Network for Studies on Pensions, Aging and Retirement

Netspar DISCUSSION PAPERS

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Altruism versus Exchange in Time and Money Transfers

Discussion Paper 02/2011-012

Is it true love? Altruism versus exchange in time and money transfers*

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February 22, 2011

Abstract

This paper investigates what motivates intergenerational time and money transfers. We consider a model in which transfers may be driven not only by altruism, but also by exchange considerations. We use data from SHARE to discriminate between the two motives. We show that both if we consider money transfers from parents to children and time transfers from children to parents, the empirical evidence rejects pure altruism in favor of exchange. This result has important policy implications on the effectiveness of formal care provision as a substitute for informal care and on the impact of taxation on transfers.

JEL Classification: D12, J14
Keywords: Intergenerational transfers, altruism, exchange

*We are grateful to Michael Hurd, Anne Laferrère, Paolo Pin and Lukas Schwank for useful comments. We also thank participants to the WISE seminar (Venice), the BOMOPA conference (Padua), the Netspar Pension workshop (Zurich) and the RAND Workshop on Comparative International Research (Santa Monica) for helpful suggestions. This paper uses data from SHARE release 2.3.1, as of July 29th 2010. SHARE data collection in 2004-2007 was primarily funded by the European Commission through its 5th and 6th framework programmes (project numbers QLK6-CT-2001- 00360; RII-CT-2006-062193; CIT5-CT-2005-028857). Additional funding by the US National Institute on Aging (grant numbers U01 AG09740-13S2; P01 AG005842; P01 AG08291; P30 AG12815; Y1-AG-4553-01; OGHA 04-064; R21 AG025169) as well as by various national sources is gratefully acknowledged (see http://www.share-project.org for a full list of funding institutions).

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1 Introduction

In this paper we empirically investigate what motivates individuals to transfer income and/or to provide care to family members. Altruism is often put forward as an important motive for money transfers and care provision (see e.g. Becker, 1974). In case of altruism, a benevolent individual (say the parent) cares about the well-being of other individuals (the children). An altruistic parent will make compensatory transfers, i.e. she will give less money to a rich child than to a poor one. The altruistic model has one other important implication, the so-called neutrality hypothesis: if income of the donor parent is reduced by 1 dollar and at the same time income of the receiving child is increased by the same amount, then the parent transfers 1 dollar less to the child. It should be realized, however, that family relations may be driven not only by altruism or blood ties, but also by exchange considerations. A strand of the literature stemming from Bernheim et al. (1985) and Cox (1987) stresses the importance of the exchange motive, focusing on the role of bequests and inter–vivos transfers as means of payment for attention and care by adult children to their elderly parents. In case of exchange, a parental financial transfer does not need to be compensatory. Cox (1987) also claims that in the exchange regime rich children will provide less care to their parents than poor ones.

Understanding the motives for transfers is crucial in order to assess the possible effects of e.g. fiscal policy. The well-known "Ricardian equivalence hypothesis" critically hinges on the assumption that households are altruistic (see Barro, 1974). According to the neutrality result such households could counterbalance the intergenerational transfer associated with government borrowing by adjusting their own private transfers. If transfers are mainly motivated by exchange, the neutrality hypothesis does not hold anymore. Motives for money transfers play an important role also in the relationship between saving and social security wealth. Standard economic theory predicts that in a world without intergenerational links social security wealth crowds out saving. This relation between social security wealth and private saving behavior is broken if households are altruistically linked. However, this is not true if the exchange motive for money transfers is important.

Several studies have examined the effect of parental and child income on parental transfers (Laferrère and Wolff, 2006, for a comprehensive review of the empirical literature, see). Due to strong data requirements, only a few studies have tested the validity of the altruism hypothesis by checking the neutrality rule (Altonji et al., 1997; Villanueva, 2001; Hochguertel and Ohlsson, 2009; Cox and Rank, 1992). Those studies typically find that the difference in the transfer-income derivatives with respect to parental and child income is rather small and certainly not equal to unity. In other words, the neutrality hypothesis is strongly rejected. McGarry (2000) and Villanueva (2001) propose extensions of the the simple altruism model that explain a small or negative difference in the transfer-income derivatives.[1] It should be stressed that those extended altruism models still predict that gift amounts from parents are compensatory. Most studies on US data cited in Laferrère and Wolff (2006) confirm this prediction (see e.g. Altonji et al., 1997, McGarry and Schoeni, 1995 and Villanueva, 2001).[2] However, Laferrère and Wolff (2006) also review some studies on French data that typically find that rich children receive higher financial gifts from their parents than poor ones. In other words, these studies reject the null hypothesis of altruism.

Some empirical studies try to discriminate between the altruistic and exchange motive by looking at time transfers from children to parents. To be more precise, these studies test the prediction that in the exchange regime rich children provide less care than poor ones. Most of these studies do not find support for this prediction and therefore reject the exchange motive for time and financial transfers (see e.g. Altonji et al., 2000, Schoeni, 1997 and Sloan et al., 2002).

The contribution of our paper is twofold. The first contribution concerns an extension of the theoretical model of Cox (1987) which explains both transfer behavior of parents and caring decisions by children. The model captures both the altruism (i.e. the parent possibly donates a transfer to the child because she cares about the child's well–being) and the exchange motive (i.e. the child provides care to the parent in exchange of the transfer which she has received or will receive). The model yields predictions on both the decision to transfer (and to provide services) and the amount to transfer (care), conditional on transferring. In comparison with Cox (1987), we obtain some sharper predictions on the effect of parent's and child's income on the amount of care provided by the child. In case of altruism, we find that this effect is positive whereas Cox (1987) was not able to sign it.[3]

The second contribution of our paper is of an empirical nature. We use the 2004 wave of the Survey of Health Aging and Retirement in Europe (SHARE) to assess whether money transfer and caring decisions are mainly driven by altruistic or exchange motives. Earlier empirical studies only analyze inter–vivos money transfers to assess which of the two motives is more important. As far as we know, this is one of the few empirical studies that

[1] McGarry (2000) considers a dynamic setting where parents are not fully informed about their child's future income. Villanueva (2001) not only allows for imperfect information but also for endogenous child's effort. His model also explains the violation of the neutrality hypothesis.

[2] However, In several studies on US data Cox and his coauthors find a positive partial correlation between transfers from parents and child's income (see Cox, 1987, Cox, 1990 and Cox and Rank, 1992).

[3] In order to derive these predictions, we have to make some separability assumptions on the utility functions of the child and of the parent. However, Cox (1987) makes similar assumptions to establish the negative relationship between child's income and the amount of care provided by her to the parent.

look both at transfer and caring decisions.[4] By using more information, we are able to discriminate more precisely between the altruistic and exchange motive of time and money transfers. SHARE contains information about three generations: the respondents, their parents and their children. Therefore, as regards parents-child relations, it is possible to build two different samples: the one in which we consider the respondents as parents (the "young" sample) and the one in which we consider the respondents as children (the "old" sample). We use the young sample to analyze financial transfers from parents to their children and the old sample to analyze services provided by each child to parents. We measure services by the time spent by each child helping her parents with paperwork or with housekeeping.

Under altruism the sign on the marginal effect of child's income[5] on the transfer amount (conditional upon transferring) should be negative: altruistic parents should give more to the children who have less. However, we find a positive marginal effect. In other words we find that inter–vivos transfers (i.e., transfers between living persons) cannot solely be explained by pure altruistic motives. Exchange motives might (partly) govern inter–vivos transfers. In that respect our findings are qualitatively similar to those of e.g. Cox (1987) and Cox and Rank (1992). However, the empirical evidence based on time transfers is even more convincing: an analysis of the data from the old sample shows that children who are worse off provide more services to their parents. This is fully in line with the exchange motive and certainly not with the altruistic motive.

The paper is structured as follows: section 2 reviews the Cox model and spells out the deviations we propose. Section 3 presents the data and provides some descriptive statistics. The estimation results are reported in section 4. Section 5 concludes.

2 The theoretical model

In this paper we take the model of Cox (1987) as starting point of analysis. This model considers two individuals, say the parent and the child. The parent possibly donates a transfer to the child because she cares about the child's well-being (altruistic motive). In addition, the child provides care to the parent in exchange of the transfer which she has received. The parent's

[4] We only found papers by Schoeni (1997) and Altonji et al. (2000) who use tobit models to estimate the relation between care and inter-vivos transfers on the one hand and donor and recipient income on the other. These authors reject the exchange motive for transfers. As we will argue below, one should not use tobit models to analyze decisions on inter–vivos transfers and care provision.

[5] In the young sample, child's income is not observed. We proxy this variable by years of education of the child.

utility function is equal to:

$$U^{*}(c_p, c_k, s) = U\left(c_p, s, V\left(c_k, s\right)\right) \tag{1}$$

where c_p is consumption of the parent, s denotes services from the children to the parent, c_k is consumption of the child. $U()$ and $V()$ are the utility functions of the parent and the child respectively. We assume that the parent is altruistic in the sense that she cares for the well being of the child, i.e. $\partial U/\partial V > 0$ but she also likes to receive services from the child ($\partial U/\partial s > 0$). We consider the consumption of both the parent and the child to be normal goods. Moreover, we assume that the parent's utility function is strictly concave and that all goods are substitutes, i.e.: $U_{cc} < 0, U_{ss} < 0, U_{vv} < 0, U_{cs} \geq 0, U_{cv} \geq 0, U_{sv} \geq 0$.[6] We deviate from Cox (1987) by assuming that the utility of the child is first increasing in s until a threshold $\bar{s}$ and then decreasing:

$$\frac{\partial V(c_k, s)}{\partial s} = \begin{cases} V_s(c_k, s) > 0 \text{ if } s < \bar{s} \\ V_s(c_k, s) < 0 \text{ if } s > \bar{s} \end{cases} \tag{2}$$

Cox (1987) assumes it to be monotonically decreasing in s (Cox's model is equivalent to $\bar{s} = 0$ in our specification). We allow for a positive $\bar{s}$ because we think that children like to provide some services to their parents. We follow Cox (1987) in assuming that the child's utility falls at an increasing rate as services increases ($V_{ss} < 0$) and that $V_{cs} \leq 0$, $V_{cc} < 0$.

The amount of services received enters the utility function of the parent as a choice variable because we assume that all the bargaining power is assigned to the parent. Note that there is no uncertainty in the model. The parent and child face the following budget and non-negativity constraints:

$$c_p \leq E_p - T \tag{3}$$

$$c_k \leq E_k + T \tag{4}$$

$$T \geq 0; \quad s \geq \bar{s} \tag{5}$$

where E_p and E_k are income respectively of the parent and of the child and T denotes transfers from parent to child. In her optimization problem the parent should also take into account that the child only provides services in excess of $\bar{s}$ if she is compensated in utility terms through a financial transfer, i.e. $s > \bar{s} \Rightarrow T > 0$. Given the child's "threat point" utility level $V(E_k, \bar{s})$, this constraint can be written as:

$$V(E_k + T, s) \geq V(E_k, \bar{s}) \tag{6}$$

For the sake of simplicity, we keep the model static. However, in the empirical implementation we explicitly take into account that transfers and

[6] Subscripts s, v and c represent partial derivatives with respect to services, child's utility and consumption respectively.

services occur at different stages of the life cycle: parents typically transfer when children are young and children provide services (such as help with paperwork) when parents are old.[7]

The maximization problem can be written as follows:

$$\max_{T,s} U\left(E_p - T, s, V\left(E_k + T, s\right)\right) \tag{7}$$

subject to the constraints:

$$T \geq 0 \quad ; \quad s \geq 0 \tag{8}$$

$$V\left(E_k + T, s\right) \geq V\left(E_k, \bar{s}\right) \tag{9}$$

The Lagrangian is:

$$\begin{aligned} L =& U\left(E_p - T, s, V\left(E_k + T, s\right)\right) + \lambda\left(V\left(E_k + T, s\right) - V\left(E_k, \bar{s}\right)\right) + \\ &+ \nu_T T + \nu_s(s - \bar{s}) \end{aligned} \tag{10}$$

and the first order conditions (F.O.C.):

$$\frac{\partial L}{\partial T} = -U_c + U_v V_c + \lambda V_c + \nu_T = 0 \tag{11}$$

$$\frac{\partial L}{\partial s} = U_s + U_v V_s + \lambda V_s + \nu_s = 0 \tag{12}$$

$$\lambda\left(V\left(E_k + T, s\right) - V\left(E_k, \bar{s}\right)\right) = 0; \quad \nu_T T = 0; \quad \nu_s(s - \bar{s}) = 0 \tag{13}$$

In appendix A, we present conditions under which the budget set is convex. In that case the parent's maximization problem has one unique solution.

2.1 Altruism

The first case we will consider is that the parent is purely altruistic in the sense that she transfers more money than what it is strictly necessary to compensate the child for her service provision. In terms of the model, this means constraint (6) is not binding, i.e. $\lambda = 0$. For the moment, we also assume interior solutions for s and T, i.e. $\nu_T = 0$ and $\nu_s = 0$.[8] Then, the first order conditions (11) and (12) can be rewritten as:

$$-U_c + U_v V_c = 0 \tag{14}$$

$$U_s + U_v V_s = 0 \tag{15}$$

[7]We implicitly assume credibility, i.e. that, after receiving the transfer, the child will indeed provide services to her parents later in life. As Bernheim et al. (1985) point out, while there might be quite substantial incentives to renege on an agreement with an arbitrary third party, to break a promise made to a family member might be quite costly in terms of reputation and family relations.

[8]The case of corner solutions will be covered in subsection 2.3.

According to equation (14) transfers are used to equate the parent's marginal utility of consumption (U_c) with the child's one from the parent's viewpoint ($U_v V_c$). Likewise, the parent's marginal utility of services (U_s) is equal to the child's marginal disutility of services from the parent's perspective ($U_v V_s$). Notice that the optimal amount of services is greater than the threshold $\bar{s}$ (cf. equation (2)), i.e. $V_s < 0$ in the optimum. Cox proves for transfers the following comparative statics properties of the model in the altruistic regime (see also appendix B.1):

$$\frac{\partial T}{\partial E_p} - \frac{\partial T}{\partial E_k} = 1 \tag{16}$$

$$\frac{\partial T}{\partial E_p} > 0; \frac{\partial T}{\partial E_k} < 0 \tag{17}$$

Equation (16) says that keeping family income $E_p + E_k$ constant, an increase in child's income is compensated with a dollar-for-dollar reduction in transfers. Since we have assumed that both child's and parent's consumption are normal goods, equation (17) implies that transfers are compensatory, i.e. a rise in child's income (keeping parent's income constant) leads to a fall in transfers. The intuition is that an altruistic parent should give more to children who have less independently of any help received.

In the altruistic regime, the parent's demand for services depends on family income, and not on the distribution of its components, i.e.:

$$\frac{\partial s}{\partial E_p} = \frac{\partial s}{\partial E_k} \tag{18}$$

If we assume that both the parent's and child's utility functions are additively separable ($U_{cs} = U_{cv} = V_{cs} = 0$) then we can prove that an increase in either child's or parent's income leads to more services (see appendix B.1):

$$\frac{\partial s}{\partial E_p} = \frac{\partial s}{\partial E_k} > 0 \tag{19}$$

The assumption of additive separability can be relaxed in order to obtain the same result (19). Consider the function $U^*(c_p, c_s, s)$ defined in equation (1). The partial derivatives $\frac{\partial s}{\partial E_p}$ and $\frac{\partial s}{\partial E_k}$ are still positive if $U^*_{c_p s} > 0$ and $U^*_{c_k s} > 0$.

2.2 Exchange

In this subsection we again assume an interior solution for s and T, that is $s > \bar{s}$ and $T > 0$ ($\nu_s = 0$ and $\nu_T = 0$, cf. Lagrangian (10)). However, contrary to the previous subsection we now allow the exchange constraint (6) to be binding ($\lambda > 0$):

$$V(E_k + T, s) = V(E_k, \bar{s}) \tag{20}$$

Equation (20) defines an implicit relationship between T and s conditional upon E_k and $\bar{s}$:

$$T = g(s; E_k, \bar{s}) \tag{21}$$

According to the implicit function theorem and given the assumptions $V_c > 0$, $V_{cs} < 0$ and $V_s < 0$ (in optimum)[9]:

$$g_s = \frac{\partial g}{\partial s} = -\frac{V_s}{V_c} > 0 \tag{22}$$

$$g_{ss} = -\frac{V_{ss}V_c - V_s V_{cs}}{V_c^2} > 0 \tag{23}$$

Substituting equation (20) and (21) into the Lagrangian (10) gives:

$$L = U_p \left(E_p - g(s; E_k, \bar{s}), s, V\left(E_k, \bar{s}\right)\right) \tag{24}$$

This utility function is maximized with respect to s. The first order condition is as follows:

$$\frac{\partial L}{\partial s} = F(s; E_p, E_k, \bar{s}) = -U_c g_s + U_s = U_c \frac{V_s}{V_c} + U_s = 0 \tag{25}$$

Equation (25) says that in the optimum the parent's and child's marginal rate of substitution of transfers for services ($-\frac{U_s}{U_c}$ and $\frac{V_s}{V_c}$) are equal to each other.

Now we can apply the implicit function theorem in order to determine the sign of $\frac{\partial s}{\partial E_p}$, $\frac{\partial s}{\partial E_k}$. In appendix B.2, it is shown that[10]

$$\frac{\partial s}{\partial E_p} > 0 \tag{26}$$

Assuming that the parent's utility function is additively separable ($U_{cs} = U_{cv} = U_{sv} = 0$) it holds that (see appendix B.2):

$$\frac{\partial s}{\partial E_k} < 0 \tag{27}$$

Equations (22), (26) imply that

$$\frac{\partial T}{\partial E_p} > 0 \tag{28}$$

Moreover, from equation (21) it follows that

$$\frac{\partial T}{\partial E_k} = \frac{\partial s}{\partial E_k} g_s + g_{E_k} \gtrless 0 \tag{29}$$

[9]Note that $g_{ss} > 0$ is the convexity condition (46) described in appendix A, thus implying that the maximization has a unique solution.

[10]We do not need to make any separability assumptions to arrive at this result.

Since we know that $g_s > 0$, $\frac{\partial s}{\partial E_k} < 0$ (under additive separability of the parent's utility function) and $g_{E_k} > 0$ (see appendix B.2), the overall sign of $\frac{\partial T}{\partial E_k}$ is ambiguous.[11]

2.3 Corner solutions

In the previous two subsections we assumed interior solutions for transfers and services, i.e. $T > 0$ ($\nu_T = 0$, see equation (10)) and $s > \bar{s}$ ($\nu_s = 0$). Suppose now that the parent decides not to transfer ($T = 0, \nu_T > 0$). Then the model presented above implies the exchange constraint (6) ($\lambda > 0$) and $s = \bar{s}$ ($\nu_s > 0$) and vice versa.[12] Altruistic parents always make money transfers to their children. The child's decision not to provide services in excess of $\bar{s}$ ($\nu_s > 0$) does not imply that the parent will not transfer ($T = 0, \nu_T > 0$): it might be possible that the exchange constraint (6) is not binding and the parent donates money to a child who does not provide services above the minimum $\bar{s}$. Such a regime could be relevant for pure altruistic parents ($U_s = 0$) or very rich ones with poor children who (strongly) dislike to provide services above the threshold. Modeling the service decision is a difficult exercise from which we abstain. In this subsection we only focus on the transfer decision.

Contrary to Cox (1987), we do not consider the extreme case of pure exchange in which the parent cares about the services provided by the child but not about the well-being of the child ($U_v = 0$). Instead we consider the transfer decision in the standard case of exchange that we have analyzed up to now, in which the parent cares about s but also about the child's utility ($U_v > 0$):

$$U(E_p - T, s, V(E_k, \bar{s})) \tag{30}$$

By applying the implicit function theorem, we obtain the marginal rate of substitution (MRS) of transfers for services at the endowment point ($T = 0, s = \bar{s}$):

$$P_p^0 = \frac{U_s(E_p, \bar{s}, V(E_k, \bar{s}))}{U_c(E_p, \bar{s}, V(E_k, \bar{s}))} \tag{31}$$

Similarly, one can obtain the child's MRS of transfers for services at the endowment point:

$$P_k^0 = -\frac{V_s(E_k, \bar{s})}{V_c(E_k, \bar{s})} \tag{32}$$

P_p^0 can be viewed as the demand price for the first unit of services and P_k^0 as the supply price. Transfer will take place if $P_p^0 > P_k^0$. The latent variable

[11] In Cox $\frac{\partial T}{\partial E_k} = \frac{\partial ps}{\partial E_k} = s\frac{\partial p}{\partial E_k} + p\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_k}\left(1 + \frac{s}{p}\frac{\partial p}{\partial s}\right)$ and the sign of the expression will depend on whether $\frac{s}{p}\frac{\partial p}{\partial s}$ is greater or lower than 1.

[12] $\nu_T > 0 \quad \Leftrightarrow \quad \lambda > 0, \nu_s > 0$

that governs the occurrence of an internal solution $T > 0$ is the following:

$$\bar{t} = P_p^0 - P_k^0 \tag{33}$$

and $T > 0 \Leftrightarrow \bar{t} > 0$, $T = 0$ otherwise.

Notice that P_p^0 depends on both E_p and E_k. The effects of an increase in E_p and E_k on the parent's demand price for services are equal to

$$\frac{\partial P_p^0}{\partial E_p} = \frac{U_{sc}U_c - U_{cc}U_s}{U_c^2} > 0 \tag{34}$$

$$\frac{\partial P_p^0}{\partial E_k} = \frac{U_{sv}V_cU_c - U_{cv}V_cU_s}{U_c^2} \tag{35}$$

The last expression cannot be signed. If parent's utility is additive separable in her own consumption and the child's well being ($U_{cv} = U_{sv} = 0$), then $\frac{\partial P_k^0}{\partial E_k} = 0$.

The effect of a rise in E_k on the child's supply price for services is equal to

$$\frac{\partial P_k^0}{\partial E_k} = -\frac{V_{cs}V_c - V_{cc}V_s}{V_c^2} > 0 \tag{36}$$

Obviously $\frac{\partial P_k^0}{\partial E_p} = 0$.

Consequently,

$$\frac{\partial \bar{t}}{\partial E_p} > 0 \tag{37}$$

$$\frac{\partial \bar{t}}{\partial E_k} \text{ unsigned} \tag{38}$$

If $U_{cv} = U_{sv} = 0$ then $\frac{\partial \bar{t}}{\partial E_k} < 0$. This is the result Cox (1987) reports at page 518.

2.4 Empirical implications

The predictions below only refer to the transfer (service) amounts conditional upon transferring (providing services). Both under altruism and under exchange, it holds that

$$\frac{\partial T}{\partial E_p} > 0 \tag{39}$$

Assuming strong separability and thus deviating from Cox (1987), it must also hold that

$$\frac{\partial s}{\partial E_p} > 0 \tag{40}$$

Under altruism:

$$\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_p} > 0 \text{ (assuming additive separability)} \tag{41}$$

$$\frac{\partial T}{\partial E_k} < 0 \tag{42}$$

Under exchange:

$$\frac{\partial s}{\partial E_k} < 0 \text{ (assuming additive separability)} \tag{43}$$

$$\frac{\partial T}{\partial E_k} \text{ is unsigned} \tag{44}$$

3 Data and descriptive statistics

We use data from the first wave of the Survey on Health, Ageing and Retirement in Europe (SHARE) that was conducted in 2004.[13] SHARE is a multi-disciplinary, cross-national survey that is representative of the population aged 50 and over. The survey took place in eleven European countries, namely Sweden (SE), Denmark (DK), Germany (DE), the Netherlands (NL), Belgium (BE), France (FR), Switzerland (CH), Austria (AT), Italy (IT), Spain (ES), and Greece (GR). The survey contains information about the socio-economic status of the respondents, as well as information about their health conditions, and on intergenerational time and money transfers. Moreover, SHARE contains information about three generations: the respondents, their parents and their children. Therefore, as regards parent–child relations, it is possible to build two different samples: the one in which we consider the respondents as parents (the "young" sample) and the one in which we consider the respondents as children (the "old" sample). The comparison between Table 1 and Table 2 clearly highlights the differences between the two samples. In the young sample children are middle-aged (40 years old on average) and their parents are on average 68.4 years old and prevalently in good health; in the old sample children are towards the end of their working career (average age is 56.2) and their surviving parents tend to be older than 80 years old and in bad health. In addition, because of the declining fertility rates in Europe, families in the old sample are on average larger than those in the young sample. The key variables in our analysis are financial transfers from parents to their children, and services provided by each child to parents. Financial transfers refer to any transfer amounting to 250 euros or more (adjusted by exchange rate and purchasing power) given by the parents to their children in the twelve months prior to the interview.

[13]We do not use data from the second wave because they do not contain information on the socio–occupational status of the respondents' parents, which is a key variable in our analysis.

Table 1 shows that parents who give monetary gifts have on average higher income and education level. It is also interesting to note that children tend to receive transfers early in life: those who receive money are on average 5 years younger than those who do not receive any gift. As for services, we provide estimates with two measures of help. The first is the time spent by each child helping her/his parents with paperwork, such as filling out forms, settling financial or legal matters. The second is the time spent by each child helping her/his parents with practical household help, e.g. with home repairs, gardening, transportation, shopping, household chores.[14] It should be noted (Table 2) that parents who receive services from their children have on average higher socio-occupational prestige, while we do not observe large differences in the composition of the sample as regards the other variables. In SHARE respondents are also asked whether they had any type of contact with their parents and children, including visits, phone calls, e-mails and text messages. However, we do not use this information on the frequency of contacts. Given such a broad definition, almost all children had at least some contacts with their parents. The threshold level $\bar{s}$ in equation (5) is not observed and it is, therefore, impossible to distinguish the choice to provide services from the choice about the amount of services.

Tables 1 and 2 about here

Table 3 suggests that the timing of financial transfers and services' provision are different: while inter-vivos transfers from parents to children seem to take place early in life, services are provided by adult children to their elderly parents. For this reason we focus on the "young" sample (respondents as parents) to test the empirical implications of the model about transfers and on the "old" sample (respondents as children) to analyze services.

Table 3 about here

In Table 4 we report the percentage of children who receive a monetary gift from their parents in the young sample, the mean amount they receive, the 90th, the 95th and the 99th percentiles and the mean and median amount of the transfer for those who have received it. The data show substantial cross-country heterogeneity (see Zissimopoulos and Smith (2009) for a comparison with the US) : the percentage of children who receive a transfer ranges from a low 3.6% in Spain to 22.2% in Sweden. However, conditional on receiving, children in Sweden are those who receive the lowest amount, while the highest transfers are found in Belgium, Switzerland and Spain. Monetary transfers from parents to their children are very unequally

[14]SHARE provides a third measure of services, namely help with personal care, e.g. dressing, bathing or showering, eating, getting in or out of bed, using the toilet. We have tried to use also this third measure but the reduced sample size of those who provide help with personal care does not allow obtaining reliable estimates.

distributed in the SHARE countries: children in the top 5 percent receive almost four times more than the mean amount. In Tables 5 and 6 we report the same descriptive statistics for services in the old sample. It is interesting to note that Sweden, Denmark and the Netherlands are the countries with the highest incidence of service provision from children to their elderly parents, while Spain, Italy and Greece are those with the lowest; however, if we look at the number of hours spent helping, the pattern is reversed. If we focus on those who provide help, a clear North-South gradient emerges: in Southern Europe, where family ties are very strong, the mean number of hours spent by children providing help with paperwork and homecare to their parents is more than double than in the Nordic countries.

Tables 4, 5 and 6 about here

4 Multivariate analysis

In the regression we control for a number of variables related to the characteristics of the child and the parent, such as age, gender, marital status and health, which are important determinants of intergenerational transfers. The description of the variables used in the following sections can be found in Tables 1 and 2.

4.1 Transfers

In each household the family respondent, who is randomly selected in SHARE, provides basic information on all living children (gender, age and proximity), whereas more detailed information relevant for this study (time and type of care provided to the parents, marital status and number of kids) is only asked for up to four children. When there are more than four children, the program sorts them in ascending order by minor, proximity and birth year, where minor is defined as 0 for all children aged 18 and over and 1 for all others, and then selects the first four. All the relevant information for our analysis are therefore collected on the 94,78% of the children. We use the data to construct a child-level file where the unit of observation is the child as in Angelini (2007) and Callegaro and Pasini (2008). In SHARE we can distinguish biological and legally adopted children from step-children. The latter are excluded from our analysis, since the relation between parents and step children cannot be analyzed within the same framework. We also exclude children who live with their parents and those who are younger than 18 years old in order to rule out transfers for educational purpose and transfers forced by law, e.g. alimony[15].

[15]We have estimated the same models by restricting only on children aged 25 or over to make sure to exclude transfers for further education but the results, reported in appendix C, are virtually unaffected

In table 7 we estimate the decision to transfer with a probit model (column 1), and the decision about the amount to transfer with a linear regression (column 2). The regression on column (2) is estimated conditional on performing an inter–vivos transfer, i.e. it is run on the sub–sample of children who receive a positive transfer from their parents. This is coherent with the empirical implications obtained in section 2.4: the model provides testable predictions about the marginal effect of E_p and E_k on the decision to transfer and on the amount to transfer, conditional on transferring a positive amount. In addition, the Tobit model is unsuitable in this context because we would need to assume that the control variables enter with the same sign both the equation on the decision to transfer and that on the amount to transfer. However, our theoretical model predicts different sign configurations. An alternative would be to use the Heckman selection model but we have no credible exclusion restrictions. This is one of the main reasons why in the health econometrics literature the two–part model is in general considered preferable (see e.g. Madden, 2008). We treat the dataset as a panel, where the cross sectional dimension is given by the different households, while the longitudinal one represents children within the same households, and we estimate the model with random effects. This procedure allows us to control for unobserved correlated effects within the households. As a sensitivity check, in columns (3) and (4) of table 7 we estimate the same models pooling observations and clustering the standard errors to control for within household correlation: results qualitatively do not change. We do not use fixed effects because we are interested in the between–family variation and we do not want to restrict our analysis to within–family heterogeneity. Indeed our model does not provide any predictions on the allocation of resources within the family nor on the strategic interactions among siblings.

Table 7 about here

We proxy E_k with the number of years of education of the child (yedu-c), while E_p is measured by current household income of the parent (income-p) and the maximum level of education attained by the parents (yedu-p), which is a better proxy for permanent income. The results show that E_k has a negative effect on the probability to transfer, as predicted by the model when we assume separability. In addition, E_p has a positive and significant effect both on the probability to perform a transfer and on the amount to be transferred. Both results confirm the validity of the model, and thus allows us to further test altruism versus the exchange model. Under altruism the sign on the marginal effect of variable proxying E_k in column 2 should be negative and significant: altruistic parents should give more to the children who have less. On the contrary, in our estimates the coefficient is positive and strongly significant, thus rejecting pure altruism in favor of exchange.

As regards the other variables, the results confirm that elderly parents are more likely to transfer money to young children. Mothers and parents in bad health are less likely to transfer but, when they do, they do not transfer less than fathers and healthy parents. On the other hand, single parents give both less and less often. The higher the number of siblings, the lower the likelihood of receiving a monetary gift and the amount received. It is interesting to note that Sweden is the country where we observe the largest number of monetary gifts but the lowest amounts transferred, while Spain is the country with the lowest number of transfers but the largest amounts transferred.

4.2 Services

While in the young sample (respondents as parents) for each parent we have data on up to four children, in the old sample (respondents as children) for each parent we only observe one child: indeed, for each respondent in the sample we have information only on the number of her siblings but not on their characteristics. Furthermore, for our analysis we have to select only family respondents[16] who have at least one parent still alive. For these reasons, the sample is relatively small. In addition, for the old sample we do not know the income and education level of the parents. However, we have information on their last job, which we use to construct a measure of their socio-occupational prestige (see Ganzeboom et al., 1992).

Table 8 reports the estimates of a two–part model for the help with paperwork provided to parents by their children (columns 1 and 2) and those for a second measure of services, i.e help with housekeeping (columns 3 and 4). The marginal effects in column (1) and (3) are obtained by a probit regression with as dependent variable a dummy which takes value 1 if the child provided any help, while the coefficients in column (2) and (4) are estimated by a OLS regression with as dependent variable the number of days per month spent by children helping their parents, for those who provide help. The first two variables ($ISCO_p$ and $homemaker_p$) measure the socio-occupational prestige of the parents and are proxies for E_p, while E_k is measured by the income and the number of years of education of the child. Since we interpret the model dynamically, we believe that what matters is not current income but permanent income, which is better proxied by education. The results of the OLS equation show that children who are worse off provide more services to their parents and are, therefore, consistent with exchange.

The behavior of the control variables is in general consistent with the literature. Gender seems to be a significant determinant of time transfers: daughters tend to provide more help than sons and female parents are more likely to receive it. Parents who are old or in bad health tend to receive

[16]In SHARE not everybody answer to the questions about services given and received from outside the household. Those respondents, named “family” respondents in the survey documentation, are chosen at random within the household

more services from their children. However, the higher the number of siblings, the less likely that the child will provide help. As regards country dummies, while we do not observe large cross–country variations in the decision to provide services, the number of hours spent by children to help their parents with paperwork is significantly lower in Northern countries (Sweden, Denmark and the Netherlands) than in the rest of Europe. Such a result is consistent with previous literature on the same data, e.g. Callegaro and Pasini (2008).

Table 8 about here

5 Conclusions

The modeling of intergenerational transfers is of central importance to tackle inequalities across or within families, heterogeneities in transmission behaviors and family relations and substitution or complementarity with other intergenerational transfers (human investment in children, social security benefits). Family relations may be driven not only by altruism or blood ties, but also by exchange considerations. In this paper we extend the standard model of transfers by Cox (1987) to derive sharper predictions on whether inter-vivos transfers of money and time are motivated by altruism or exchange considerations. We then provide empirical evidence on the relative importance of the two motives using data from the first wave of the Survey on Health, Ageing and Retirement in Europe (SHARE) on individuals aged 50 or over in eleven European countries. The dataset contains information on intergenerational transfers both in money and in kind on three generations: the respondents, their children and their parents. We document that while financial transfers from parents to children seem to take place early in life, time services are provided by adult children to their elderly parents. We show that both if we consider money transfers from parents to children and if we consider time transfers from children to parents, the empirical evidence rejects pure altruism in favor of exchange. Parents do not give more to children who have less, as predicted by altruism, and children who are worse off provide more attention to their parents. This result has important policy implications on the effectiveness of formal care provision as a substitute for informal care to their parents as well as on the impact of taxation on inter-vivos transfers.

References

Altonji, J. G., F. Hayashi, and L. J. Kotlikoff (1997). Parental altruism and inter vivos transfers: Theory and evidence. *Journal of Political Economy 105*(6), 1121–1166.

Altonji, J. G., F. Hayashi, and L. J. Kotlikoff (2000). The effects of income and wealth on time and money transfers between parents and children. In A. Masson and G. Tapinos (Eds.), *Sharing the Wealth: Demographic Change and Economic Transfers between Generations*, pp. 306–357. Oxford, UK: Oxford University Press.

Angelini, V. (2007). The strategic bequest motive: evidence from SHARE. *'Marco Fanno' working papers* (62).

Barro, R. J. (1974). Are government bonds net wealth. *Journal of Political Economy 82*, 1095–1117.

Becker, G. S. (1974). A theory of social interactions. *Journal of Political Economy 82*, 1063–1093.

Bernheim, B., A. Shleifer, and L. H. Summers (1985). The strategic bequest motive. *Journal of Political Economy 93*(6), 1045–1076.

Callegaro, L. and G. Pasini (2008). Social interaction effects in an intergenerational model of informal care giving. *Netspar discussion papers* (23).

Cox, D. (1987). Motives for private income transfers. *Journal of Political Economy 95*(3), 508–546.

Cox, D. (1990). Intergenerational transfers and liquidity constraints. *The Quarterly Journal of Economics 105*(1), 187–217.

Cox, D. and M. R. Rank (1992). Inter-vivos transfers and intergenerational exchange. *The review of Economics and Statistics 74*(2), 305–314.

Ganzeboom, H. B. G., P. M. D. Graaf, and D. J. Treiman (1992). A standard international socio-economic index of occupational status. *Social Science Research 21*(1), 1 – 56.

Hochguertel, S. and H. Ohlsson (2009). Compensatory inter vivos gifts. *Journal of Applied Econometrics 24*(6), 993–1023.

Laferrère, A. and F.-C. Wolff (2006). Microeconomic models of family transfers. In S.-C. Kolm and J. Mercier Ythier (Eds.), *Handbook of the Economics of Giving, Altruism and Reciprocity*, Volume 2, pp. 879–969. Elsevier.

Madden, D. (2008). Sample selection versus two-part models revisited: The case of female smoking and drinking. *Journal of Health Economics 27*, 300–307.

McGarry, K. (2000, March). Testing parental altruism: Implications of a dynamic model. Working Paper 7593, National Bureau of Economic Research.

McGarry, K. and R. F. Schoeni (1995). Transfer behavior in the health and retirement study: Measurement and the redistribution of resources within the family. *The Journal of Human Resources 30*, S184–S226.

Schoeni, R. E. (1997). Private interhousehold transfers of money and time: New empirical evidence. *Review of Income and Wealth 43*(4), 423–448.

Sloan, F. A., H. H. Zhang, and J. Wang (2002). Upstream intergenerational transfers. *Southern Economic Journal 69*, 363–380.

Villanueva, E. (2001). Parental altruism under imperfect information: Theory and evidence. Working Paper 566, Universitat Pompeu Fabra.

Zissimopoulos, J. and J. P. Smith (2009). Unequal giving: Monetary gifts to children across countries and over time. Working Paper 723, Rand Labor and Population.

Tables and figures

Table 1: Variables codebook: young sample, respondents as parents - Transfers

		Full sample		**Transfer**		**No Transfer**	
		mean	**std dev**	**mean**	**std dev**	**mean**	**std dev**
income-p	ppp-adjusted gross total household income of the parent	37,509	102,290	51,447	50,438	34,511	110,108
yedu-p	maximum number of years of education of the parent and his/her partner(current or former)	10.5	4.48	12.3	3.88	10.1	4.52
yedu-c	years of education of the child	12.4	3.58	13.3	2.98	12.3	3.66
age-c	age of the child	40	9.94	35.1	8.93	40.9	9.81
married-c	dummy, 1 if the child is married or in a registered partnership	.775	.418	.667	.471	.796	.403
female-c	dummy, 1 if the child is a woman	.506	.500	.531	.499	.500	.500
nchild-c	number of children of the child	1.36	1.23	1.04	1.15	1.42	1.24
sibling-c	number of siblings of the child	1.87	1.41	1.37	.993	1.92	1.44
age-p	age of the parent	68.4	9.94	64.2	8.95	69.3	9.89
married-p	dummy, 1 if the parent is married or in a registered partnership	.611	.487	.722	.448	.586	.493
female-p	dummy, 1 if the child is a woman	.550	.497	.465	.499	.569	.495
badhealth-p	dummy, 1 if the parent self report to be in less than good health	.402	.490	.266	.442	.428	.495

Table 2: Variables codebook: old sample, respondents as children - Help with paperwork

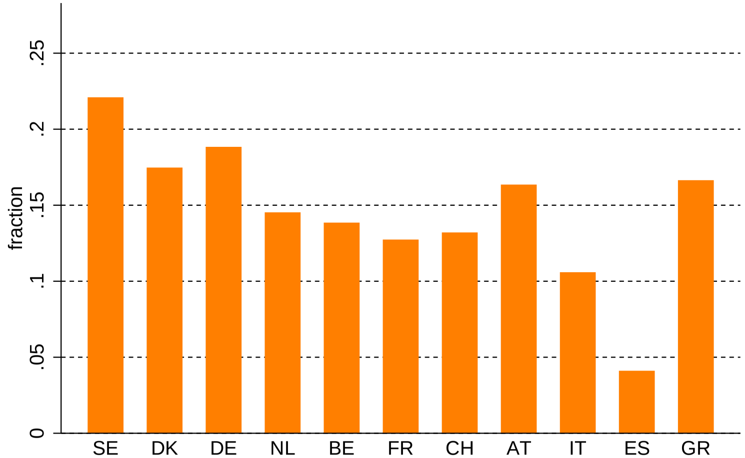
		Full sample		**Service**		**No service**	
		mean	**std dev**	**mean**	**std dev**	**mean**	**std dev**
ISCO-p	maximum between the International Socio-Economic Index of the parents (see Ganzeboom et al., 1992). For people who work the ISCO code refers to their main job, for the retired it refers to the last job before retirement;	43.5	21.1	50.4	19.4	42.5	21.1
homemaker-p	dummy equal to 1 if both the parents are homemakers. In this case ISCO-p is equal to 0.	.100	.286	.041	.199	.097	.297
income-c	ppp-adjusted gross total household	55,622	184,081	57,125	56,017	55,382	196,583
yedu-c	years of education of the child	12	3.94	13	3.55	11.8	3.97
age-c	age of the child	56.2	5.36	56.7	5.15	56.1	5.39
married-c	dummy, 1 if the child is married or in a registered partnership	.742	.437	.744	.437	.742	.438
female-c	dummy, 1 if the child is a woman	.531	.499	.567	.496	.526	.499
nchild-c	number of children of the child	2.09	1.29	1.96	1.25	2.11	1.29
sibling-c	number of siblings of the child	2.72	2.05	2.25	1.71	2.79	2.09
age-p	maximum between the age of the parents	82.7	6.73	84.1	5.81	82.4	6.84
mo-alive	dummy, 1 if only the mother is still alive	.631	.483	.721	.449	.617	.486
fa-alive	dummy, 1 if only the father is still alive	.118	.323	.066	.249	.127	.333
badhealth-p	dummy, 1 if either the father or the mother self report to be in less than good health	.626	.484	.699	.459	.615	.487

Table 3: Transfer and service decision: Descriptive evidence

Young sample, respondents as parents

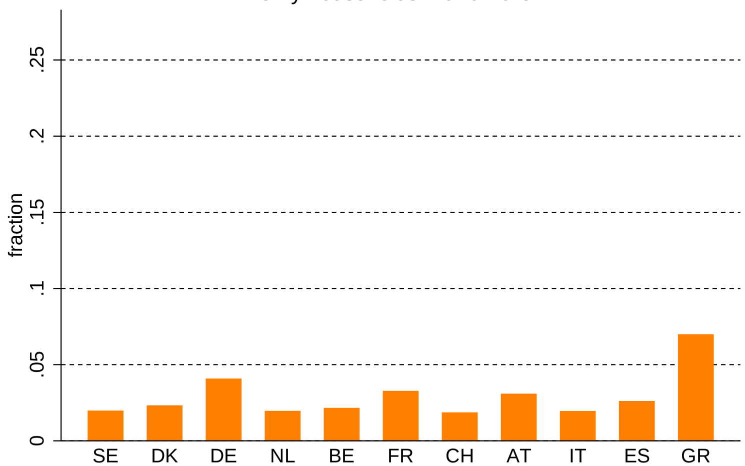
Proportion of children who receive transfer from resp

Only households with children



Proportion of children who help Resp with paperwork

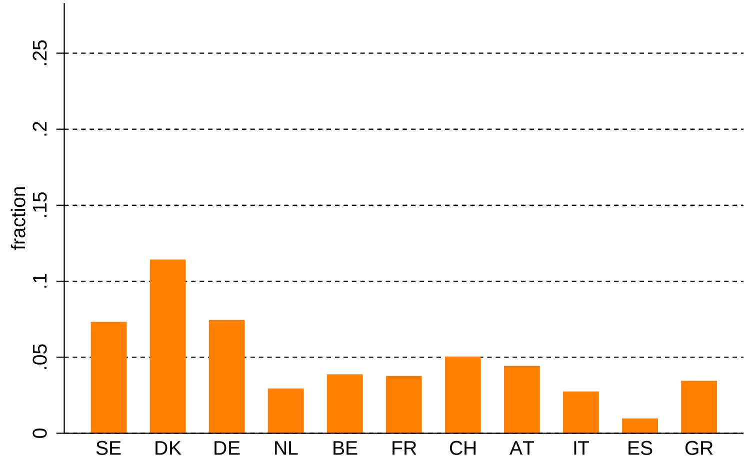
Only households with children



Old sample, respondents as children

Prop of resp. who received a transfer from parents

Conditional on at least one parent alive



Prop of fam resp who give help in paperwork

Conditional on having one parent alive, being fam respondent

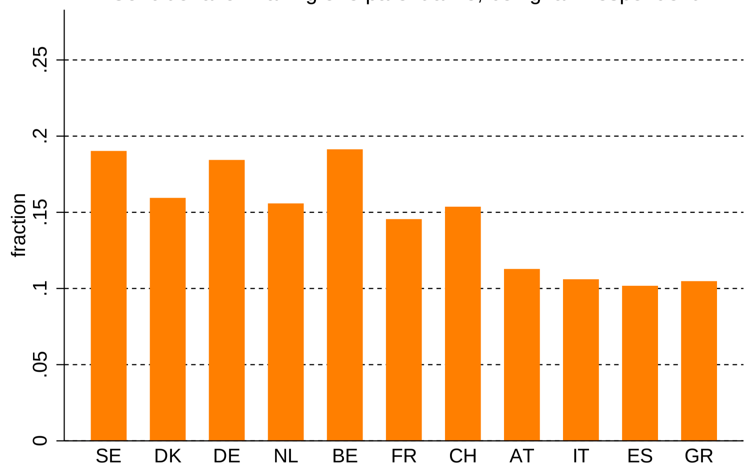


Table 4: Financial transfers from Parents to each child

			Unconditional				Conditional	
	obs	**%**	**mean**	**90th**	**95th**	**99th**	**mean**	**50th**
SE	3334	22.25	294	973	1460	4866	1235	730
DK	1736	18.94	417	1024	2540	5120	2212	1024
DE	2351	15.36	403	785	2031	7617	2333	1016
NL	2816	13.54	425	513	1715	6671	2916	1026
BE	3179	13.72	1223	509	2546	25462	8977	1528
FR	2665	13.57	616	706	2016	15119	4317	1512
CH	864	12.99	1046	494	2469	9875	8143	1975
AT	1808	16.89	480	625	2085	6255	2915	1042
IT	1453	9.90	532	255	1020	10199	5085	991
ES	1574	3.63	215	0	0	4862	6505	2188
GR	1919	13.46	664	644	2577	9278	4654	1289
Total	23699	13.18	571	604	1947	9179	3722	1016

Table 5: Days of help with paperwork per month provided by respondents to their parents

			Unconditional				Conditional	
	obs	**%**	**mean**	**90th**	**95th**	**99th**	**mean**	**50th**
SE	562	15.7	.915	1	4	30	5.38	2.5
DK	297	13.1	.609	.5	1	30	4.33	1
DE	388	15.7	1.28	1	4	30	7.97	4
NL	479	14.0	.617	1	4	4	3.76	4
BE	584	16.4	1.61	4	4	30	8.48	4
FR	586	13.3	1.26	1	4	30	8.78	4
CH	169	11.8	.559	.5	1	30	4.6	1
AT	235	9.8	.532	0	1	30	5.43	1
IT	349	10.3	1.26	.5	4	30	11.2	4
ES	345	13.0	1.42	.5	4	30	10.2	1
GR	521	10.0	1.08	.5	4	30	10.5	4
Total	4515	13.4	1.08	1	4	30	7.44	4

Table 6: Days of homecare per month provided by respondents to their parents

				Unconditional			Conditional	
	obs	**%**	**mean**	**90th**	**95th**	**99th**	**mean**	**50th**
SE	562	29.4	1.63	4	4	30	5.04	1
DK	297	31.3	1.48	4	4	30	4.51	1
DE	388	24.7	1.65	4	4	30	6.44	2.5
NL	479	26.9	1.17	4	4	30	3.88	4
BE	584	25.3	2.39	4	30	30	8.36	4
FR	586	17.6	1.25	1	4	30	6.57	1
CH	169	13.0	.754	.5	4	30	5.75	1
AT	235	16.6	1.15	4	4	30	6.78	4
IT	349	12.9	1.92	2	30	30	14.6	4
ES	345	13.9	2.18	4	30	30	14.9	4
GR	521	15.7	2.06	4	30	30	12.3	4
Total	4515	21.5	1.68	4	4	30	7.27	4

Table 7: Respondents as parent: transfer equation

	Panel RE		Pooled OLS	
	probit	cond OLS	probit	cond OLS
	(1)	(2)	(3)	(4)
income-p	.335***	.103***	.156***	.122***
	(.037)	(.025)	(.021)	(.028)
yedu-p	.093***	.037***	.034***	.040***
	(.010)	(.007)	(.004)	(.008)
yedu-c	-.015**	.021***	.003	.029***
	(.008)	(.006)	(.004)	(.008)
age-c	-.054***	-.013***	-.026***	-.007
	(.005)	(.004)	(.002)	(.005)
married-c	-.537***	-.024	-.219***	-.067
	(.052)	(.035)	(.027)	(.044)
female-c	.169***	-.039	.067***	-.044
	(.041)	(.029)	(.022)	(.039)
nchild-c	.079***	-.029*	.029***	-.019
	(.021)	(.016)	(.011)	(.022)
sibling-c	-.397***	-.072***	-.180***	-.090***
	(.030)	(.023)	(.013)	(.024)
age-p	-.002	.017***	.003	.012***
	(.005)	(.004)	(.002)	(.004)
married-p	.213***	.041	.070**	.013
	(.075)	(.056)	(.035)	(.059)
female-p	-.210***	.017	-.091***	-.007
	(.067)	(.048)	(.030)	(.051)
badhealth-p	-.357***	-.075	-.159***	-.037
	(.069)	(.052)	(.031)	(.055)
SE	.743***	-.230***	.345***	-.155**
	(.125)	(.087)	(.054)	(.078)
DK	.264*	.012	.148**	.133
	(.145)	(.102)	(.065)	(.102)
NL	-.212	.142	-.046	.191**
	(.133)	(.097)	(.058)	(.094)
BE	.056	.735***	.063	.783***
	(.130)	(.096)	(.058)	(.117)
FR	.058	.525***	.071	.555***
	(.138)	(.100)	(.061)	(.110)
CH	-.469**	.592***	-.172*	.655***
	(.192)	(.146)	(.089)	(.175)
AT	.176	.048	.097	.154
	(.144)	(.103)	(.062)	(.101)
IT	.156	.392***	.070	.477***
	(.173)	(.130)	(.075)	(.159)
ES	-1.168***	1.051***	-.512***	1.172***
	(.218)	(.190)	(.093)	(.229)
GR	.555***	.721***	.229***	.767***

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	(1)	(2)	(3)	(4)
	(.152)	(.108)	(.065)	(.111)
Observations	23699	3636	23699	3636
Log-likelihood	-7469.472		-8828.35	-5659.491
σ_u	2.168	.993		

Table 8: Respondents as children: service equation

	Paperwork		**Housekeeping**	
	probit	cond OLS	probit	cond OLS
	(1)	(2)	(3)	(4)
ISCO-p	.007***	-.042	.002	-.040*
	(.002)	(.035)	(.002)	(.023)
homemaker-p	-.074	-1.829	-.045	-3.242*
	(.133)	(3.093)	(.109)	(1.835)
income-c	-.012	-.118	.017	.055
	(.023)	(.396)	(.021)	(.365)
yedu-c	.027***	-.425**	.0005	-.375***
	(.008)	(.190)	(.007)	(.131)
age-c	-.008	.199*	-.014***	.213**
	(.006)	(.113)	(.005)	(.088)
married-c	.022	-.520	-.018	-.986
	(.061)	(1.152)	(.054)	(.840)
female-c	.152***	2.259**	.237***	1.913***
	(.049)	(.911)	(.044)	(.644)
sibling-c	-.075***	-.186	-.065***	-.339*
	(.015)	(.282)	(.012)	(.202)
nchild-c	-.044**	.416	-.073***	.397
	(.022)	(.355)	(.019)	(.289)
age-p	.027***	.161	.020***	.210***
	(.005)	(.099)	(.004)	(.073)
mo-alive	.215***	1.913*	.136**	-.039
	(.061)	(1.128)	(.053)	(.789)
fa-alive	-.221**	-1.710	-.605***	.617
	(.099)	(2.151)	(.094)	(2.032)
badhealth-p	.230***	1.049	.154***	1.629**
	(.052)	(.948)	(.046)	(.660)
SE	.077	-5.196***	.199**	-3.760***
	(.105)	(1.890)	(.094)	(1.300)
DK	-.053	-4.828**	.254**	-2.697**
	(.124)	(1.945)	(.105)	(1.305)
NL	.057	-5.263***	.184*	-3.423***
	(.111)	(1.700)	(.097)	(1.242)
BE	.210**	-1.299	.133	.572
	(.104)	(1.923)	(.094)	(1.402)
FR	.073	-.858	-.139	-1.857
	(.107)	(2.034)	(.097)	(1.457)
CH	-.114	-4.315*	-.414***	-1.309
	(.152)	(2.392)	(.145)	(2.134)
AT	-.191	-2.957	-.229*	-.961
	(.142)	(2.481)	(.125)	(1.813)
IT	-.117	.213	-.412***	5.256**
	(.128)	(2.589)	(.119)	(2.241)
ES	.183	-1.278	-.263**	4.254*

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	(1)	(2)	(3)	(4)
	(.126)	(2.664)	(.118)	(2.430)
GR	-.131	1.412	-.290***	5.055***
	(.114)	(2.379)	(.101)	(1.828)
Observations	4515	605	4515	970
Log-likelihood	-1659.75	-2271.719	-2191.819	-3579.693

Notes: Robust standard errors are in parenthesis, * significant at 10%; ** significant at 5%; *** significant at 1%. Income-c is the hyperbolic-sine transformation of the original monetary value. Since hyperbolic-sine transformation is not scale invariant, we re–estimated the four equations applying a simple log transformation: results are virtually unchanged.

A Convexity of the budget set

The budget set of our problem is:

$$T \geq F(s) \quad ,$$

where $F(s, T)$ is implicitly defined by

$$V\left(E_k + T, s\right) - V\left(E_k, \bar{s}\right) = 0 \quad . \tag{45}$$

In order for the budget set to be convex, we need F (as function of s) to be convex, i.e. the second derivative of F with respect to s must be positive. For the implicit function theorem:

$$\frac{\partial F}{\partial s} = -\frac{\partial\left(V\left(E_k + T, s\right) - V\left(E_k, \bar{s}\right)\right)/\partial s}{\partial\left(V\left(E_k + T, s\right) - V\left(E_k, \bar{s}\right)\right)/\partial T} = -\frac{V_s\left(E_k + T, s\right)}{V_T\left(E_k + T, s\right)} \quad ,$$

where F decreases as long as $s < \bar{s}$ and then increases, and has a minimum in $\bar{s}$, at which it takes value 0 (see Figure A).

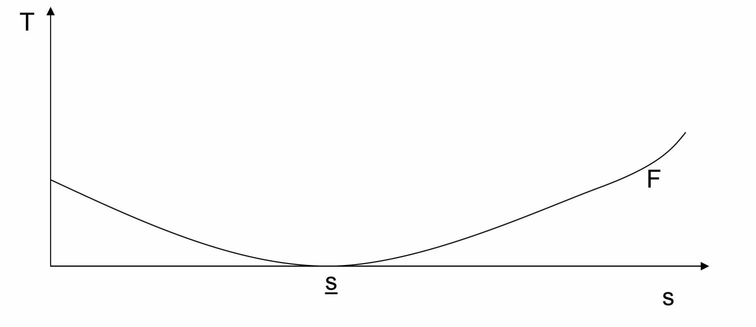

Figure 1: The budget set

Hence:

$$\frac{\partial^2 F}{\partial s^2} = \frac{\partial}{\partial s}\left(-\frac{V_s\left(E_k + T, s\right)}{V_T\left(E_k + T, s\right)}\right) = \frac{V_s V_{cs} - V_c V_{ss}}{V_c^2} \tag{46}$$

Therefore, a sufficient condition for the convexity of the budget set is that

$$V_s V_{cs} - V_c V_{ss} \geq 0 \tag{47}$$

for each $s \geq 0$, with T given by (45). Given the validity of our assumptions $V_s < 0, V_{cs} \leq 0, V_c > 0$ and $V_{ss} < 0$ (see main text), condition (47) is satisfied.

B Signing first order conditions

B.1 Altruism

Total differentiation of (14) and (15) yields:

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} dT \\ ds \end{bmatrix} = \begin{bmatrix} E \\ F \end{bmatrix} \tag{48}$$

where

$$\begin{aligned}
\frac{\partial^2 L}{\partial T \partial T}: \quad U_{cc} - 2U_{cv}V_c + U_{vv}V_c^2 + U_vV_{cc} &= A \\
\frac{\partial^2 L}{\partial s \partial T}: \quad -U_{cs} - U_{cv}V_s + U_{vs}V_c + U_{vv}V_cV_s + U_vV_{cs} &= B \\
\frac{\partial^2 L}{\partial T \partial s}: \quad -U_{cs} + U_{sv}V_c - U_{vc}V_s + U_{vv}V_cV_s + U_vV_{cs} &= C = B \\
\frac{\partial^2 L}{\partial s \partial s}: \quad U_{ss} + 2U_{sv}V_s + U_{vv}V_s^2 + U_vV_{ss} &= D
\end{aligned}$$

and

$$\begin{aligned}
(U_{cc} - U_{vc}V_c)dE_p + U_{cv}V_cdE_k - U_{vv}V_c^2dE_k - U_vV_{cc}dE_k &= E \\
(-U_{cs} - U_{cv}V_s)dE_p - U_{sv}V_cdE_k - U_{vv}V_cV_sdE_k - U_vV_{cs}dE_k &= F
\end{aligned}$$

As expected, $B = \frac{\partial^2 L}{\partial s \partial T} = \frac{\partial^2 L}{\partial T \partial s} = C$[17].

Equations (48) imply

$$\begin{bmatrix} dT \\ ds \end{bmatrix} = \frac{1}{AD - BC} \begin{bmatrix} D & -B \\ -C & A \end{bmatrix} \begin{bmatrix} E \\ F \end{bmatrix}$$

or

$$dT = \frac{1}{AD - BC}(DE - BF) \tag{49}$$

$$ds = \frac{1}{AD - BC}(-CE + AF) \tag{50}$$

Like Cox we assume that the determinant $|G| = AD - BC > 0$.

Notice that E and F can be rewritten as follows:

$$E = -AdE_k + (U_{cc} - U_{vc}V_c)(dE_k + dE_p) \tag{51}$$

$$F = -CdE_k - (U_{cs} + U_{cv}V_s)(dE_k + dE_p) \tag{52}$$

[17] Cox (1987) also provide formulas for A, B, C and D. These formulas contain some typos. For instance, his appendix incorrectly implies that $B \neq C$.

B.1.1 ds

By substituting (51) and (52) into (50), we obtain:

$$\begin{aligned} ds &= \frac{1}{AD-BC}(CAdE_k - C(U_{cc}-U_{vc}V_c)\,(dE_k+dE_p) \\ &\quad - ACdE_k - A(U_{cs}+U_{cv}V_s)\,(dE_k+dE_p) \\ &= -\frac{1}{AD-BC}\left(C(U_{cc}-U_{vc}V_c)\,(dE_k+dE_p) + A(U_{cs}+U_{cv}V_s)\,(dE_k+dE_p)\right) \end{aligned}$$

This equation implies

$$\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_p} = -\frac{1}{AD-BC}\left(C(U_{cc}-U_{vc}V_c) + A(U_{cs}+U_{cv}V_s)\right) \qquad (53)$$

Can we sign $\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_p}$? If we make the assumption of strong separability of the *parent utility function* $(U_{cv}=0, U_{cs}=0, U_{sv}=0)$, then $C = U_{vv}V_cV_s$.[18] Moreover, the last term of the right hand side of equation (53) $(A(U_{cs}+U_{cv}V_s))$ becomes zero. Therefore, we need to sign:

$$-U_{cc}U_{vv}V_cV_s$$

If $U_{cc}<0$, $U_{vv}<0$, $V_c>0$, $V_s<0$ then

$$\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_p} > 0$$

Note that if V_s first increases with s and then decreases, the two derivatives will be negative for small values of s and positive for large values of s. Nevertheless by (15) at the optimum $V_s < 0$, thus the sign of the two derivatives is unambiguous.

[18] On page 542 and 543, Cox (1987) assumes the following sign configuration: $U_{cs}>0$, $V_{cs}<0$, $U_{cv}>0$, $U_{sv}>0$, then one cannot sign $\frac{\partial s}{\partial E_k}$. However, consider utility function (1) and assume that $U^*_{c_p s}>0$ and $U^*_{c_k s}>0$. Then it can be shown that $\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_p} > 0$. Notice that

$$\begin{aligned} U^*_{c_p s} &= U_{cs} + U_{cv}V_s \\ U^*_{c_k s} &= U_{sv}V_c + U_{vv}V_cV_s + U_vV_{cs} \\ C &= U^*_{c_k s} - U^*_{c_p s} \end{aligned}$$

Then we can rewrite equation (53)

$$\begin{aligned} \frac{\partial s}{\partial E_k} &= -\frac{1}{AD-BC}\left((U^*_{c_k s} - U^*_{c_p s})E_1 + AU^*_{c_p s}\right) \\ &= -\frac{1}{AD-BC}\left(U^*_{c_k s}E_1 + (A-E_1)U^*_{c_p s}\right) \end{aligned}$$

where $E_1 = U_{cc} - U_{vc}V_c$. Given the sign configuration presented above, it can be easily shown that $E_1<0$ and $A-E_1<0$. Consequently,

$$\frac{\partial s}{\partial E_k} = \frac{\partial s}{\partial E_p} > 0$$

B.1.2 dT

By substituting (51) and (52) into (49), we obtain:

$$\begin{aligned} dT &= \frac{1}{AD - BC}\big[- DAdE_k + D(U_{cc} - U_{vc}V_c)\,(dE_k + dE_p) \\ &\quad + BCdE_k + B(U_{cs} + U_{cv}V_s)\,(dE_k + dE_p)\,\big] \\ &= -\frac{AD - BC}{AD - BC}dE_k + \frac{D(U_{cc} - U_{vc}V_c) + B(U_{cs} + U_{cv}V_s)}{AD - BC}\,(dE_k + dE_p) \\ &= \left(\frac{D(U_{cc} - U_{vc}V_c) + B(U_{cs} + U_{cv}V_s)}{AD - BC} - 1\right) dE_k \\ &\quad + \frac{D(U_{cc} - U_{vc}V_c) + B(U_{cs} + U_{cv}V_s)}{AD - BC}dE_p \end{aligned}$$

Let us define

$$x = \frac{D(U_{cc} - U_{vc}V_c) + B(U_{cs} + U_{cv}V_s)}{AD - BC} \tag{54}$$

We then have:

$$\begin{aligned} \frac{\partial T}{\partial E_k} &= x - 1 \\ \frac{\partial T}{\partial E_p} &= x \end{aligned}$$

that proves:

$$\frac{\partial T}{\partial E_k} - \frac{\partial T}{\partial E_p} = -1 \tag{55}$$

Since consumption is a normal good:

$$\frac{\partial c_p}{\partial E_p} = \frac{\partial\,(E_p - T)}{\partial E_p} = 1 - \frac{\partial T}{\partial E_p} > 0$$

which implies:

$$\frac{\partial T}{\partial E_p} < 1 \tag{56}$$

The last step is to sign $\frac{\partial T}{\partial E_k}$ and $\frac{\partial T}{\partial E_p}$.

Under the assumption of strong separability of the parent utility function, all the cross derivatives are equal to zero and the numerator in (54) becomes:

$$U_{cc}\left(U_{ss} + U_{vv}V_s^2 + U_vV_{ss}\right)$$

where $U_{cc} < 0$, $U_{ss} < 0$, $U_{vv} < 0$, $V_s^2 > 0$, $U_v > 0$, $V_{ss} < 0$. This implies that:

$$\frac{\partial T}{\partial E_p} > 0$$

which together with (56) and (55) gives:

$$\frac{\partial T}{\partial E_k} < 0$$

B.2 Exchange

For the derivation of the comparative statics results we take equations (20), (21), (22), (23) and (25) as starting point of analysis. From these equations it follows that

- $g_{E_k} = -\frac{\partial V(E_k+T,s)/\partial c - \partial V(E_k,\bar{s})/\partial c}{\partial V(E_k+T,s)/\partial c} > 0$.
- $g_{sE_k} = -\frac{\partial^2 V(E_k+T,s)/\partial c\partial s - \partial^2 V(E_k,\bar{s})/\partial c\partial s}{\partial V(E_k+T,s)/\partial c} + \frac{(\partial V(E_k+T,s)/\partial c - \partial V(E_k,\bar{s})/\partial c)\partial^2 V(E_k+T,s)/(\partial c\partial s}{(\partial V(E_k+T,s)/\partial c)^2}$.
  If the child's utility function is additive separable ($V_{cs} = 0$) then $g_{sE_k} = 0$.
- $F_s = \frac{\partial F}{\partial s} = (U_{cc}g_s - U_{cs})g_s - U_c g_{ss} - U_{sc}g_s + U_{ss} < 0$
- $F_{E_p} = \frac{\partial F}{\partial E_p} = -U_{cc}g_s + U_{cs} > 0$
- $F_{E_k} = \frac{\partial F}{\partial E_k} = (U_{cc}g_{E_k} - U_{cv}V_c)g_s - U_c g_{sE_k} - U_{sc}g_{E_k} + U_{sv}V_c$
  Given additive separability of the parent's and child's utility function, the expression above simplifies to
  $F_{E_k} = \frac{\partial F}{\partial E_k} = U_{cc}g_{E_k}g_s < 0$

Remarks

- $\frac{\partial s}{\partial E_p} = -\frac{F_{E_p}}{F_s}$. Since $g_{ss} > 0$, $\frac{\partial s}{\partial E_p} > 0$ and $\frac{\partial T}{\partial E_p} = \frac{\partial s}{\partial E_p}g_s > 0$
- $\frac{\partial s}{\partial E_k} = -\frac{F_{E_k}}{F_s}$. Since $F_{E_k} < 0$ (under additive separability of the parent's and child's utility functions), $\frac{\partial s}{\partial E_k} < 0$.

C Additional estimation results

Table 9: Respondents as parent: transfer equation, children older than 25

	Panel RE		**Pooled OLS**	
	probit	cond OLS	probit	cond OLS
	(1)	(2)	(3)	(4)
income-p	.371***	.094***	.169***	.124***
	(.041)	(.029)	(.023)	(.034)
yedu-p	.095***	.035***	.034***	.038***
	(.010)	(.007)	(.004)	(.008)
yedu-c	-.016**	.023***	.001	.031***
	(.008)	(.006)	(.004)	(.009)
age-c	-.049***	-.010**	-.025***	-.004
	(.005)	(.004)	(.003)	(.005)
married-c	-.535***	-.013	-.210***	-.042
	(.056)	(.038)	(.028)	(.047)
female-c	.140***	-.047	.059***	-.058
	(.044)	(.031)	(.022)	(.042)
nchild-c	.077***	-.032**	.029***	-.025
	(.022)	(.016)	(.011)	(.022)
sibling-c	-.405***	-.078***	-.179***	-.099***
	(.031)	(.025)	(.013)	(.026)
age-p	-.002	.016***	.003	.011**
	(.005)	(.004)	(.003)	(.005)
married-p	.199**	.052	.060*	.031
	(.079)	(.061)	(.036)	(.065)
female-p	-.210***	.035	-.087***	.011
	(.070)	(.051)	(.031)	(.056)
badhealth-p	-.352***	-.063	-.152***	-.024
	(.072)	(.055)	(.032)	(.058)
SE	.762***	-.210**	.351***	-.120
	(.131)	(.092)	(.056)	(.082)
DK	.297**	.045	.165**	.191*
	(.152)	(.109)	(.067)	(.108)
NL	-.283**	.139	-.068	.204**
	(.140)	(.105)	(.061)	(.102)
BE	.115	.753***	.092	.811***
	(.135)	(.100)	(.059)	(.120)
FR	.018	.538***	.066	.553***
	(.146)	(.108)	(.063)	(.119)
CH	-.426**	.575***	-.150	.678***
	(.199)	(.154)	(.092)	(.186)
AT	.185	.050	.097	.171
	(.150)	(.109)	(.064)	(.108)
IT	.202	.397***	.086	.491***
	(.179)	(.135)	(.076)	(.163)
ES	-1.092***	1.032***	-.478***	1.168***

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	(1)	(2)	(3)	(4)
	(.227)	(.198)	(.093)	(.244)
GR	.538***	.635***	.218***	.690***
	(.161)	(.118)	(.067)	(.119)
Observations	22646	3235	22646	3235
Log-likelihood	-6909.1		-8175.019	-5083.396
σ_{u_i}	2.227	1.012		
ρ	.832	.753		

Notes: Standard errors are in parenthesis, * significant at 10%; ** significant at 5%; *** significant at 1%. Column (1) and (2) are estimated with RE where the cross sectional dimension is variation between households, while the longitudinal dimension captures variation among children within the same household. Column (3) and (4) are estimated on the pooled sample, standard errors are clustered by household. The depedent variable as well as income-p are hyperbolic-sine transformations of the original monetary values. Since hyperbolic-sine transformation is not scale invariant, we re–estimated the four equations applying a simple log transformation and dropping the 5 observations with income-p equal to 0. Results are virtually unchanged.

Table 10: Respondents as parent: transfer equation, transfers and income in levels

	Panel RE		Pooled OLS	
	probit	cond OLS	probit	cond OLS
	(1)	(2)	(3)	(4)
income-p	6.28e-07***	.021***	2.94e-07**	.023**
	(2.39e-07)	(.006)	(1.21e-07)	(.012)
yedu-p	.110***	243.906***	.041***	270.855***
	(.010)	(79.856)	(.004)	(78.730)
yedu-c	-.013	140.016*	.005	204.878***
	(.008)	(79.719)	(.004)	(77.443)
age-c	-.054***	-55.008	-.026***	-51.197
	(.005)	(48.262)	(.002)	(76.293)
married-c	-.541***	917.340*	-.220***	797.252*
	(.052)	(469.361)	(.027)	(471.474)
female-c	.166***	-420.188	.064***	-492.905
	(.041)	(394.121)	(.022)	(464.407)
nchild-c	.077***	-232.917	.026**	-55.417
	(.021)	(214.822)	(.011)	(253.476)
sibling-c	-.400***	35.642	-.180***	-179.259
	(.030)	(267.157)	(.013)	(247.914)
age-p	-.004	93.256*	.002	83.742
	(.005)	(48.346)	(.002)	(59.925)
married-p	.411***	-186.636	.159***	-200.538
	(.073)	(635.552)	(.033)	(680.458)
female-p	-.244***	-117.946	-.105***	-61.536
	(.067)	(557.172)	(.030)	(521.641)
badhealth-p	-.386***	596.958	-.170***	634.670
	(.069)	(609.135)	(.031)	(652.449)
SE	.849***	239.492	.394***	515.342
	(.126)	(1004.017)	(.054)	(423.605)
DK	.301**	677.916	.167***	919.022**
	(.145)	(1189.088)	(.064)	(454.949)
NL	-.129	840.911	-.005	1119.501
	(.133)	(1127.861)	(.058)	(792.057)
BE	.036	7798.370***	.059	8027.239***
	(.131)	(1114.633)	(.058)	(1566.561)
FR	.128	2948.687**	.109*	3282.659***
	(.139)	(1161.854)	(.060)	(748.461)
CH	-.414**	6835.991***	-.140	6874.588**
	(.192)	(1699.836)	(.088)	(3264.721)
AT	.185	1106.565	.106*	1795.961*
	(.144)	(1203.904)	(.062)	(929.444)
IT	.120	4485.415***	.057	4917.457***
	(.173)	(1514.825)	(.075)	(1495.240)
ES	-1.273***	6240.599***	-.553***	6603.216***
	(.220)	(2226.480)	(.095)	(1983.242)

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	(1)	(2)	(3)	(4)
GR	.432***	4252.732***	.174***	4586.453***
	(.152)	(1260.176)	(.064)	(1342.363)
Observations	23699	3636	23699	3636
Log-likelihood	-7512.333		-8903.392	-39696.05
σ_{u_i}	2.193	10550.25		
ρ	.828	.591		

Notes: Standard errors are in parenthesis, * significant at 10%; ** significant at 5%; *** significant at 1%. Column (1) and (2) are estimated with RE where the cross sectional dimension is variation between households, while the longitudinal dimension captures variation among children within the same household. Column (3) and (4) are estimated on the pooled sample, standard errors are clustered by household.