings	22813	2.136	1.365
Number of children	22692	1.311	1.216
Hours of help given to parents	22813	96.505	828.310
Contact with parents	22735	177.524	134.389
Distant from parental home	22769	98.198	157.569
Country dummies			
Austria	22813	0.081	
Germany	22813	0.114	
Sweden	22813	0.166	
Netherlands	22813	0.142	
Spain	22813	0.102	
Italy	22813	0.087	
France	22813	0.132	
Denmark	22813	0.085	
Greece	22813	0.091	

Table 6
Probit estimates for transfers received from parents

Variable	Coef.	Rob .Clus. Std. Err.	dF/dx	Mean
Parental Characteristics				
Male (in couple)	0.103 **	0.043	0.018	0.66
Married and living with couple	-0.042	0.050	-0.008	0.68
Age (male in couple)	-0.001	0.003	-1.3E-04	67.12
High school (male in couple)	0.232 ***	0.041	0.045	0.28
Higher education (male in couple)	0.414 ***	0.046	0.088	0.17
At least one parent in bad health condition	-0.274 ***	0.051	-0.044	0.15
Number of members of HH	-0.012	0.025	-0.002	1.97
HH ppp income (in 10,000s)	0.019 ***	0.003	0.003	4.14
Child characteristics				
High school	0.088 **	0.040	0.016	0.46
Higher education	0.113 **	0.046	0.021	0.32
Married or living with couple	-0.163 ***	0.030	-0.031	0.68
Age	-0.021 ***	0.003	-0.004	38.40
Male	0.010	0.027	0.002	0.50
Yearly labour ppp income	-1.2E-05 ***	2.2E-06	-2.1E-06	13263.40
Yearly labour ppp income of siblings	2.7E-06	2.2E-06	4.9E-07	12794.40
Number of siblings	-0.178 ***	0.016	-0.032	2.15
Number of children	0.021 *	0.013	0.004	1.32
Hours of help given to parents	2.0E-05	1.6E-05	3.6E-06	92.09
Contact with parents	0.001 ***	1.1E-04	1.1E-04	178.04
Distant from parental home	1.8E-04 **	8.8E-05	3.2E-05	95.86
Germany	-0.100	0.069	-0.017	0.11
Sweden	0.269 ***	0.067	0.054	0.17
Netherlands	-0.010	0.069	-0.002	0.14
Spain	-0.505 ***	0.088	-0.070	0.10
Italy	-0.053	0.080	-0.009	0.09
France	-0.046	0.070	-0.008	0.13
Denmark	0.002	0.075	0.000	0.08
Greece	0.036	0.076	0.007	0.09
Constant	-0.179	0.162		0.00
Number of observations	21109.0			
Log pseudolikelihood	-7389.2			
chi2(28)	1018.2			
Dependent variable mean	0.136			

*** indicates significant at 1%, ** at 5%, * at 10%.

Table 7
Tobit estimates for transfers received from parents

Variable	Coef.	Rob .Clus. Std. Err.
Parental Characteristics		
Male (in couple)	1552.049***	496.018
Married and living with couple	-760.097	543.715
Age (male in couple)	-4.969	31.378
High school (male in couple)	2285.643***	562.031
Higher education (male in couple)	4721.266***	915.228
At least one parent in bad health condition	-2994.454***	701.241
Number of members of HH	-51.288	276.269
HH ppp income (in 10,000s)	183.168***	41.655
Child characteristics		
High school	931.197**	459.434
Higher education	1465.817***	551.561
Married or living with couple	-1050.251***	325.278
Age	-226.775***	44.796
Male	56.734	320.567
Yearly labour ppp income	-0.086***	0.027
Yearly labour ppp income of siblings	0.053*	0.028
Number of siblings	-1709.302***	303.030
Number of children	103.681	149.981
Hours of help given to parents	-0.055	0.175
Contact with parents	6.631***	1.663
Distant from parental home	1.962**	0.990
Germany	-1079.887	862.916
Sweden	1984.973**	811.568
Netherlands	-909.842	882.271
Spain	-5305.821***	1550.178
Italy	-54.657	1100.554
France	-696.069	895.606
Denmark	-365.223	876.634
Greece	1021.432	1054.368
Constant	-6618.422***	1980.858
Number of observations	21109.0	
Log pseudolikelihood	-30970.9	
chi2(28)	75.8	
Dependent variable mean	2893.2	

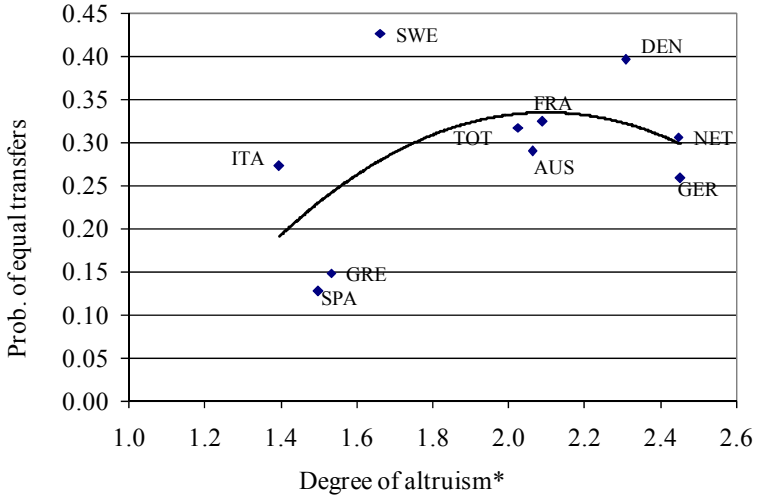
*** indicates significant at 1%, ** at 5%, * at 10%.

Table 8
Probit estimates for giving equal transfers to all children

Variable	Coef.	Robust Std. Err.	dF/dx	Mean
Parental Characteristics				
Male (in couple)	-0.072	0.091	-0.025	0.75
Married or living with couple	0.174	0.116	0.059	0.74
Age (male in couple)	0.014 ***	0.004	0.005	63.30
High school (male in couple)	-0.031	0.093	-0.011	0.36
Higher education (male in couple)	-0.193 **	0.096	-0.066	0.30
At least one parent in bad health condition	-0.256 *	0.135	-0.083	0.08
Number of members of HH	-0.040	0.069	-0.014	1.94
HH ppp income (in 10,000s)	0.011	0.008	0.004	5.16
Number of children	-0.187 ***	0.048	-0.065	2.71
Child characteristics				
Difference in age (b)	-0.031 ***	0.012	-0.011	5.51
Difference in yearly labour ppp income (b)	-9.4E-06 *	5.7E-06	-3.3E-06	7820.40
Difference in number of children (b)	-0.018	0.035	-0.006	1.11
Difference in hours of help given to parents (b)	-6.2E-06	3.6E-05	-2.2E-06	104.52
Difference in contact with parents (b)	-0.001 **	3.4E-04	-2.9E-04	103.29
Difference in distant from parental home (a)	0.123	0.085	0.043	0.38
Germany	-0.170	0.156	-0.057	0.13
Sweden	0.361 ***	0.139	0.130	0.25
Netherlands	0.003	0.155	0.001	0.13
Spain	-0.584 *	0.300	-0.168	0.03
Italy	-0.234	0.198	-0.076	0.05
France	0.089	0.156	0.031	0.12
Denmark	0.236	0.158	0.085	0.10
Greece	-0.650 ***	0.184	-0.189	0.10
Constant	-0.561	0.357		
Number of observations	1552			
Log pseudolikelihood	-885.82			
chi2(23)	140.37			
Dependent variable mean	0.318			

*** indicates significant at 1%, ** at 5%, * at 10%.
(a) Indicates the division of the min. over the max. value of the relevant variable for siblings
(b) Indicates the positive difference between the max. and min. value of the relevant variable for siblings

Figure 1
Predicted probability of equal transfers and degree of altruism



*How much agree with: "Parents' duty is to do their best for their children even at the expense of their own well-being" (from =strongly agree to 5=strongly disagree)

Appendix

A. Optimal values for T_i

A1. Take total derivatives to the first order conditions 9 and 10 with respect to I_p:

$$\frac{\partial T_2}{\partial I_p} = \frac{a - a_1}{a_2 a_1 - a^2} \qquad \text{(a1)} \qquad\qquad \frac{\partial T_1}{\partial I_p} = \frac{a - a_2}{a_2 a_1 - a^2} \qquad \text{(a2)}$$

where $a_1 = -\frac{\beta C_p^2}{C_1^2} - 2\gamma C_p^2 - 1$; $a_2 = -\frac{\beta C_p^2}{C_2^2} - 2\gamma C_p^2 - 1$ and $a = 2\gamma C_p^2 - 1$.

Since $a_2 a_1 - a^2 > 0$ and $a - a_1 > 0$, $\frac{\partial T_2}{\partial I_p} > 0$. And similarly $\frac{\partial T_1}{\partial I_p} > 0$.

A2. Take total derivatives to the first order conditions 9 and 10 with respect to I_1:

$$\frac{\partial T_1}{\partial I_1} = \frac{z a_2}{a_2 a_1 - a^2} \qquad \text{(a3)} \qquad\qquad \frac{\partial T_2}{\partial I_1} = \frac{-z a}{a_2 a_1 - a^2} \qquad \text{(a4)} \qquad\qquad \text{where } z = \frac{\beta C_p^2}{C_1^2}.$$

$z a_2 < 0$, thus $\frac{\partial T_1}{\partial I_1} < 0$. Since $za = \frac{\beta C_p^2}{C_1^2}(2\gamma C_p^2 - 1)$, $\frac{\partial T_2}{\partial I_1} = \begin{cases} > 0 & if \quad 2\gamma C_p^2 < 1 \\ < 0 & if \quad 2\gamma C_p^2 > 1 \end{cases}$

A3. Take total derivatives to the first order conditions 9 and 10 with respect to I_2:

$$\frac{\partial T_1}{\partial I_2} = \frac{-w a}{a_2 a_1 - a^2} \qquad \text{(a5)} \qquad\qquad \frac{\partial T_2}{\partial I_2} = \frac{w a_1}{a_2 a_1 - a^2} \qquad \text{(a6)} \qquad\qquad \text{where } w = \frac{\beta C_p^2}{C_2^2}.$$

$w a_1 < 0$, thus $\frac{\partial T_2}{\partial I_2} < 0$. Similarly to A2, $\frac{\partial T_1}{\partial I_2} = \begin{cases} > 0 & if \quad 2\gamma C_p^2 < 1 \\ < 0 & if \quad 2\gamma C_p^2 > 1 \end{cases}$.

A4. Optimal value for T_1=T_2=T and derivatives.

$$T = \frac{-[(1+\beta)(I_1 + I_2) - \beta I_p] + \{[(1+\beta)(I_1 + I_2) - \beta I_p]^2 - 4(1+2\beta)[I_1 I_2 - 0.5\beta I_p (I_1 + I_2)]\}^{0.5}}{2(1+2\beta)} \qquad \text{(a7)}$$

$$\frac{\partial T}{\partial I_1} = \frac{1}{2A(1+2\beta)}\left[(I_1 - I_2)(1+2\beta) + \beta^2 (I_1 + I_2 + I_p) - (1+\beta)A\right] \qquad \text{(a8)}$$

Where $A = \{\beta^2[(I_1 + I_2)(I_1 + I_2 + 2I_p) + I_p^2] + (I_1 - I_2)^2(1+2\beta)\}^{0.5}$

The sign of a8 is equivalent to that of $\left[(I_1 - I_2)(1+2\beta) + \beta^2 (I_1 + I_2 + I_p)\right]^2 - (1+\beta)^2 A^2$ and if we simplify this expression we obtain $-\beta^2(1+2\beta)(2I_2 + I_p)^2 < 0$. Thus, $\frac{\partial T}{\partial I_1} < 0$.

And similarly, $\frac{\partial T}{\partial I_2} < 0$. Finally, $\frac{\partial T}{\partial I_p} = \frac{1}{4\beta + 2}\left[\frac{\beta(I_1 + I_2 + I_p) + A}{A}\right] > 0$.

B. Corner solutions for T_i

Define the latent variable $z^* = \partial U/\partial C_j - \partial U/\partial C_p$ evaluated at $T_j = 0$. Thus, $T_j > 0$ when $z^* > 0$ and $T_j = 0$ otherwise. Let's consider none child receives a transfer: $T_j = 0$ for j=1,2, then $z^* = \beta/I_j - 1/I_p$. Thus, $\partial z^*/\partial I_j < 0$ and $\partial z^*/\partial I_p > 0$ for j=1,2. The same results apply for the case of equal transfers by modifying the latent variable to $z^* = \partial U/\partial C_j + \partial U/\partial C_k - \partial U/\partial C_p$ evaluated at $T_j = T_k = T = 0$.

This time consider one of the children is receiving a positive transfer: $T_k > 0$ and $T_j = 0$ for $j \neq k$. For the child j, the latent variable is $z^* = \frac{\beta}{I_j} - \frac{1}{I_p - T_k}$ and hence $\frac{\partial z^*}{\partial I_p} = \frac{\beta + 2\gamma C_2^2}{\beta + 2\gamma C_2^2 + C_2^2/C_p^2} > 0$. $\frac{\partial z^*}{\partial I_j} = \frac{-\beta}{I_j^2} - \frac{\partial T_k/\partial I_j}{(I_p - T_k)^2} < 0$ since $\partial T_k/\partial I_j = 0$ when $T_j = 0$. Finally, $\frac{\partial z^*}{\partial I_k} = -\frac{\partial T_k/\partial I_k}{(I_p - T_k)^2} > 0$.

C. Latent variable *t**

Define $t^* = V^e + \gamma - V^u$ as a latent variable for which the parent gives equal transfers if $t^* > 0$, otherwise the parent gives unequal transfers.

C1. Effects of the differences of income between siblings:

Define $\theta = I_1 - I_2$ as a measure for income inequality between siblings. Assume without loss of generality that $I_1 > I_2$ and take derivative of t^* w.r.t θ. If we maintain I_2 fixed and only allow I_1 to vary, we obtain $\frac{\partial t^*}{\partial \theta} = \frac{\beta(T_1 - T)}{(I_1 + T)(I_1 + T_1)} < 0$ since $T_2 > T > T_1$. Similarly, if I_1 is fixed and I_2 varies, $\frac{\partial t^*}{\partial \theta} = \frac{-\beta(T_2 - T)}{(I_1 + T)(I_1 + T_1)} < 0$ as well. It does not matter which income varies, a raise of θ always reduces the probability of giving equal transfers.

C2. Effects of the concern with fairness:

$\frac{\partial t^*}{\partial \gamma} = 1 + (T_2 - T_1)^2 > 0$.

C3. Effects of the altruism:

$\frac{\partial t^*}{\partial \beta} = \ln\left[\frac{(I_1 + T)(I_2 + T)}{(I_1 + T_1)(I_2 + T_2)}\right]$ which can take positive or negative values.

D. Neutrality results

As before, assume $I_1 > I_2$.

D1. Intergenerational neutrality results:

Assume dI_1=-dI_p, thus the neutrality result between the parent and child 1 is:

$$\frac{\mathrm{d}T_1}{\mathrm{dI_p}} = \frac{\partial T_1}{\partial I_1} - \frac{\partial T_1}{\partial I_p} = \frac{za_2 - a + a_2}{a_1 a_2 - a^2} \qquad \text{(a9)}$$

If we try $dT_1/dI_p = -1$, as is the case of the pure altruism setting, we get $\beta C_p^2 / C_2^2 = -2$ which is a contradiction. However, $dT_1/dI_p > -1$ always holds. And analogously to child 1, $dT_2/dI_p > -1$ always holds. Likewise, dT_1/dI_p and dT_2/dI_p are negative.

D2. Intra-generational neutrality results:

Assume dI_1=-dI_2, thus the neutrality result between the child 1 and child 2 is:

$$\frac{\mathrm{d}T_1}{\mathrm{dI_1}} = \frac{\partial T_1}{\partial I_1} - \frac{\partial T_1}{\partial I_2} = \frac{za_2 + wa}{a_1 a_2 - a^2} \qquad \text{(a10)}$$

If we try $dT_1/dI_1 = -1$, as is the case of the pure altruism setting, we get $4\beta\gamma C_p^4 / C_2^2 + 8\gamma C_p^2 = 0$ which is a contradiction. Hence $dT_1/dI_1 \neq -1$. And similarly, $dT_2/dI_2 \neq -1$. Likewise, dT_1/dI_1 can be positive or negative but dT_2/dI_2 is negative:

$$\frac{\mathrm{d}T_1}{\mathrm{dI_1}} = \frac{-C_1^2(\overbrace{1-2\gamma C_p^2}^{+/-}) - C_2^2(1+2\gamma C_p^2) - \beta C_p^2}{\underbrace{C_1^2 C_2^2 (a_1 a_2 - a^2)}_{+}} < or > 0 \qquad \text{(a11)}$$

$$\frac{\mathrm{d}T_2}{\mathrm{dI_2}} = \frac{2\beta\gamma C_p^4 (C_2^2 - C_1^2) - \beta C_p^2 (C_2^2 + C_1^2) - \beta C_p^2}{C_1^2 C_2^2 (a_1 a_2 - a^2)} < 0 \qquad \text{(a12)}$$

D3. Neutrality results with equal transfers:

$$\frac{\mathrm{d}T}{\mathrm{dI_1}} = \frac{\partial T}{\partial I_1} - \frac{\partial T}{\partial I_2} = \frac{1}{\left\{ \frac{\beta^2 [(I_1 + I_2)(I_1 + I_2 + 2I_p) + I_p^2]}{(I_1 - I_2)^2} + 1 + 2\beta \right\}^{0.5}}, \text{ thus } 0 < \frac{\mathrm{d}T}{\mathrm{dI_1}} < 1$$

$\frac{\mathrm{d}T}{\mathrm{dI_2}} = -\frac{\mathrm{d}T}{\mathrm{dI_1}}$, thus $-1 < \frac{\mathrm{d}T}{\mathrm{dI_2}} < 0$.

From the view of child 1, $\frac{\mathrm{d}T}{\mathrm{dI_p}} = \frac{\partial T}{\partial I_1} - \frac{\partial T}{\partial I_p} = -0.5 + \frac{1}{\left\{ \frac{\beta^2 [(I_1 + I_2)(I_1 + I_2 + 2I_p) + I_p^2]}{(I_1 - I_2)^2} + 1 + 2\beta \right\}^{0.5}}$,

thus $-0.5 < \frac{\mathrm{d}T}{\mathrm{dI_p}} < 0.5$.

Analogously, from the child 2's view, $-1.5 < \frac{\mathrm{d}T}{\mathrm{dI_p}} < -0.5$