

The Intergenerational Linkage between Children and their Parents – Empirical Evidence of Upstream Transfers in Germany

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Abstract

Social security reforms are gaining political momentum in most European countries. As this agenda is closely associated with deregulation and privatization, intergenerational and intrafamilial transfers might become more important. This paper focuses on upstream intergenerational transfers from children to parents. Two motives have to be distinguished. The first one is an exchange motive. Aging parents, for example, may wish to substitute not only private market insurance for the public pension scheme but they may also supply their children with intrafamilial services in exchange for a transfer payment. The second motive is that private transfers may be motivated by pure altruism. Thus, research on children's motives for upstream intergenerational transfers is crucial for an ex ante evaluation of the effectiveness of reform policies.

Starting from theoretical considerations, the paper derives empirically testable hypotheses. The tests are carried out using a matched child-parents panel data set from the German Socio-Economic Panel Study. Primarily, the data provide results in favor of exchange-related motives. In addition, the findings support the argument that there is a close connection between denominational affiliation and transfer behavior. Religious regulatory seems to result in greater efficiency of the household production function and, as a consequence, religious children have to spend fewer resources on the intrafamilial services.

JEL Classification: D13, Z12

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1 Introduction

In pre-industrial times, civilized societies obliged children to maintain their parents and, thus, parents could depend on their children in their old age. Introducing public pension schemes, the later emerging welfare state drove back individual obligations and old aged people have since received a state pension. Today, however, the demographic developments and the persistent high unemployment rates put enormous pressure on the public pension scheme in most European countries. As a result, a reform of social security is on the agenda and, in this context, the downsizing of the public system seems inevitable at the moment.

A much discussed alternative to the public system is the reliance on the private sector. But, is there also a possibility for a revival of provision for the old age within the family? Can private income transfers from adult children to their elderly parents stand in for a public system today? An attempt to an answer requires a sound knowledge of the children's motivation for providing their parents with financial support. Two motives have to be distinguished. The first one is an exchange motive. Aging parents, for example, may wish to substitute not only private market insurance for the public pension scheme but they may also invest in their children in anticipation of a repayment when they are retired, or they may supply their children with intrafamilial services and demand a price (i.e. a transfer). On the other hand, private transfers may be motivated by pure altruism. So, I analyze the motive and present empirical evidence for child-to-parents transfers in Germany.

In addition, I examine the role of the cultural background which is one of the major determinants of behavior within families. The child's religious affiliation is used as a proxy for the cultural influence because religious norms may dominate the child's value system due to their all-embracing impact since very early in life. I offer some theoretical and empirical results regarding the importance of religious affiliation in a child-to-parents transfer regime.

I use a rich panel data set, the German Socio-Economic Panel Study (SOEP), for the empirical analysis. However, the econometric investigation of family data is a challenge of its own because of the statistical dependency of the observations. Dependencies arise between adult children who belong to the same original household and, therefore, share the same family background. Using multilevel estimation techniques, I control for unobserved heterogeneity at the individual *and* household level.

The paper is organized as follows. In section two, I give some general thoughts on the interdependency of the child and the parents' welfare, shortly summarize the main points from a model concerning the underlying motive for child-to-parents transfers and present theoretical considerations on religious norms. Section three and four provide an overview of the data and the estimation procedure respectively. The estimation results are presented in section five. A short conclusion is drawn in section six.

2 Theoretical considerations

2.1 Interdependent welfare and its consequences for families

Homo oeconomicus who is uninterested in the welfare of other economic agents and pursues a strategy of strict self-interest maximizing is the center of micro economic standard models. Such a framework may deliver explanation for issues of pure market relationships but one may question whether this behavioral hypothesis can be applied to other areas of life without further modification. The present study investigates the relationships between members of the family. Family ties between children and their parents are said to be characterized first and foremost by intimacy and emotionality and seemingly less by considerations of profit and loss. For this reason, it seems sensible to extend the standard model of homo oeconomicus by another component, namely interdependent welfare.

In economic analysis, the dependency of a person's welfare on another person's welfare is modelled as altruistic behavior. A person is said to be an effective altruist if his or her pleasure or utility depends positively on (seeing) the happiness of others and the person's behavior is changed by this (cf. Becker, 1998). An economic framework that incorporates the idea of altruistic motivation is described below in more detail.

By including altruism as a motive for private, voluntary monetary transfers, certain crucial consequences for the distribution of welfare within the family and important implications for social policy making can be derived. For example, Barro (1974) set up a framework with two overlapping generations in which an individual's welfare depends on lifetime consumption and on the utility of the succeeding respectively preceding member of another generation. In this case, changing the public pension scheme leads to an adjustment in the pattern of private transfers in a way that would fully offset the intergenerational redistribution. Consequently, a

decrease of governmentally imposed transfers from young to old leads to an equivalent increase in the size of private, voluntary transfers from young to old.

Becker (1998) predicts a similar theoretical outcome which results from an intrafamilial redistribution of income from an altruist to a beneficiary. With total family income remaining constant, a redistribution of income has no effect on the consumption of the members of the family because a reduction in the altruists' income induces an equal sized decrease in the transfers and vice versa. This proposition holds as long as the benefactor remains an effective altruist. A further important result from Becker's model is that the beneficiary has not to be altruistic toward his or her benefactor. Originally Becker calls this phenomenon the rotten kid theorem but in the analysis of upstream transfers where I assume the child to be altruistic toward his or her (selfish) parents one can re-interpret this as the rotten parent theorem. This means that one only has to assume one sided altruism to obtain an outcome as if the parents were altruistic toward the child: "Sufficient caring by an altruist induces even a selfish beneficiary to act as if she cares about her benefactor as much as she cares about herself" (Becker, 1998).

An implication of the rotten kid/parents theorem for the analysis of intergenerational upstream transfers is that we do not have to model reciprocal altruism but it is sufficient to assume that the altruist's welfare depends on the welfare of his or her beneficiary. In other words, it is not necessary to model an explicit interdependency which considers the child's utility as a parameter of the parents' utility function. Instead, it is sufficient to make the parents' welfare part of the child's utility function. By this, the child is no longer solely interested in his own happiness but also in the happiness of his parents.

An example from current social security reform in Germany can be interpreted as a case of intergenerational redistribution. The intergenerational redistribution is caused by the introduction of a sustainability factor which considers the ratio of pensioners to contribution payers and, thus, it diminishes the growth of pensions. So, the current reform efforts aim at reducing the burden of financing the pay-as-you-go public pension scheme for the younger generation. In addition, government aid, the so-called "Riester-Rente", is given to dependent employees who are liable to social security in order to build a private provision for old age. The effects of such reforms may be offset by an adjustment of intergenerational transfers within families in which the child behaves as an effective altruist. Of course, the present study is *no* attempt to describe the impact of this reform policy introduced only recently in 2005. The effects of the reform pol-

icy are long-term and there is no direct cut in pension. Even so it can be taken for granted that public pensions will increase more slowly than wages in the long run and the level of pensions (measured as the ratio between pension and income) will fall. However, if one wants to make at least a vague prognosis considering the long-term consequences of intergenerational redistribution for the members of the family information about the motive for upstream transfers will be the starting point.

2.2 A theoretical framework for intergenerational upstream transfer

A general framework that allows for a differentiated analysis of motives for private income transfers was set up by Cox (1987). The model distinguishes between altruism and exchange as the motive for the transfer and analyzes both in a single framework. Although the original model considers the parents as the transfer donors and the child as the transfer recipient, it can easily be modified for a study of upstream intergenerational transfers. Park (2003) gives an example. In the modified, upstream intergenerational transfers framework the child grants his or her parents monetary transfers. By doing this, the child's well-being increases because the parents' welfare is an argument of his or her utility function. The parents make in response for the payments services available which cannot be purchased in the marketplace. Services in this context are not restricted to household services, as looking for grandchildren for example, but they may also include providing emotional support and rational advice.

Following Cox (1987), the child's utility function can be written as

$$U = U[c_k, s, V(c_p, s)] \quad (1)$$

where c_k is the child's own consumption and s denotes the intrafamilial services provided by the parents. The child's utility increases with an increase of both consumption c_k and services s . The first partial derivatives of the utility function with respect to c_k and s are therefore positive, i.e. $\partial U / \partial c_k > 0$ and $\partial U / \partial s > 0$. V stands for the parents' utility function which increases with consumption c_p ($\partial V / \partial c_p > 0$) but decreases with services ($\partial V / \partial s < 0$) because parents have to bear costs from reduced leisure time, for example, when providing the services. As mentioned above, the child is an effective altruist if his or her utility depends positively on the welfare of

the parents, i.e. $\partial U/\partial V > 0$. The budget constraints are given by

$$c_p = y_p + T \quad (2)$$

$$c_k = y_k - T \quad (3)$$

$$c_p + c_k = y_p + y_k \quad (4)$$

where T are the child-to-parents transfers and y_k and y_p are the child's and the parents' own income respectively. In addition, the parents' participation constraint must be considered.

$$V(y_p + T, s) \geq V_0(y_p, 0) \quad (5)$$

$V_0(y_p, 0)$ denotes the parents' utility when they do not participate in the transfer-service arrangement, i.e. the parents do not supply any services and the child does not make any transfers. On the other hand, the parents reach the utility level $V(y_p + T, s)$ when they provide intrafamilial services and receive transfers in return. Condition (5) ensures that the parents are at least not worse off when they join the transfer-service regime.

In the case of altruism, participation in the transfer-service regime must be an improvement for the parents. This can be expressed formally as

$$V(y_p + T, s) > V_0(y_p, 0). \quad (6)$$

Maximizing the child's utility (1) subject to the constraints given in equations (2) to (4) and (6) and carrying out a comparative static exercise on the first order conditions yields important hypotheses for identifying an altruistic motive. Firstly, the transfer amount must decrease when the parents' income increases and it must increase when the child's income increases, i.e. $\partial T/\partial y_p < 0$ and $\partial T/\partial y_k > 0$. Secondly, the "redistributive neutrality property" (Laferrère and Wolff, 2006) can be deduced from the model.

$$\frac{\partial T}{\partial y_p} - \frac{\partial T}{\partial y_k} = -1 \quad (7)$$

Equation (7) indicates that a redistribution of the family income (which is assumed to remain constant) from the altruistic child to the parents results in an equal sized decrease in the child-to-parents transfer (and vice versa). As a result, the initial (i.e. pre-redistributive) allocation is restored through an adjustment of the transfer amount. This condition regarding the derivatives can be utilized for an empirical test of the child being an effective altruist.

The framework of Cox (1987) further allows the identification of an exchange motive. In this case transfers are interpreted as expenditures for intrafamilial services provided by the parents. The total transfer amount is the product of the quantity of service supplied and the implicit price, i.e. $T(s, p) = s(y_p) \cdot p(y_p)$, where the quantity of the service and its price per unit depend on the parents' income.

Maximization of the child's utility (1) is carried out subject to the budget constraints (2) to (4), again, and the dominant child assumption. The latter says that the parents' well-being is *not* improved by participation in the transfer regime.¹ So, equation (5) can be re-formulated as

$$V(y_p + T, s) = V_0(y_p, 0). \quad (8)$$

Two hypotheses regarding the income components y_k and y_p can be derived from a comparative static analysis on the first order conditions. Firstly, an increase in the child's income leads to an increase in transfers ($\partial T / \partial y_k > 0$). This result is identical to the one obtained from assuming altruism. Secondly, the effect of a change in the parents' income on the transfer amount is not determined ($\partial T / \partial y_p \stackrel{\leq}{\geq} 0$). This ambiguous deduction from the model is the essential difference to altruistic behavior. (When the child is altruistic toward the parent, transfers decrease with an increase in the parents' income unambiguously.) Therefore, the distinguishing feature between altruism and exchange is that an increase in the parents' income which leads to an increase in the transfer amount, i.e. $\partial T / \partial y_p > 0$, is compatible only with an exchange motive.

Finally, it has to be pointed out that the implications of the analysis of the transfer amount are not valid for the transfer decision. Cox (1987) shows that the probability of a transfer occurrence increases with an increase in the child's income and decreases with an increase in the parents' income independently whether the transfer decision is based on altruism or exchange.

¹ An analysis of the more general Nash bargaining solution which relaxes this assumption can be found in Ermisch (2003).

2.3 Religious norms and the household production function

This paper takes up the notion that there is a close connection between religious and economic behavior at the level of individuals and households (cf. Iannaccone, 1998). The question is, however, what is the impact of religious regulatory on transfer-service behavior and household production from a theoretical point of view? Hence, I develop an argument to illustrate the influence of religious norms on economic behavior within the family and consider the consequences for the child-to-parents transfers.

Following Becker (1998), I argue that a household uses factor inputs into the production of household commodities which cannot be purchased in the marketplace. Commodities are “children, prestige and self esteem, health, altruism, envy and pleasures of the senses” (Becker, 1998).² I extent this listing by subsuming intrafamilial services under the household commodities because there may be no clear market substitutes.

Leaving aside afterlife consumption and concentrating on benefits in this world, a child’s secular utility function can be written as

$$U = U(c_k, s) \quad (9)$$

where I ignore the dependency on the parents’ welfare discussed above. Instead, I introduce a production function for the household commodities or intrafamilial services s which is

$$s = f(\mathbf{x}, t|E). \quad (10)$$

The amount of services produced depends on inputs: \mathbf{x} denotes a vector of goods that can be purchased in the marketplace and t stands for the time needed. I further assume that intrafamilial

² Setting up an explicit production function for altruism, economists draw an imprecise picture of altruism. Becker (1998), for example, treats altruism as a type of motivation that changes behavior when he discusses altruism in the family. With it, altruism becomes a *property* of the utility function because altruistic from this point of view “means that [a person’s] utility function depends positively on the well being of [another person]”. Combining both arguments – altruism as a commodity that can be produced according to the household production function and as a property of the utility function – leads to the conclusion that preferences are not constant but can be altered by the household production function. Nevertheless, Becker treats altruistic behavior as a constant internal type of motivation when analyzing altruism in the family.

monetary transfers can be regarded as one of the resources that can function as a factor input for producing intrafamilial services, i.e. $T \in \mathbf{x}$.

In addition, the production function depends on the parameter E that indicates “household ability, human capital, social and physical climate, and other environmental variables” (Becker, 1998). As religious norms have a strong impact on these variables, I assume that the returns to scale of the production function of s (or equivalently the input elasticities) depend on the members of the family being religious or not. I suppose that the returns to scale are higher if there is a religious family background.

This assumption gains plausibility from the following consideration. Religious norms can be regarded as part of the production technology for intrafamilial services. Devout persons have a concurrent notion of what their individual task in the household production process is because the religious regulatory gives clear instructions regarding interpersonal relations. So, the household does not have to develop a technology of its own and avoids the cost of risky research and development. In addition, the religious norms represent effective participation obligations. The latter becomes relevant especially when several members of the family are involved in the production process of the intrafamilial services. In this case, the production function is

$$s = f(\mathbf{x}_i, t_i | \mathbf{x}_j, t_j, E), \quad i \neq j \quad (11)$$

where the indices denote the contributions of persons i and j respectively who might be two siblings. From the viewpoint of person i , the contributions of person j is given.

Intrafamilial services are quasi-public goods because they are (at least partly) non-excludable and non-rival and, in consequence, the problem of free rider behavior is evident. When the parents provide care of grandchildren, for example, it would be difficult to withhold the service from one child without disturbing the familial harmony (non-exclusion). Let us assume that the parents are only in a position to provide grandchild care because one child supports his or her parents financially and, therefore, the parents do not have to be employed in the labor market or they can at least reduce their hours of work. In this situation, the sibling who does not contribute to the parents’ income, i.e. the free rider, can take up the parents’ services by getting them to look for two instead of only one grandchild (non-rivalry). However, the

problem of free-rider behavior may be defused by incorporating participation obligations on the members of the family regarding the contributions and the family engagement. Denominational affiliation serves as an instrument to rule out free rider behavior by introducing the ideas of an all-seeing judge and the Last Judgement, for example. The consequence of the religious regulatory is a greater efficiency of the production function which manifests in the property that fewer resources (in terms of monetary child-to-parent transfers) are necessary to provide the intrafamilial services. Therefore, the hypothesis is that child-to-parent transfers are less frequent and have lower size if there is a religious family background.

Table 1 summarizes the hypotheses deduced in this section.

Table 1
Empirically testable hypotheses

effect of ...	hypothetical marginal effect	conclusion
child's income	$\partial P(T = 1)/\partial y_k > 0$ $\partial T/\partial y_k > 0$	motive not determined motive not determined
parents' income	$\partial P(T = 1)/\partial y_p < 0$ $\partial T/\partial y_p < 0$ $\partial T/\partial y_p \leq 0$ $\partial T/\partial y_p \geq 0$	motive not determined altruism (if redistributive neutrality property is satisfied) exchange
redistributive neutrality property	$\partial T/\partial y_p - \partial T/\partial y_k = -1$	altruism
religiousness	$s(\mathbf{x}, t \text{religious child}) >$ $s(\mathbf{x}, t \text{non-religious child})$ or equivalently $T(s \text{religious child}) <$ $T(s \text{non-religious child})$	greater efficiency of the household production function when child is religious \Rightarrow fewer resources needed to produce intrafamilial services

Note: The second column contains hypotheses derived from the theoretical models.

3 Data

This paper uses data from the German Socio-Economic Panel Study (SOEP) for the years 1995 to 2004. The SOEP is a longitudinal data set which contains information on all household members (cf. Haisken-DeNew and Frick, 2003). In 2004, the SOEP embraced nearly 12,000 households and about 22,000 persons. The data covers a wide range of topics that are of interest for the analysis of upstream intergenerational transfers, e.g. information about children's and parents' socio-economic characteristics and household composition. A major advantage of the

SOEP is that persons are still included in the panel even when they moved out of the original household. Therefore, it is possible to create a data set with matched child-parents pairs when the child has grown up and forms a household of his or her own.

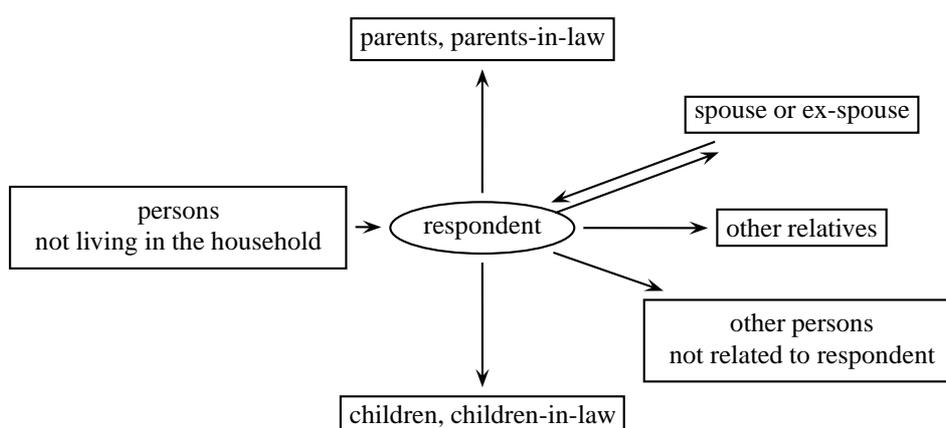
Besides the advantages of the SOEP, there is also a serious shortcoming that makes an investigation of intrafamilial transfers a challenging task. The difficulty arises from the impossibility to link the transfers given to the transfers received directly. The reason why it is not possible to build a direct linkage between the donor and the recipient is because the two questions in the questionnaire regarding incoming and outgoing intrafamilial payments, respectively, are asked in different ways. The transfers received from persons living outside the household are recorded as part of the income question “[...] please state what sources of income you received in the past calendar year” where one answer category is “[o]ther types of financial assistance from persons who do not live in the household” (Infratest Sozialforschung, 2004). In contrast, the question regarding monetary transfers given to parents in the questionnaire is: “Have you personally given payments or support during the last year [...] to relatives or other persons outside of your household” (Infratest Sozialforschung, 2004). The answer categories include the total amount per year that is transferred “[t]o parents/step parents”. It must be pointed out that there is a translation error in the questionnaire. The English version individual questionnaire asks for payments or support given to “step parents” but the German version asks for transfers given to “Schwiegereltern” which means parents-in-law. As the respondents are usually confronted with the German version of the questionnaire, this translation error has no consequences for this study.

The answers to these two questions do usually not agree because the income question is much more general than the one regarding the transfers given. When parents report on receiving private transfers, the sum of money declared is greater than the pure child-to-parents transfer amount for all cases included in the sample. Obviously, parents who are financially supported by their children have several sources of income from private transfers. But, the number of cases in which parents give information on private transfers conditional on children saying that they support their parents financially is very small. Only about 5% of the observations in the sample satisfy this condition. However, this does not mean that parents who do not report on the question regarding the incoming private transfers do not receive transfers at all. Instead, one can assume that they feel stigmatized and ashamed to admit that they have to rely on other

person's support. As a consequence, the information given by children can be considered to be more reliable because they do not have any incentive to provide false or incomplete information. After all, I assume that the parents receive the transfers even when they do not report this in the questionnaire. Jürges (1999) states similar problems when he analyzes downstream parent-to-child transfers in Germany. Reconstructing the transfer flow from parents to children, he states that "the sum of transfers received [is] roughly one third of the transfers given in each sample wave". This supports the suggestion that the incoming transfer question is not very reliable.

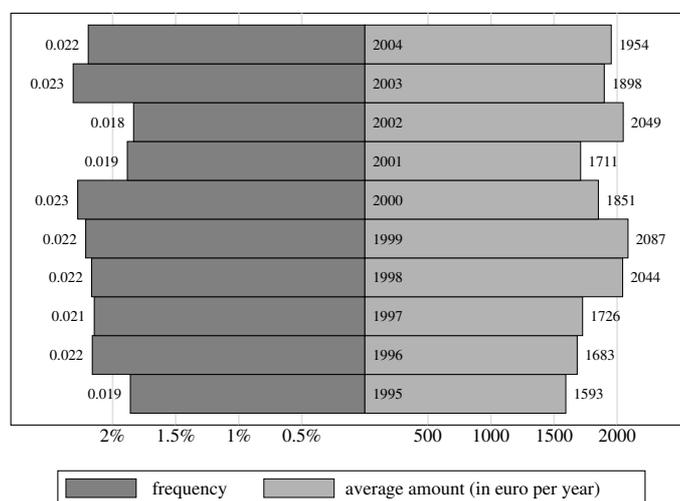
A more detailed overview of what kinds of monetary transfers are included in the SOEP is given in figure 1. It is apparent that there is no specific question regarding the child-to-parents transfers received. All payments from other persons, except maintenance payments from the (ex-)spouse, are subsumed in the more general income question. So, it is impossible to identify the distinct sources of the payments. The transfer amount is captured in detail only when the respondent is a transfer donor. For this reason, I use the information from the child's questionnaire and link the parents' variables. In principle, and on the basis of sufficient data, it would be possible to examine the child-parents transfer relationship starting from the parents, too. The analysis of intrafamilial transfers and utilization of the SOEP would be improved considerably if the questionnaire had a consistent design regarding the incoming and outgoing transfers.

Figure 1
Private monetary transfers in the SOEP



The total number of transfers reported is, even after pooling ten panel waves, relative small. While up to 50% of all households in developing countries receive private transfers (cf. Cox and Jimenez, 1990), their occurrence is in general a relative rare event in Western industrial nations. Bonsang (2005), for example, uses data from the Survey of Health, Ageing and Retirement in Europe (SHARE) which covers different European countries. He reports the highest frequencies of monetary child-to-parents transfers for Switzerland and Greece with 6.2% and 5.3% respectively and the lowest for Denmark with 0.8%. On the average, 2.6% of all adult children across Europe make financial transfers to their parents. The frequency of the transfer occurrences in the SOEP is reported in figure 2 separately for every panel year used in this paper. Figure 2 is calculated from a non-matched data set in order to make use of the unabridged information available in the SOEP. The proportion of children providing financial support for their parents is about 2% per year. The average transfer amount given is for those who give between 1,600 and 2,100 euros per year. Figure 2 suggests that the transfer frequency as well as the transfer amount remain stable over the years.

Figure 2
Transfer frequency and average transfer amount



Note: Source is SOEP 1995-2004, cross section weighted. Calculations from non-matched data (frequency: $n = 169,331$; amount $n = 3564$). Average transfer amount in constant prices of 2001.

Different model specifications were estimated with respect to the income variable. In the basic specification (model 1), I use the post-government income of all persons in the household 16 years of age and older after tax and government transfers. The parents' income variable

excludes all private transfers. As the analysis focuses on individuals as central units of interest, a certain share of household income must be attributed to every member of the household. Therefore it is necessary to make an assumption about the underlying equivalence scale because there are economies of scale when the number of people living together increases. Here the widely accepted OECD scale is used which weights the first adult with 1.0, every further adult with 0.5 and every child with 0.3. An approximation of almost any equivalence scale can be achieved by calculating the equivalent income for every individual, y_i , as

$$y_i = \frac{y_{HH}}{h^e} \quad (12)$$

where h is the household size, y_{HH} denotes the household income and e is the equivalence scale elasticity. Setting $e = 0.5$ approximates the OECD scale (cf. Faik, 1994).

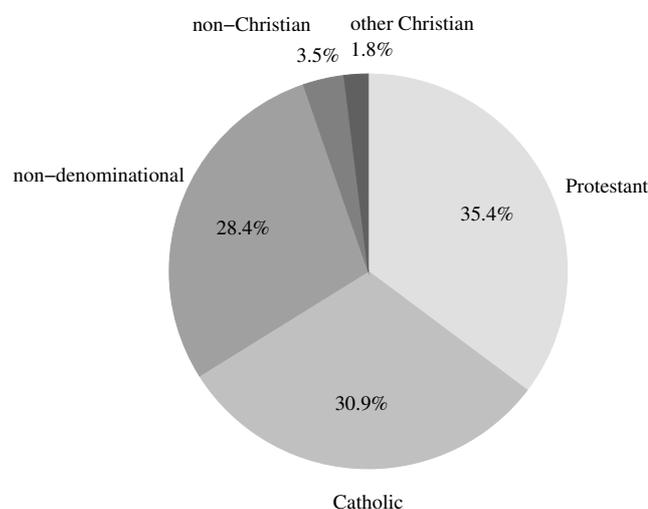
The second specification (model 2) includes the total household income and the logarithm of the number of persons in the household. Thus, a more flexible formulation regarding the equivalence scale is implemented. The child's and parents' gross income which is calculated from the income question in the questionnaire is in the third model in place of the household income.

As there are children with only one parent (father or mother) in the sample, the parents' average income was calculated in order to make amounts comparable. Summary statistics are reported in tables 3 and 4 in the appendix for the matched samples used in the analysis of the transfer decision and transfer amount, respectively.

An important individual characteristic for the investigation is the children's religious affiliations. Unfortunately, this information is only available in 1997 and, in a very detailed form, in 2003. For this reason, I make an assumption for the years in which this variable is missing. Such a procedure is straightforward because a person's religious affiliation is one of the more constant characteristics and it does not change for the majority of people during their whole life. So, I assume that every child belongs to the same church from 1995 to 1997 and from 1998 to 2004 where the information from 1997 and 2003 is assigned to the first and second period, respectively.

Figure 3 gives an overview of the religious composition of the non-matched sample population in 2003. The by far dominating group is the Christians including Protestants, Catholics

Figure 3
Religious affiliation in 2003



Note: Source is SOEP 2003, cross section weighted. Calculations from non-matched data ($n = 19,652$).

and other Christian sects which accounts for more than two third of all people. Almost 30% are non-denominational and a small share of 3.5% belongs to a non-Christian religion. The latter are mostly Muslim people. Comparing these numbers with the summary statistics of the matched child-parents pairs used in the estimation (cf. tables 3 and 4 in the appendix), one immediately recognizes the proportionally high share of non-Christians in these subsamples. The reason for this is that immigrants are oversampled in the SOEP. While figure 3 is calculated using cross-section weights which account for the oversampling, I do not weight the observations in the regression analysis because the underlying, “true” transfer motive must be independent from the weights. In addition, a dummy variable is included in the regression analysis which identifies the immigrants. Thus, I control for the effects of oversampled guest workers who make remittances to parents or parents-in-law in the home country.

4 The econometric analysis of family data

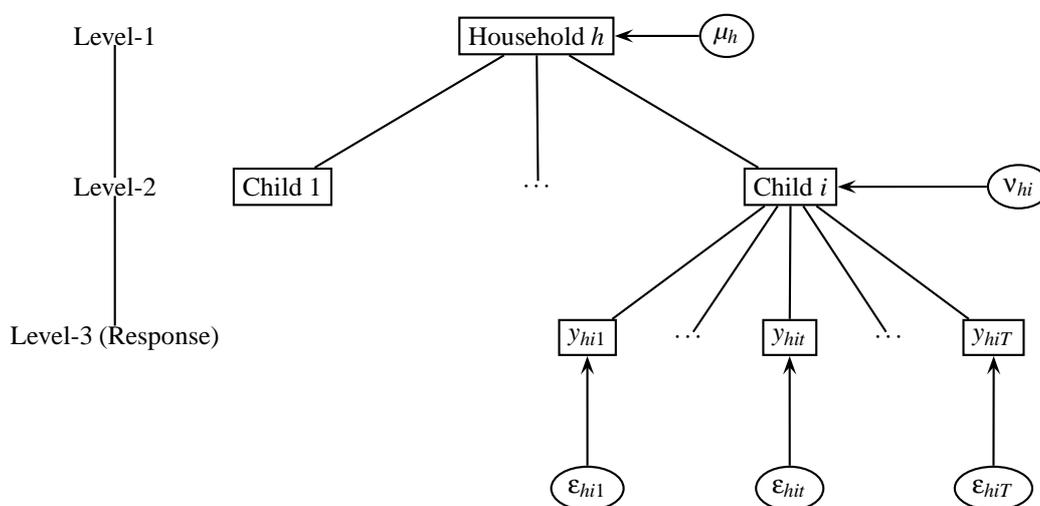
The data regarding the intrafamilial child-to-parent transfers has a hierarchical structure. The longitudinal data provides repeated transfer observations on individuals, i.e. these observations over time are nested within children. In addition, children are nested in higher level clusters when several siblings belong to the same original household. Figure 4 gives a graphical illus-

tration of the hierarchical structure of the data. In this paper, children are referred to as level-2 units and households are level-1 units.

The statistical analysis of hierarchically structured data requires an econometric model specification that allows for clustering at different levels. The necessity for a special estimation approach arises from the fact that the distinguishing features of the clusters are only observable to a certain extent and, as a consequence, there is cluster-specific unobserved heterogeneity which results in dependence between units in the same cluster. Consequently, there is correlation between the repeated transfer observations per child and between different children within the same family respectively household. The within family correlation arises because siblings who have grown up in the same original household share the same family background and they may show similar behavior and have analogous attitudes considering intrafamilial monetary transfers. Winkelmann (2005) gives a further example when he applies an ordered probit model with intra-family correlation to an analysis of the subjective well-being of the members of the family.

Ignoring the clustering, the variance of the estimated parameters may be biased and one may draw mistaken conclusions regarding the statistical significance level. In addition, Rodríguez and Goldman (2001) demonstrate that ignoring the unobserved effects can lead to a substantial bias in the estimated coefficients when the relationship between the observed response and the underlying latent variable is nonlinear which is the case in the analysis of the transfer decision where only a binary outcome is observed.

Figure 4
Three-level random intercept regression Model



A random intercept model with random effects at the household and individual level is applied to an analysis of the transfer decision by extending the standard logistic regression framework to a multilevel model (cf. Gibbons and Hedeker, 1997; Rabe-Hesketh and Skrondal, 2005). Combining the longitudinal data and the family clusters, the resulting three level model can be written for the i -th child in family h at time t as

$$t_{hit}^* = \beta_0 + \mathbf{x}'_{hit} \boldsymbol{\beta} + \mathbf{z}'_{ht} \boldsymbol{\gamma} + \mu_h + \nu_{hi} + \varepsilon_{hit} \quad (13)$$

where \mathbf{x}'_{hit} and \mathbf{z}'_{ht} are the child's and the parents' observed characteristics, respectively. $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ represent the corresponding coefficient vectors of interest. β_0 is an overall constant term. The random effects on the household and child level are denoted μ_h and ν_{hi} respectively. The former captures the time-invariant household specific effect whereas the latter controls for a time-invariant individual specific effect. Both are assumed to be random and normally distributed with mean zero and constant variances, σ_μ^2 and σ_ν^2 . ε_{hit} is the idiosyncratic error term on the third level.

The left hand side variable t_{hit}^* represents an unobservable latent variable which is related to the observed binary response t_{hit} through a threshold concept. The latent variable t_{hit}^* is assumed to be continuous and can be interpreted as the child's underlying propensity to make a monetary transfer. A transfer occurs (i.e. is observable) when t_{hit}^* exceeds a certain threshold τ . Without loss of generality, τ can be set to zero and the resulting threshold model can be written as

$$t_{hit} = \begin{cases} 1, & \text{if } t_{hit}^* > 0; \\ 0, & \text{if } t_{hit}^* \leq 0. \end{cases} \quad (14)$$

The observed response t_{hit} indicates whether the i -th child in family h makes a transfer at time t or not.

The conditional probability of a transfer occurrence given the explanatory variables and the higher level random effects μ_h and ν_{hi} is

$$P(t_{hit} = 1 | \mathbf{x}_{hit}, \mathbf{z}_{ht}, \mu_h, \nu_{hi}) = \Lambda(w_{hit}) \quad (15)$$

where $w_{hit} = \beta_0 + \mathbf{x}'_{hit} \boldsymbol{\beta} + \mathbf{z}'_{ht} \boldsymbol{\gamma} + \mu_h + v_{hi}$ and Λ is the logistic cumulative distribution function

$$\Lambda(w_{hit}) = \frac{\exp(w_{hit})}{1 + \exp(w_{hit})} = \frac{1}{1 + \exp(-w_{hit})}. \quad (16)$$

Consequently, the probability of a particular transfer pattern $\mathbf{t}'_h = (t_{11}, \dots, t_{1T_{h1}}, \dots, t_{i1}, \dots, t_{iT_i}, \dots, t_{iT_{hi}}, \dots, t_{n_h1}, \dots, t_{n_hT_{hn_h}})'$, $P(\mathbf{t}_h | \mathbf{x}_{hit}, \mathbf{z}_{ht}, \mu_h, v_{hi})$, in household h for the $i = 1, \dots, n_h$ children at occasions $t = 1, \dots, T_{hi}$ is the product of the probabilities of the individual transfer occurrences (because the clusters are assumed to be mutually independent after controlling for the unobserved heterogeneity)

$$P(\mathbf{t}_h | \mathbf{x}_{hit}, \mathbf{z}_{ht}, \mu_h, v_{hi}) = \prod_{i=1}^{n_h} \prod_{t=1}^{T_{hi}} [\Lambda(w_{hit})]^{t_{hit}} [1 - \Lambda(w_{hit})]^{1-t_{hit}} \quad (17)$$

$$= \prod_{i=1}^{n_h} \prod_{t=1}^{T_{hi}} \frac{\exp(w_{hit})^{t_{hit}}}{1 + \exp(w_{hit})}. \quad (18)$$

The marginal probability of the transfer pattern \mathbf{t}_h , $P(\mathbf{t}_h | \mathbf{x}_{hit}, \mathbf{z}_{ht})$, is the joint probability of all observed transfer occurrences conditional on the given covariates, \mathbf{x}_{hit} and \mathbf{z}_{ht} , and unconditional on the random intercepts, μ_h and v_{hi} . One can calculate the marginal probability by integrating out the random intercepts which is feasible by making use of the assumption of conditional independence among children given the family-specific unobserved effects and the conditional independence among the transfer occurrences given the family- and the child-specific unobserved effects. This yields

$$P(\mathbf{t}_h | \mathbf{x}_{hit}, \mathbf{z}_{ht}) = \int \left\{ \prod_{n=1}^{n_h} \int \left(\prod_{t=1}^{T_{hi}} [\Lambda(w_{hit})]^{t_{hit}} [1 - \Lambda(w_{hit})]^{1-t_{hit}} \right) \phi(v) dv \right\} \phi(\mu) d\mu \quad (19)$$

where $\phi(\cdot)$ is the normal distribution of the random effects on level-1 and level-2 with zero mean and variances σ_μ^2 and σ_v^2 respectively. Re-writing the reduced form distribution in equation (19) as a function of the parameters of interest yields the marginal likelihood for the whole model

$$L(\boldsymbol{\beta}, \boldsymbol{\gamma}, \sigma_v^2, \sigma_\mu^2) = \prod_{h=1}^H P(\mathbf{t}_h | \mathbf{x}_{hit}, \mathbf{z}_{ht}). \quad (20)$$

The log likelihood for all transfer patterns in the $h = 1, \dots, H$ families is

$$\ln L(\boldsymbol{\beta}, \boldsymbol{\gamma}, \sigma_v^2, \sigma_\mu^2) = \sum_{h=1}^H \ln P(\mathbf{t}_h | \mathbf{x}_{hit}, \mathbf{z}_{ht}). \quad (21)$$

In order to find parameters which maximize the (log) likelihood an approximative approach must be carried out because there is no closed form of the integrals involved. I use the program `gllamm` implemented in the statistical software package Stata (version nine) to estimate the multilevel model (cf. Rabe-Hesketh et al., 2004; Rabe-Hesketh and Skrondal, 2005). `gllamm` uses an adaptive quadrature procedure to maximize the marginal likelihood.

Analyzing the transfer amount, I refer back to equation 13 and substitute the transfer amount T_{hit} for the latent transfer decision t_{hit}^* . This results in

$$T_{hit} = \beta_0 + \mathbf{x}'_{hit} \boldsymbol{\beta} + \mathbf{z}'_{ht} \boldsymbol{\gamma} + \mu_h + v_{hi} + \varepsilon_{hit} \quad (22)$$

where I account for the correlation on the household and child level respectively by including random intercepts, μ_h and v_{hi} , again. I assume that the random intercepts and the error term are mutually uncorrelated, not autocorrelated and distributed according to

$$\mu_h \sim N(0, \sigma_\mu^2), \quad v_{hi} \sim N(0, \sigma_v^2), \quad \text{and} \quad \varepsilon_{hit} \sim N(0, \sigma_\varepsilon^2). \quad (23)$$

Baltagi et al. (2001) give a general overview of the framework for linear nested error component models. The model was estimated using `xtmixed` which is also included in the statistical software Stata (version nine).

5 Estimation results

What is the children's primary motive for the intergenerational upstream transfer? And how does religion influence the transfer behavior? I try to give answers to these questions in this section by discussing the estimation results from the multilevel models which are displayed in table 2.

The findings suggest a gender specific transfer pattern. The coefficients for females indicate a negative impact on the transfer decision and transfer amount which is statistically significant

at the 10% and 5% level respectively. The fact that women give smaller amounts of financial support may mirror a traditional gender specific division of labor. For example, Schupp and Künemund (2004) report clear differences between women and men in the extent of care given to elderly persons. Not only the share of women providing care is greater but they also spend, on the average, more time on intrafamilial services. So, adult children may diverge in behavior towards their elderly parents such that women are more involved in household production and may, therefore, provide attention and care, whereas men, the breadwinners, tend to give financial assistance.

The child's and parents' health statuses have opposite impact on the transfer amount, though their influence is not statistically significant. While the transfer amount declines when the child is in poor health, it increases with the parents being in poor health.

As the child's health status is an indicator for the full income capacity, a poor health status at the present suggests a tightening of the budget constraint in the future. This could find its expression in diminished expenditures for intrafamilial services provided by parents just as in reduced consumption of market goods. In contrast, the incentives to give a larger transfer amount seem to rise when the parents' health status is poor. This finding is compatible with an altruistic motivation which fosters helping behavior but other explanations are also possible. For example, when the child is in need of financial support in the future, he or she may want to receive payments from his or her own child. A strategy that promotes intergenerational exchange and holds out the prospect of a (re-)payment of such a transfer is setting the own, growing child an example. The sandwich generation, i.e. the generation between aging parents and grandchildren, makes transfers to the parents in expectation of a repayment from the own children. The ultimate aim of this action is to shape or "manipulate" the growing child's preferences by a so-called demonstration effect (cf. Stark, 1995).

From the short review of transfer motives in section 2.2 follows that no sharp line between altruism and exchange can be drawn from an analysis of the transfer decision. In either case, the theoretical model predicts a positive correlation of the transfer probability and the child's income, on the one hand, and a negative correlation of transfer probability and the parents' income, on the other hand. Although the exact motive underlying the transfer cannot be identified, the theoretical hypotheses are confirmed by the highly statistically significant estimation results very clearly. The child's income has the expected positive sign, i.e. an increase in the donor's

income leads to an increase in the probability of a transfer occurrence. In contrast, an increase in the recipients' income reduces the probability.

An analysis of the coefficients of the child's and parents' incomes in the transfer amount regression gives more detailed information about the underlying transfer motive. The theory predicts an increase in the transfer amount for both altruism and exchange when the child's income rises. The corresponding coefficient is statistically significantly positive and provides empirical evidence for this hypothesis. The most important result is, however, that the parents' income has a positive effect on the transfer amount, i.e. an increase in the parents' income leads to an increase in the transfer amount. As aforementioned in section 2.2, the effect of a change in the parents' income on the transfer amount is the essential indicator to distinguish between an altruistic and an exchange motive. Altruism requires a negative sign of the coefficient unambiguously. On the other hand, the statistically significantly positive correlation observed in the regression is compatible only with an exchange motive. This result arises because the impact of an increase in the implicit price of the services due to the rise in the parents' income is larger than the effect of the decline in the quantity of services (the transfer probability decreases). Consequently, I conclude that the intergenerational upstream transfers are expenditures for intrafamilial services provided by parents. Children give financial support to their parents if they get something in return that is worth the price (i.e. the transfer).

Within the context of this study it is not possible to make detailed inferences about the nature of the intrafamilial services. In general, one can assume that it is difficult to obtain substitutes for them in the marketplace, or, in other words, the children's demand is relatively price inelastic. Such services may include both physical work, like babysitting and help in the household, and just as much intellectual work, e.g. giving advice on the basis of the experience of a long life. The latter may even be provided over long geographical distances which are likely to be overcome by modern means of communication and transport.

From a theoretical point of view, religious norms influence the efficiency of the household production function (cf. section 2.3). Therefore, dummy variables indicating a child's religious affiliation are included in the regression analyses in order to control for the impact of the cultural background. I assume that the influence of religion on behavior manifests mostly in the religious affiliation and is (at least) partly independent of the active religious practice. So,

the regression equations can be estimated without a variable which measures the frequency of church attendance, for example.

As one of the few studies considering the influence of the cultural background on intergenerational family transfers, Wolff et al. (2005) analyze the impact of the religious affiliation – essentially differentiating between Muslim and non-Muslim – on *downstream* transfers using a cross-sectional data set of immigrants to France. One of their main findings is that Muslims are more likely to give financial aid but that the average transfer amount is smaller. The results in the present study provide analogous empirical evidence for *upstream* transfers, though they are estimated imprecisely. The coefficients in the transfer decision and transfer amount regressions indicate a positive and negative correlation, respectively. While Muslim children seem to be more willing to support their elderly parents which manifest in the higher probability of a transfer occurrence, they give smaller amounts.

The coefficients of the dummy variable indicating non-denominational persons are statistically significant in all regressions. Non-denominational children have a higher propensity to make transfers and they also spend larger sums compared to Christians and non-Christians. This outcome supports the thesis of a resource-preserving household production function due to religious norms. Religious children have to spend fewer resources on intrafamilial services.

Table 2
Estimation results from multilevel models

independent variables	transfer decision		transfer amount					
	model 1		model 1		model 2		model 3	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
female	-0.43*	0.09	-822.30**	0.04	-870.97**	0.02	-53.22	0.89
age	-0.01	0.70	-28.92	0.59	-24.71	0.63	-12.47	0.80
married	-0.00	0.99	319.69	0.54	118.41	0.82	146.31	0.77
health status: poor	-0.25	0.45	-8.57	0.99	-47.08	0.93	-347.14	0.54
number of siblings	0.04	0.64	-83.19	0.48	-104.47	0.37	-91.49	0.39
parents: age	-0.01	0.58	-24.50	0.53	-15.41	0.69	-24.53	0.50
parents: health status: poor	-0.05	0.81	265.77	0.42	285.82	0.38	353.13	0.28
parents live in same district	0.11	0.66	64.84	0.88	3.14	0.99	46.36	0.91
number of persons in HH	0.22	0.34	-381.88	0.35			114.62	0.77
number of children in HH	-0.33	0.23	923.41*	0.06	598.55*	0.08	183.85	0.70
years of education	-0.52*	0.09	784.49	0.15	749.15	0.16	1062.19**	0.04
years of education (squared)	0.02*	0.09	-32.00	0.12	-30.52	0.13	-42.45**	0.03
equivalent income	0.04***	0.00	135.00***	0.00				
parents: equivalent income	-0.05***	0.00	51.00**	0.02				
household income					91.15***	0.00		
parents: household income					26.25*	0.07		
log of household size					-1346.23**	0.05		
parents: log of household size					-43.15	0.93		
gross income							81.27***	0.00
parents: gross income							32.28*	0.07
non-Christian religion	0.43	0.34	-283.27	0.65	-389.23	0.52	-267.74	0.64
non-denominational	0.66**	0.02	1185.24***	0.01	1079.07**	0.01	772.58*	0.07
immigrants	0.73**	0.03	309.82	0.48	363.84	0.40	213.95	0.62
East Germany	-0.17	0.63	-777.98	0.18	-806.08	0.15	-461.24	0.40
N	11326		269		269		269	

† Reference category is singles, divorced, separated and widowed.

Note: Source is SOEP 1995 to 2004. A constant term was estimated in all regressions. Alternative model specifications with dummy variables for each year respectively one dummy variable for the euro conversion and monetary variables in constant prices of 2001 were also estimated. The results differ only very slightly and are not presented here. Parents' equivalence and household incomes (models 1 and 2) exclude all private transfers. All incomes in 1,000.

Significance levels: * <0.1 , ** <0.05 , *** <0.01 .

Non-Christian people who are by a majority Muslim may relative often be guest workers. Therefore, the influence of denomination might be overestimated because of the fact that in the case of Muslims the variable indicating religious affiliation may capture the effect of immigrants who make remittances to their home country. On the one hand, this problem is defused by using a sample with matched child and parents data. By this, observations with the parents living abroad are excluded from the sample automatically because the SOEP provides only detailed information about households in Germany. Remittances to parents-in-law living abroad may still be included, though, because there is no possibility to distinguish whether the transfers benefit parents or parents-in-law. However, assuming an efficient marriage market and positive assortative mating (cf. Becker, 1998) parents and parents-in-law may be described by similar characteristics. On the other hand, a dummy variable indicating nationality is included in the specification in order to cope with the bias that may be induced by immigrants' remittances to their home country. This approach enables to control the effect of being an immigrant. The corresponding coefficients are positive, though significant only for the transfer decision, suggesting that immigrants have a higher propensity to make transfers (which might be remittances) and, in addition, they give higher amounts.

6 Conclusion

The central tasks of this study are, firstly, to give an idea about the motive for intergenerational upstream transfer in Germany and, secondly, to assess the impact of religious norms on transfer behavior. I find no evidence for an altruistic motivation for the transfer. In contrast, the results support the hypothesis that the upstream transfers are driven by an exchange motive. In this case, the child-to-parents transfers are interpreted as the expenditures for intrafamilial services provided by parents. These services are household commodities which may have no clear market substitutes.

I also find evidence for the hypothesis that the returns to scale of the production function for intrafamilial services are higher when the child is a member of a church. Apparently, religious norms regulate the family relationships in a resource preserving way. In other words, I suggest that a religious child has to spend fewer transfers for a given quantity of services than an unreligious one (or equivalently more services are provided for a given transfer), though no direct

test for this hypothesis is presented. Presumably, a child's wisely exercising self-restraint that is implemented by religious norms results in a superior provision of intrafamilial services.

The transfers that represent the total expenditures for the services are a source of (market) income for the parents. And this is the crucial point for the question whether the transfer-service regime can function, besides insurance in the private market, as a further substitute for a state pension. Since the child-parents interaction seems to be in accordance with market conditions, it is not extravagant to suppose that economism has become the *weltanschauung* which dominates the family relationships as far as monetary upstream transfers are concerned. Even Karl Marx saw the cause of the disintegration of family structures which had been characterized by the mutual caring of the family members for each other in the rise of capitalism. He stated in the "Manifesto of the Communist Party":

"The bourgeoisie has torn away from the family its sentimental veil, and has reduced the family relation to a mere money relation." (Marx and Engels, 1975)

There is, however, doubt whether submission to the market is the best strategy for families to fulfill their needs. The aging parents will obtain a transfer income only if they supply intrafamilial services. A poor physical shape, for example, would be an entry barrier to the market for intrafamilial services and, thus, handicapped persons have to rely on other sources of financial support. Reforming the public pension schemes, one has to keep in mind that the family relationships are probably insufficient to provide an *unconditional* minimum income for the elderly parents. Only a public pension scheme which does not follow the law of the market seems to be able to manage the challenge of providing an unconditional basic income for the old aged.

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A Descriptive statistics

Table 3
Summary statistics: transfer decision regression

variable	mean	std. dev.	min.	max.
transfer decision	0.024	0.15	0	1
female	0.51	0.5	0	1
age	30.39	5.8	17	60
married	0.49	0.5	0	1
single	0.45	0.5	0	1
divorced/separated	0.06	0.23	0	1
health status: poor	0.07	0.26	0	1
number of siblings	1.87	1.62	0	10
parents: age	57.73	8.31	35	88
parents: health status: poor	0.34	0.47	0	1
parents live in same district	0.69	0.46	0	1
number of persons in HH	2.5	1.24	1	9
number of children in HH	0.77	0.96	0	5
years of education	12.03	2.55	7	18
equivalent income	16.38	8.76	0	193.62
parents: equivalent income	18.7	11.14	0	238.48
non-Christian religion	0.08	0.28	0	1
non-denominational	0.28	0.45	0	1
migrants	0.14	0.35	0	1
East Germany	0.18	0.38	0	1

Note: SOEP 1995-2004. N=11326. All incomes in 1,000.

Table 4
Summary statistics: transfer amount regression

variable	mean	std. dev.	min.	max.
transfer amount	1548.51	3036.65	68.51	40000
female	0.4	0.49	0	1
age	31.23	6.69	19	56
married	0.53	0.5	0	1
single	0.43	0.5	0	1
divorced/separated	0.04	0.19	0	1
health status: poor	0.07	0.25	0	1
number of siblings	2.12	1.95	0	9
parents: age	58.67	8.57	39.5	84
parents: health status: poor	0.41	0.49	0	1
parents live in same district	0.68	0.47	0	1
number of persons in HH	2.48	1.27	1	8
number of children in HH	0.71	0.98	0	4
years of education	12.01	2.85	7	18
years of education (squared)	152.29	76.62	49	324
equivalent income (in 1000)	18.14	9.9	2.72	84.33
parents: equivalent income (in 1000)	15.31	8.27	2.02	56.83
minus private transfers				
non-Christian religion	0.19	0.39	0	1
non-denominational	0.33	0.47	0	1
migrants	0.26	0.44	0	1
East Germany	0.15	0.36	0	1

Note: SOEP 1995-2004. N=269. All incomes in 1,000.