Title: Caring for dependent parents: altruism, exchange or family norm?

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Abstract

The purpose of this paper is to test alternative models of long-term caring motives. We consider three main motives: pure altruism, exchange and family norm. Our database is the second wave of SHARE (Survey of Health, Ageing and Retirement in Europe) which allows to link almost perfectly and with complete information children and their parents' characteristics. Comparing the empirical results to the theoretical models developed, it appears that, depending on the regions analyzed, long-term caring is driven by moderate

altruism or by family norm, while Alessie et al. (2014), also using SHARE data, stress the importance of exchange motive in intergenerational transfers.

I. Introduction

In assessing the adequacy of the financing and provision of long-term care (LTC), it is important to bear in mind the extent to which countries will be able to rely on the informal provision of care to the elderly in the future. The bulk of long-term care is indeed provided informally. Informal provision has no direct bearings on public finances but it is not clear whether such a situation is desirable or, in any case, will last. Family solidarity is very uneven and its propensity to provide care could diminish due to changes in family structure and growing participation of women in the labour market, which may constrain the future provision of informal care within households. Besides the uncertainty of informal care, another issue that has been overlooked for obvious reasons is whether informal care is motivated by either altruism or exchange, or by family norms. The difference between the two is important. Altruistic caring or caring that is based on an implicit exchange contract are voluntary whereas informal caring induced by family norm is constrained and as such does not necessarily bring utility to the caregiver and may even have negative psychological and physical implications. In other words informal caring that is triggered by either altruism or exchange motives has a positive social value and can be encouraged by the government, but when it is founded on a social norm it can have a net negative social value and thus should not be fostered by public action.

There exists a growing literature trying to assess the collateral costs that informal caring can represent for the caregivers. Some, as Pollack (1985), found significant advantages in care given by family members. Tarlow et al. (2004) discovered that most caregivers of persons with dementia perceive their experience of help as positive and satisfying. The feeling of utility and necessity prevails. Moreover, caregiving would enable helpers to better enjoy life and strengthen their relationships with others. Finally, Brown et al. (2003) showed that mortality was significantly reduced for individuals who reported providing instrumental support to friends, relatives, and neighbours, and individuals who reported providing emotional support to their spouse. However, several studies have also highlighted that caregivers bear large opportunity costs because of care responsibilities (e.g. Van Houtven et al., 2013). Furthermore, informal care may have adverse effects on multiple dimensions of health of the caregivers (Schultz et al., 1995; Pinquart and Sörensen, 2003; Vitaliano et al., 2003). The detrimental effects related to the physical aspect are generally less intensive than the psychological effects. (Schultz and Sherwood, 2008). Hirst (2005) and Burton et al. (2003) showed that moving into a demanding caregiving role (more than 20 hours per week of help for dealing with basic ADLs) led to an increase of depression and psychological distress, impaired self-care and poorer self-reported health.

A conjecture that would need testing is that those costs depend closely on the motives underlying caring. The purpose of this paper is less ambitious. It is to use the SHARE data to test the motives of informal caring in a number of European countries. To do so we start by sketching simple models of long-term care provision within the family, which results into testable hypotheses regarding caring motives. Then we use the SHARE information regarding the effect of parental and filial resources on two key variables: the level of informal long-term care and the amount of *inter-vivos* transfers, which the parent may have left to his child. Section II refers to the existing literature. Section III presents the theoretical models. Depending on the hypothesis of substitutability or complementarity between informal and formal care, the conclusions vary. Section IV focuses on the presentation of data and sample construction. Some descriptive statistics about the two main explanatory variables (wealth of the parents and education of their children) are explained. Section V presents the empirical results that determine the type of relationship between parents and children. Findings are presented on the whole sample but also by groups of countries (North, Center, South and East). Tobit models are applied after the two-part models (which allow the separation of behavior into two stages: first, help/transfer or not, and second, how much conditional on help/transfer) are rejected. It appears, applying empirical results to theoretical models that, depending on the regions analyzed, family norm or moderate altruism play a role in long-term caring motives. This is to be contrasted with Alessie et al. (2014) who stress the importance of exchange motive in intergenerational transfers and do not consider the impact of the social norm. Our empirical results tend to reject the exchange motive. Numerous robustness tests have been carried out. Section VI concludes.

II. Literature

Different family transfer models have been widely studied in the literature. According to the real motivations for family solidarity, the emergence of private or public scheme of LTC insurance will have different impacts on transfers (assistance and bequests or *inter-vivos* gifts). Three main types of motivations are often discussed. Cremer et al. (2012) mention that “the fairy tale view of children or spouses helping their dependent parents with joy and dedication” has for a long time been adopted. This is called pure altruism. However, they observe that this solidarity is also often based on social norm or strategic considerations (forced or reciprocal (exchange) altruism). Pure altruism, exchange and family norm are modeled with variations depending on the authors. Strategic self-interest, family constitution or preference shaping are widespread in the literature (Cigno, 1993, Cigno et al., 2006). Beyond the question on family motivations, two types of models of family decision-making are usually considered in economics (Bianchi et al., 2008). The most dominant is the unitary model where the head of the family makes all decisions and does it in the best interest of the family members (Becker, 1974). Besides, the more recent theoretical literature considers each family member as unique (spouses, parents, siblings, children viewed as having their own preferences/bargaining powers). These are called collective models (Chiappori, 1988). The models proposed in Section III are unitary ones.

In the models of altruism, family members are concerned by other family members' welfare. Pure altruism denotes the willingness to make voluntary transfers of resources (time, money) to another person or other persons, disregarding of own benefit (Schwarze and Winkelmann, 2011). For a transfer to exist, the members of the family have to be separate entities. However, Laferrère and Wolff (2006) highlight the length of the process of separation from parents. Indeed, it takes place gradually with a child who studies, marries, maybe divorces (potentially temporarily goes back to live with parents). In our models, we assume that children are not co-residing with their parents. Our empirical results concern only relationships between children and parents who do not live under the same roof. Pure altruism leads parents to provide more to their less well-off children. Pure altruism implies children take care of their dependent parents, regardless of required time. Cigno et al. (1998) illustrate pure altruism with the example of two people altruistic towards each other. If the same value is given to the consumption of one or the other person by each of them, both will pool their incomes and the poorer of the two will be subsidized by the richer.

Some family members may be altruistic while others would rather be selfish. Glazer and Kondo (2015) illustrate this case by a child who may want to get a large transfer from his parents, even if that impoverishes his parents and even if the transfer comes at the expense of reduced transfers to his brothers and sisters. The economics literature has highlighted the importance of bequests in challenging the altruism explanation developed by Becker (1974). In reciprocity altruism (exchange), parents could give a larger bequest to the most caring child. The exchange model implies interactions where "each member has his/her own objectives (preferences) and resources (sources of power) and each member can potentially improve his/her well-being by engaging in trades of different goods and services so as to maximize individual well-being" (Bianchi et al., 2008). The classic paper by Bernheim et al. (1985) on strategic bequests shows that parents can threaten to disinherit their children to force them to take care of them, presupposing that the dependent elderly has sufficiently good cognitive skills (Cremer et al., 2012). Parents can thus voluntarily try to buy children's attention. Even if Perelman and Pestieau (1992) proved that bequest motives influence the composition of household's wealth, bequests can also arise only because of uncertainty about life expectancy (Laferrère and Wolff, 2006). By contrast and not accidentally (especially since the vast majority of parents do not disinherit their children), *inter-vivos* gifts are always voluntary and allow more redistribution, although they are generally smaller and not always registered. Hence the choice of considering *inter-vivos* transfers in our theoretical and empirical analyses. It is not necessary that the transfers are reciprocated at the same time (Bianchi et al., 2008). Transfers can be compensated at a much later date and in different ways. For instance, parents pay tuition fees for their children or help them to buy an apartment, and in return expect regular visits and assistance in their old days in case of dependency.

The last potential motive of transfers is family norm (forced altruism). Canta and Pestieau (2014) focus on the case where care is provided to dependent parents by children out of

some norm inculcated during their childhood. Children have the feeling they are compelled to take care of their parents (beyond the legal rules enacted in different countries).

Empirical tests of family motivations are abundant and varied. Based on data on Italian households, Cigno et al. (1998) reject the altruistic and the simple exchange models as well as the one based on the preference-shaping utility. The strategic self-interest model is not rejected by the data. Schwarze and Winkelmann (2011) propose a direct measure of altruism between parents and children using German data (GSOEP). This measure is based on self-reported happiness as a proxy for utility. They find evidence for interdependent preferences. Alessie et al. (2014), using SHARE data, investigate the motives of intergenerational *inter-vivos* time and money transfers. The empirical evidence rejects pure altruism in favor of exchange. However, Laferrère and Wolff (2006) conclude that transmission practices are more in accordance with the existence of family demonstration or education mechanisms. Children help their parents if the latter have themselves provided care to their own parents (see Laferrère and Wolff (2006) for a large review of the empirical US and European literature). The objective of our research is to bring new results to the question of motivation, with the idea of continuing opening the family black box.

Indeed, depending on intergenerational support reasons, impacts of public policies can widely vary. A well-known implication of altruism is that redistribution is ineffective since public transfers will crowd out private transfers (Becker, 1974). Alessie et al. (2014) discuss the effectiveness of formal care provision as a substitute for informal care and the impact of taxation. As the exchange motive seems to prevail, they conclude that a higher tax rate on intergenerational monetary transfers is likely to increase the demand for formal care (because of the potential decrease of informal care), thus increasing public spending on health care. Glazer and Kondo (2015), in the case of altruism, show that governmental transfers restricting reallocations from a person who saves much to the one who saves little reduce the effect of the so-called Good Samaritan Dilemma and lead to a Pareto-superior outcome than the equilibrium without government taxation and transfers. Cigno et al. (1998), highlighting the strategic self-interest motive in intergenerational agreements, advocate that a modest redistribution programme could be effective to address credit issue. Others study family solidarity in a dynamic world. Canta and Pestieau (2014) develop an OLG model with traditional and “modern” agents. They find two reasons for public action: redistribution and correction for the inefficiency in the child’s choice. Finally, Ponthière (2013) shows that the crowding out effect is not certain when State provides LTC to dependent persons who cannot rely on their children. Even if some models can be simplistic and lead to contradictory conclusions in terms of public policies, their different predictions can be testable to a certain extent. While we are in a crisis of both family (see section I) and public transfers, it is essential to understand the motives of interactions within the family.

III. Simple models

There exist many ways of modelling intergenerational transfers. Here we choose unitary models wherein a parent interacts with a child. The parent can offer some financial benefit whereas the child can provide informal care. The substitutability or complementarity between informal and formal care matters for the comparative statics. We consider three motives for caring: altruism, exchange and family norm. As it will appear, it is not always possible to discriminate their predictions.

III.1. Altruism

We assume a two-sided altruism with partial altruism of the child. The child's own utility depends on a single argument, c, his private consumption. It is represented by a strictly concave function: $u(c)$ where

$$c = (1 - a)w + b$$

w is the wage rate;

a, the time spent caring;

b, the transfer from the parent;

$1 - a$, the labor supply.

The parent's own utility is represented by a quasi-concave utility function $H(m, a)$ with two arguments: m, formal care and a, informal care. Formal care comprises the parent's wealth, y, minus b. We can now write the full utility of both the child and the parent:

$$U_c = u((1 - a)w + b) + \alpha H(y - b, a)$$

and $$U_p = H(y - b, a) + \beta u((1 - a)w + b)$$

where α and β are respectively the child's and the parent's altruism parameters with $0 < \alpha \leq 1$ and β = 1 as the parent is assumed to be perfectly altruistic. In other words, we assume that the parent is always perfectly altruistic whereas the child might or might not be a perfect altruist. We will discuss these two cases separately where relevant.

We assume that the parent moves first and chooses b. Then the child chooses a. Moving backward, we first look at the first order condition of the child's choice:

FOC: $\Delta = \frac{\partial U_c}{\partial a} = -u'(c)w + \alpha H_a(m, a) = 0$

From this, we obtain the effect of b on a:

$$da/db = \frac{-u''(c)w - \alpha H_{am}(m, a)}{-\Delta_a}$$

where $\Delta_a < 0$ is the second order condition of the child's choice.

One easily checks that $\frac{da}{db} > 0$ if $H_{am} \leq 0$, that is, if formal and informal care are substitutes or independent of each other. In case of complementarity, namely if $H_{am} > 0$, we could have $\frac{da}{db} < 0$.

The intuition for these results is as follows. The first term in the numerator of $\frac{da}{db}$ is always positive and calls for increasing a when b increases. Indeed, when b increases, the child becomes wealthier (and can consume more) and therefore values less the consumption lost due to an additional hour of care provision. The second term reflects the fact that the child cares about the utility of the parent and its sign depends on whether formal and informal care are substitutes or complements. An increase in b lowers the parent's wealth available to pay for formal care. If formal and informal care are substitutes, a decrease in formal care calls for increasing the amount of informal help and thus the second term is positive just like the first one. The overall effect is therefore clearly an increase in a. We also have a clear increase in a if formal and informal care are independent of each other, in which case the second term is zero and the result is driven only by the first term.

On the other hand, if formal and informal care are complements, a decrease in formal care due to an increase in b calls for reducing informal care as well. The second term in the numerator is then negative and the overall effect is ambiguous. Thus, both $\frac{da}{db} > 0$ and $\frac{da}{db} < 0$ are possible.

Turning to the parent's decision, we obtain the first order condition:

$$\Lambda = -H_m + u'(c) + [H_a - u'(c)w]\, da \,/\, db = 0$$

or, taking into account the child's first order condition,

$$\Lambda = -H_m + u'(c) + [(1-\alpha)H_a]\, da \,/\, db = 0$$

Note that if the child is perfectly altruistic (i.e. $\alpha = 1$), the third term in the parent's first order condition disappears. Indeed, if $\alpha = 1$, both the parent and the child maximize exactly the same utility function (which is the sum of their individual utilities) and therefore the child's choice of informal care is exactly the same as the one wanted by the parent. There is thus no need for the parent to "correct" the child's choice by using his transfer. In that case, the parent simply chooses the transfer so as to equalize his child's and his own marginal utilities. On the other hand, if the child is imperfectly altruistic (i.e. $0 < \alpha < 1$), his chosen level of informal care is lower than wanted by the parent since the parent's utility is not fully taken into account. In that case, the parent wants to "correct" the child's choice and thus chooses his transfer accordingly. For instance, if $\frac{da}{db} > 0$, the parent chooses a higher transfer than he would choose if the child was perfectly altruistic since now the transfer has an

additional role, that is, to foster informal care. In contrast, if $\frac{da}{db} < 0$, informal care is fostered by choosing a lower transfer.

We now use Δ and Λ and the second order conditions $\Delta_a < 0$ and $\Lambda_b < 0$ to obtain the following comparative statics:

- $\frac{da}{dw} = \frac{-u'(c) - wu''(c)(1-a)}{-\Delta_a} \gtreqless 0$
- $\frac{da}{dy} = \frac{\alpha H_{am}(m,a)}{-\Delta_a} \gtreqless 0$ (> 0 if $H_{am} > 0$, < 0 if $H_{am} < 0$ and = 0 if $H_{am} = 0$)
- $\frac{db}{dw} = \frac{(1-a)\, u''(c) + (1-\alpha) H_a \frac{d(da/db)}{dw}}{-\Lambda_b} \gtreqless 0$
- $\frac{db}{dy} = \frac{-H_{mm} + (1-\alpha)\, H_{am} \frac{da}{db} + (1-\alpha)\, H_a \frac{d(da/db)}{dy}}{-\Lambda_b} \gtreqless 0$

Let us now discuss these results. The impact of an increase in the child's wage rate on the amount of caregiving ($\frac{da}{dw}$) can be decomposed into two effects. The first effect (reflected by the first term in the numerator) is the substitution effect: an increase in the wage rate is an increase in the child's opportunity cost of caregiving (every additional hour of care provision now costs more in terms of what is lost by not working on the labour market), and this pushes the child to provide less care. The first term in the numerator is thus negative. The second effect (reflected by the second term in the numerator) is the income effect: an increase in the wage rate means that, at any given level of labour supply, the child now earns more than before. This allows him to reduce his labour supply and thus to increase care provision. The second term in the numerator is therefore positive. Taken the two effects together, it is not clear which one of them prevails, which means that the total impact can be positive or negative, or even zero if the two effects compensate each other.

The way the child's caregiving is affected by an increase in the parent's wealth ($\frac{da}{dy}$) depends on whether formal and informal care are substitutes, complements or independent of each other. When the parent becomes wealthier, he can afford buying more formal care. If formal and informal care are complements, he then also values more the informal care provided by his child. Since the child cares about the utility of the parent, the increase in the parent's valuation of informal care induces him to enhance his caregiving. On the other hand, if formal and informal care are substitutes, a rise in the parent's wealth and thus in the amount of formal care decreases the parent's valuation of informal help, which induces the child to reduce his care provision. Finally, if formal and informal care are independent of each other, an increase in formal care does not change the parent's valuation of informal aid and thus the child does not adjust his caregiving.

Let us now turn to the impact of an increase in the child's wage rate on the parent's transfer ($\frac{db}{dw}$). The first term in the numerator of $\frac{db}{dw}$ is negative: since the child starts earning more, there is less need for the parent's financial support and this pushes for lowering the transfer.

If the child is perfectly altruistic (i.e. $\alpha = 1$), this is the only effect that an increase in w has on b, which means that the sign of $\frac{db}{dw}$ is clearly negative. However, if the child is imperfectly altruistic (i.e. $0 < \alpha < 1$), another effect comes into play as well. Since, as discussed above, in that case the parent wants to "correct" the child's choice of informal care, it has to be considered that an increase in the child's wage rate also affects the way in which the child adjusts his caregiving in response to the parent's transfer (i.e. $\frac{da}{db}$ also depends on w). It can be verified that the sign of $\frac{d(da/db)}{dw}$ is generally ambiguous and therefore different situations are possible. If $\frac{d(da/db)}{dw} < 0$ (i.e. an increase in the child's wage rate induces him to increase his caregiving by less (if $\frac{da}{db} > 0$) or to decrease it by more (if $\frac{da}{db} < 0$) when the parent's transfer goes up), the second term in the numerator of $\frac{db}{dw}$ is negative and pushes for lowering the transfer. Indeed, if an increase in w makes the transfer less successful (or more unsuccessful) in fostering informal care, the transfer should be reduced. In that case, the overall sign of $\frac{db}{dw}$ is clearly negative. On the other hand, if $\frac{d(da/db)}{dw} > 0$ (i.e. an increase in the child's wage rate induces him to increase his caregiving by more (if $\frac{da}{db} > 0$) or to decrease it by less (if $\frac{da}{db} < 0$) when the parent's transfer goes up), the second term in the numerator is positive and pushes for a higher transfer. In that case, the overall sign of $\frac{db}{dw}$ is ambiguous. If the positive effect on $\frac{da}{db}$ is large enough (i.e. if an increase in w makes the transfer sufficiently more productive (or sufficiently less unproductive) in eliciting care from the child) and/or the degree of the child's altruism is sufficiently low (so that "correcting" his choice of caregiving is considerably important for the parent), the second term might outweigh the first one and the sign of $\frac{db}{dw}$ might turn positive.

Finally, let us look at how the parent's transfer is impacted by an increase in his wealth ($\frac{db}{dy}$). If the child is perfectly altruistic, there is only one effect playing a role: a wealthier parent can afford giving more financial support to his child and he thus increases his transfer. This is reflected by the positive first term in the numerator of $\frac{db}{dy}$. If the child is not perfectly altruistic, then the fact that his caregiving is insufficient needs to be taken into account and this results in additional effects coming into play. First, an increase in the parent's wealth changes his appreciation of informal care: a wealthier parent can afford more formal care and, depending on whether formal and informal care are substitutes or complements, his marginal utility of informal aid either decreases or increases. The effect on his transfer then also depends on whether the child's caregiving is increasing or decreasing in the amount of the transfer. This effect is reflected by the second term in the numerator. For instance, if formal and informal care are substitutes (i.e. $H_{am} < 0$), the child's caregiving is always increasing in the transfer (i.e. $\frac{da}{db} > 0$), which means that the second term is negative and pushes for lowering the transfer: since the parent's valuation of informal care decreases, he

has less need to use the transfer for eliciting the child's aid. If formal and informal care are complements, both $\frac{da}{db} > 0$ and $\frac{da}{db} < 0$ are possible (see the discussion above), which means that the second term might be positive or negative. In addition to this, an increase in the parent's wealth also affects $\frac{da}{db}$, and this is reflected by the third term in the numerator. The sign of $\frac{d(da/db)}{dy}$ is generally ambiguous and, similarly to the discussion of $\frac{d(da/db)}{dw}$, different situations are possible. Thus, overall, when the child is not perfectly altruistic, the sign of $\frac{db}{dy}$ is not clear and both $\frac{db}{dy} > 0$ and $\frac{db}{dy} < 0$ are possible, while with perfect altruism we clearly have $\frac{db}{dy} > 0$.

III.2. Exchange

We now assume that there is a market for assistance at price p. The parent and the child behave like agents who respectively demand and supply a. The child maximizes

$$u(w(1-a)+pa)$$

This gives an infinitely elastic supply function for a at $p = w$.

The parent maximizes

$$H(m,a) \;=\; H(y-pa,a)$$

This yields the FOC:

$$-H_m p \;+\; H_a \;=\; 0$$

From this condition, one obtains a demand function $a(p)$ such that

$$da/dp = \frac{-H_m \;+\; H_{mm} pa \;-\; aH_{am}}{-\Delta_a}$$

The first two terms in the numerator unsurprisingly push for lowering the demand for assistance when its price goes up. The sign of the third term depends on whether formal and informal care are substitutes or complements. It can be easily checked that $\frac{da}{dp} < 0$ if $H_{am} \geq 0$. Indeed, an increase in the price of the child's assistance leaves the parent with fewer resources to buy formal care. If formal and informal care are complements, a decrease in formal care also pushes for a decrease in informal help and thus the third term in the numerator goes in the same direction as the first two terms. If $H_{am} < 0$, the third term is positive since a decrease in formal care calls for increasing informal aid. Then the expression is generally ambiguous. For it to turn positive, however, we would generally need a very large absolute value of H_{am} (that is, a very high degree of substitutability between formal and informal care), which does not seem to be very likely. We thus expect $\frac{da}{dp} < 0$ to hold.

Nevertheless, to give the model all its chances and not to miss any possibilities, we keep the case of $\frac{da}{dp} > 0$ under consideration as well.

Quite clearly the equilibrium price is $p = w$. We can obtain from the FOC the impact of y and w on a and b. Note that here b is simply the amount paid for a, namely $b = wa$.

For the impact of y we get:

- $da/dy = \frac{-H_{mm}p + H_{am}}{-\Delta_a} > 0$ if $H_{am} \geq 0$ (otherwise ambiguous)
- $db/dy = w(da/dy) > 0$ if $H_{am} \geq 0$ (otherwise ambiguous)

When the parent becomes wealthier, he can afford buying more care from the child. This is reflected by the positive first term in the numerator of $\frac{da}{dy}$. However, at the same time, he can also afford more formal care. If formal and informal care are complements, an increase in formal care increases the parent's valuation of informal aid and thus reinforces his demand for the child's assistance ($\frac{da}{dy}$ is clearly positive). On the other hand, if formal and informal care are substitutes, the valuation of informal aid is decreased and thus pushes for demanding less assistance. In that case, the overall sign of $\frac{da}{dy}$ is not clear.

It is important to note that, since b here is simply a linear function of a, the sign of $\frac{db}{dy}$ directly depends on the sign of $\frac{da}{dy}$, which means that in this model the two signs always coincide. This will appear to be crucial for the interpretation of our empirical results.

For the impact of w, we should first note that a change in w changes the equilibrium price of informal care. The equilibrium quantity of a is then equal to the parent's demand at this price. Therefore, the impact of w on a coincides with the impact of p derived above, that is,

- $da/dw = da/dp < 0$ if $H_{am} \geq 0$ (otherwise ambiguous)

The impact on b is then as follows:

- $db/dw = a + w(da/dw) \gtreqless 0$

On the one hand, an increase in the price of informal care means that the parent has to pay more for the amount of care he buys (the first term of $\frac{db}{dw}$); on the other hand, the demand for informal care is reduced (the second term). It is thus overall not clear whether the parent's total payment increases or decreases when the child's wage rate goes up.

III.3. Norm

We now assume that the child has to provide an amount of care $\bar{a}$ that is determined by the tradition and the culture of the social environment, by some family norm. It is likely that this level is higher than what he would freely choose.

Unsurprisingly, we clearly have that:

- $(d\bar{a})/dw = 0$
- $(d\bar{a})/dy = 0$

As to the parent, his objective is to maximize

$$U_p = H(y-b, \bar{a}) + \beta u\big((1-\bar{a})w + b\big)$$

The parameter β reflects the extent of descending altruism. If $\beta = 0,\ b = 0$. In other words, if the parent is not altruistic, he will not make any transfer since his transfer has no effect on the child's aid which is determined by the norm. In that case, all the comparative statics will simply be equal to zero.

If $\beta > 0$, namely the parent is concerned by the welfare of his child, then the first order condition is:

$$\Lambda = -H_m(y-b, \bar{a}) + \beta u'\big((1-\bar{a})w + b\big) = 0$$

Hence,

- $db/dw = \frac{\beta(1-\bar{a})\, u''(c)}{-\Lambda_b} < 0$
- $db/dy = \frac{-H_{mm}(m,\bar{a})}{-\Lambda_b} > 0$

The signs of $\frac{db}{dw}$ and $\frac{db}{dy}$ in this case actually coincide with their signs in the model of altruism when the child is perfectly altruistic. As in that case, the parent decreases his support when the child starts earning more and increases it when he himself becomes wealthier. This is, however, different from the case of an imperfectly altruistic child where, as discussed before, the parent needs to make "corrections" of the child's caregiving choice. Such "corrections" are not made neither in the case of the norm nor in the case of a perfectly altruistic child, but for slightly different reasons. When the child is perfectly altruistic, he chooses exactly the amount of care the parent wants and there is thus no need for the parent to "correct" it. In the case of the norm, the child's caregiving is determined by the social environment and therefore is not affected by the parent's transfer. The amount of care determined by the norm might or might not be the one which is optimal for the parent.

The findings of the theoretical models are summarized in Table 1. In particular, Table 1 summarizes the comparative statics $\frac{da}{dy}, \frac{da}{dw}, \frac{db}{dy}, \frac{db}{dw}$ predicted by each of the models. The aim of the empirical part of our paper will be to test empirically the signs of these four derivatives in order to verify which of the theoretical models is the most compatible with the data. As it can be seen from Table 1, the predictions of the theoretical models are not always unambiguous and the signs of some derivatives might coincide for several models. For this

reason, our strategy primarily consists in considering each model "as a whole", that is, considering together both the parent's and the child's side and requiring compatibility between the theoretical and empirical signs for all the four derivatives in question as well as paying a particular attention to verifying whether no contradictions arise. As it will be seen in the analysis, this will appear to be particularly important in the case of the model of exchange where the model's predictions might (to some extent) be compatible with the empirical results if the parent's and the child's decisions are analyzed separately but as soon as the two sides are considered together, it becomes evident that the empirical findings in fact contradict the model.

We are able to consider the models as a whole since, as will be explained below, we use a single sample where the information about children and their parents is linked, which is not the case in Alessie et al. (2014) who use separate samples for children and for parents.

Insert Table 1 here

Table 1: Summary of theoretical models

IV. Data and sample

SHARE, the Survey of Health, Ageing and Retirement in Europe, is a free-access database created in 2002 in order to study the phenomenon of Ageing in Europe. The survey, inspired by HRS & ELSA (USA & UK counterparts), brings together many disciplines (epidemiology, economics, sociology, psychology and demography). The survey is large (more than 85,000 individuals aged 50+ interviewed in the first four waves) and longitudinal. We use in this paper the 6th release of the second wave of the survey, conducted in 2007. We do not use a more recent wave[1] because only wave 2 links information on informal care and financial transfers between adult children and their parents. In addition, the information relative to the amount of informal care (hours per month) provided by children is available for this second wave[2]. Table 2 summarizes the two relevant questions. We are now able to know exactly if a child has taken care of his (her) parents and if a child has received or not financial transfers from his (her) parents.

Insert Table 2 here

Table 2: Interest variables from SHARE wave 2 questionnaire

[1] The 6th wave ended at the end of 2015.

[2] Data are also available for the first wave of SHARE conducted in 2004 but this wave contains fewer observations and fewer countries, hence the decision to study only the second wave.

IV.1. Sample selection criteria

SHARE questions people aged 50 and over. Their partner is also interviewed if agreed but some questions (financial and children issues for instance) are only posed to one of the two. The reason is to avoid wasting time and to have higher response and retention rates. Whereas Alessie et al. (2014) used two different samples[3], we created only one sample from information obtained on respondents' children. Our base sample therefore consists of respondents' children for whom accurate information about their age, gender, location, marital status, employment status, level of education and number of siblings is available[4]. In the main models, we duplicated the information about children, help and transfer to the partner not interviewed on these issues[5]. Indeed, it seemed reasonable to assume that the aid received will benefit the entire household and that financial transfers are a common decision. However, monthly hours of help and the total amount of gifts were shared equally among partners in order to not overestimate the ascending and descending flows. Regarding the informal support received and financial transfers made by parents from/to their children, three people[6] are potentially nameable by respondents in each case. In SHARE, information regarding the amount of informal care received (financial transfers given) is collected for only up to three potential informal caregivers (receivers). So, if the respondent has more than three caregivers (receivers), it is possible that our variable of informal care (financial transfer) underestimates the amount of informal care (financial transfer) provided (given) by (to) all the children (and the children's spouse and their children). Of the 33,132 respondents (parents in our model), 29.7%[7] reported having made a financial donation of more than 250 euros in the last 12 months. 11,704 children received a transfer from their parents, which is equivalent to 74.4% of all recipients[8]. Looking into informal help, 20.9%[9] of the 33,132 respondents declared having received help from outside the household. 5,067 children provided informal help to their parents, which is equivalent to 49.2% of all suppliers[10]. Finally, information about the health, education, gender, age, marital status of

[3] They built two different samples: the one in which they consider the respondents as parents (the "young" sample) and the one in which they consider the respondents as children (the "old" sample). They 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.

[4] Among the 33,132 respondents considered in Wave 2, 29,655 declare having at least one child while 3,178 report not having one. There are 299 missing values (due to a refusal to answer). In addition, this complete information is available on up to *four* children in a household. That represents 93.3% of households for which complete information on all their children is available.

[5] As explained previously, only one household member is interviewed about the children and/or step-children, financial transfers and help received to reduce the duration of the interview.We also focus our analysis on single respondents in order to not have this duplication issue. See section V.4: Robustness tests.

[6] That can be children, but also partner, other relatives, friends, and so on.

[7] 412 respondents refused or did not know the answer (1.2%). 69.1% declared not having made a transfer.

[8] The other transfers recipients are: Family for 21.4% and other relationships 4.2%

[9] 258 respondents refused or did not know the answer (0.8%). 78.3% declared not receiving informal help.

[10] The other care suppliers are: Family other than children (nephew, niece, uncle, etc.) for 20.3%, children-in-law 6.9% (unfortunately, no complete information on their characteristics is available) and other relationships 23.6%.

respondents and the presence of cohabiting child in the household is collected at the individual level while wealth is collected at the household level.

A panel of children is now built and allows testing both ascendant (help) and descendant (gift) flows on this unique children-file, bringing symmetry to the issue we try to address. The questions and answers to these questions in SHARE are very specific; we know exactly which child helped his parent and which child received a transfer from his parent. The sample is now composed of the children of the respondents, with some who help their parents, others who receive transfers from them, some who help and who receive money and a majority who does not help and does not receive anything. There are 69,069 children in the sample (from 19,852 households) but since the goal of the research relates in part to informal care and because the population aged 65 or older is more at risk of dependency (OCDE, 2013), the sample selected will be the entirety of children whose at least one parent is more than 65 years old. There remain 32,637 children in the sample from 10,216 households. We also drop from the sample the children still living with their parents in order to conduct our analyses only on non-cohabiting children. This corresponds to 2,377 children now withdrawn from the sample. However, we keep the information on the presence of a cohabiting child in the household.

Once we remove the children for whom the information is not complete[11], our final sample consists of 28,780[12] children (from 9,471 households) coming from 13 countries: Austria (AT), Germany (DE), Sweden (SW), Netherlands (NL), Spain (ES), Italy (IT), France (FR), Denmark (DK), Greece (GR), Switzerland (CH), Belgium (BE), Czech Republic (CZ), Poland (PL). 3,455 children received a financial gift from a parent (12.0%) while 3,109 children provided informal help to a parent (10.8%). There are differences in the propensity to help or to receive money and the intensity of these actions depending on countries.

IV.2. Variables and descriptive statistics

As mentioned above, the aim of the empirical analysis is to test the signs of four relationships predicted by the theoretical models. In these relationships there are two dependent variables, namely, the child's informal help and the parent's financial transfer (a and b in the theoretical models). In the empirical analysis, we focus on the ascending help and downward transfers that cover a year of respondents' life (last 12 months in the question). Even if our results are thus like a window into people's life, we suppose that the size of the sample (more than 28,000 children) allows thinking that many circumstances of life are encountered and evoking long-term behavior.

[11] 1107 children with missing information about age, 446 with employment status, 380 with education level, 121 with siblings, 231 with location, 652 with level of parent education, 58 with health status of parent.

[12] The sum of missing information is not equal to the difference between 32,235 and 31,416. Indeed, the sum is equal to 2,995 when the difference is only 1,480. This is because some missing information relates to the same child.

Table 3 details the information on the two dependent variables. The first column **Help (%)** gives the percentage of children caring while the column **Transfer (%)** indicates the proportion of children receiving *inter-vivos* transfers. Parents are once assistance beneficiaries, once financial donors. We can note the heterogeneity of the propensity for aid and transfer between countries. 30.3% of Czechs children declare helping their parents when they are only 4.9% in the Netherlands. 2.6% of Spanish children received a transfer from their parents when they are almost 20% in Sweden. Besides, we note that in the Southern and Eastern countries, the intensity of care (in hours) seems more important once we consider children who help. While Danish or Dutch children helpers support their parents less than 11 hours per month on average, Italian, Spanish and Greek caregivers spend more than 33 hours per month on average caring for their parents. The North/South-East gradient is present. The countries of Central Europe (France, Germany, Belgium, Austria and Switzerland) are in between, as the Eastern ones. For the amount of financial transfers, the gradient appears to exist but it is less clear than for informal care. Indeed, Italian parents approach the French behavior while Swiss and particularly Belgian parents seem more "generous" than their counterparts from Northern Europe. This first look at raw data seems to be confirmed when we dwell on medians and last deciles conditional to a transfer. We note also that the average is greater than the median, meaning many children help a few hours and many parents make low financial transfers.

Insert Table 3 here

Table 3: Informal Help (hours per month) & Transfers (PPP euros)

The explanatory variables involved in the relationships to be tested are the parent's and the child's endowments, namely, the parent's wealth (y) and the child's wage rate (w). To use the first variable in the first part of empirical analysis (Descriptive figures 1 & 2), quartiles of parents' wealth were created by country on the initial base sample (50+). As far as the second variable is concerned, we use the child's education as a proxy for his/her wage rate. For the level of education of children, ISCED[13] 1997 classification is used in order to create 3 categories. The lowest one corresponds to children with at best a lower secondary degree. The medium level of education corresponds to ISCED 3 (upper secondary education) while the highest level matches post-secondary degrees[14].

[13] ISCED: *International Standard Classification of Education* was created by UNESCO in order to facilitate comparisons of educations statistics and indicators across countries.

[14] "Low" is from ISCED 0 (pre-primary education) to 2 (lower secondary or second state of basic education) through 1 (primary education or first stage of basic education) when "High" ranges from ISCED 4 (post-secondary non-tertiary education) to 6 (second stage of tertiary education) through 5 (first stage of tertiary education).

Table 4 provides some descriptive statistics of the two key explanatory variables as well as of some other independent variables that will be used in the econometric analysis for control. The first part of the table focuses on the characteristics of the parents (potential financial donors) in terms of average and median wealth, health limitations, age, gender, presence of a cohabiting child and couple status. The second part provides information concerning children (potential care providers) in terms of education, age, gender, employment status and distance from parent. Significant differences appear in wealth levels between countries. Children's places of residence also vary widely by country. At a roughly comparable country-scale, Italian, Spanish or Polish children are on average closer (more or less than 70 kilometers) to their parents than German, Swedish or French ones (over 100 km). Moreover and because of average differences in life expectancy, mothers are more represented (54.2%) in the sample (65+) than fathers while the parents' average age is 74.2 years. Children are 45.2 years old on average and there are almost as many men (50.2%) as women (49.8%) in the sample. The percentage of parents living in a couple varies from 56.0% in Austria to 79.6% in Spain. Focusing on cohabiting children, we can see that Italian, Polish and Spanish households seem more intergenerational (more than 20% of children still have a sibling living with their parents). The employment status of children varies between countries, with many children without work in the countries of the South and in Poland. In addition, data show that children who are not employed are the ones who help their parents the most (on average more than 6 hours per week versus less than 2 hours for child employed children). Finally, the differences between the education levels of children are very important. Indeed, children from South and East Europe have a low level of education. The reverse holds in North and Central Europe.

Insert Table 4 here

Table 4: Summary statistics of independent variables

If we have a first look at the relationship between informal care and the two explanatory variables, the descriptive statistics shown in Figure 1 seem to confirm the altruism of children in care provision. The poorer the parents are, the more care they receive from their children. This negative link between aid received and wealth of parents holds for all regions[15] except in the East where the link is not continuous. In parallel, first descriptive results suggest that the more educated the children, the less help they provide to their parents, which depending on our theoretical model can illustrate either altruism or exchange, not a norm.

[15] The negative link appears also when we only look at the people who have received help even if it is less strong.

Insert Figure 1 here

Figure 1: Informal help from children to parents

If we have a first look at the question of financial *inter-vivos* downward transfers, the descriptive statistics in Figure 2 seem to confirm, at first view, altruism or the role of the family norm for parents. The poorer the parents, the less money they transfer to their children. This positive link between transfer received and wealth of parents holds for all regions[16]. The exchange motive cannot be confirmed as the first descriptive results seem to be contrary to the proposed theoretical model. Indeed, the theoretical model of exchange implies the same type of relationship (either positive or negative) both between aid and the parents' wealth and between transfer and the parents' wealth, whereas the first descriptive results on the contrary suggest opposite relationships. In parallel, the first descriptive results suggest that the more educated the children, the more they receive from their parents, which according to our theoretical models can only illustrate exchange or altruism (in case where child is not perfectly altruist), not a norm. However, the same remark about the rejection of the exchange model must be mentioned.

Summing up, depending on the country, altruistic motives may be those behind help and transfers, even if the family norm could be a secondary driver. These first descriptive results from Figures 1 and 2 must be confirmed by a rigorous econometric analysis[17].

Insert Figure 2 here

Figure 2: Transfers to children from parents

V. Estimation results

The first empirical model consists in analyzing the effect of parents' and children's endowments, represented respectively by parents' wealth and children's education, on informal care provided by the adult children to their parents. Three types of informal care are considered: personal care, practical household help and help with paperwork, as mentioned in Table 2. The two-part model introduced by Duan et al. (1983), which applies the separation of behavior into two steps -first, the decision regarding providing informal

[16] The negative link appears also when we only look at the people who have made a transfer even if it is less strong.

[17] These initial results are a bit contrasted in the case of a sample of children whose parents have no more / no partner. See table A.1. in Appendix. That is why we analyze this particular sample in a specific way.

care to parents (the extensive margin), and second, a decision regarding the level of this help (the intensive margin), conditional on providing any- was considered, but finally dropped since our theoretical models only deal with the intensive margin. That is why we opted for the Tobit model, a model where the dependent variable is continuous but is observable on a certain interval. Thus, these are models that lie halfway between the linear regression models where the endogenous variable is continuous and observable and the qualitative models. More formally, if we consider N couples of variables (X_i, Y_i^*) where the variable Y_i^* is such that $E[Y_i^*|X_i] = X_i\theta$ (where θ is a vector of parameters), the linear model is perfectly adapted to the situation. Unfortunately, and as for qualitative variables, the variable $Y_i^*$is a latent variable which is not always observable. We can observe it only if its value is higher than a threshold c. It is thus possible to build an observable variable Y_i which is equal to Y_i^* when this one is observable and which is equal to c by convention when Y_i^* is not observable. The Tobit models are censored models: contrary to Y_i^*, we observe X_i for the whole sample[18].

The second model focuses on the impact of parents' and children's endowments on transfers received by adult children from their parents. These financial transfers are higher than 250 euros in the last twelve months. A two-part model was also considered but also dropped because the theoretical models explain the intensive margins. A Tobit model is thus applied. For the two considered models, we take the logarithm of $(1 + variable)$ to deal with high values of hours of help and amount of transfers and the indeterminacy problem of the logarithm of zero (some children do not help their parents and do not receive financial transfer from their parents).

These two analyses are conducted on the entire sample, but also on groups of countries (Northern, Central, Southern and Eastern Europe). Heckman selection model was also considered but no obvious exclusion restrictions were available. Future research should address this problem, as well as the issue of endogeneity. Indeed, the question of simultaneous care and transfers is not directly tackled. We conduct two reduced models and the combination of the results allows us to draw a conclusion about the motives of intergenerational family ties. These empirical analyses are carried out on the whole of the selected sample but also only on the children whose parents are single since descriptive results seem to show differences between the two cases. In the models, the parent's wealth variable is a continuous variable built on wealth deciles while the education of the child variable is also a continuous variable based on 7 categories of ISCED codes (from 1, lowest to 7, highest). In order to perfectly follow the theoretical models, we took the option to run the "help model" and then the "transfer model" twice. Indeed, in the theoretical models, we look at the comparative statics between the help offered/transfer made and the wealth of the parent when the wage of the child (proxied by education) is fixed and the comparative statics between the help offered/transfer made and the wage of the child when the wealth

[18] This property challenges the assumption of linearity and shows that the ordinary least squares are not the relevant method for estimating such a relationship.

of the parent is fixed. We adopt exactly the same process in the empirical part, applying Tobit models but with dummies for children's education when we study the effect of the wealth of the parent on help/transfer and with deciles dummies for the wealth of the parents when we focus on the effect of the education of the child on help/transfer.

V.1. Main drivers of providing informal help

As mentioned previously, the first model focuses on drivers of hours of help provided by children to their parents. The dependent variable is the logarithm of (number of hours of help + 1). Table 5 summarizes the results in 5 columns when children from all types of households are considered. The results from the first regression (endowments of children are fixed) seem to indicate that the wealthier the parents, the less they will be helped by their children, except in the East where there is no effect. The results from the second regression (endowments of parents are fixed) concern the impact of education of the child, as proxy for his/her wage, and no clear and significant relation appears from the regression, regardless of the region considered. Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child. Coefficients associated to the covariates may slightly vary but the significativity does not.

Being a woman leads to offering (child side, except in the North) and receiving (parent side, except in the South and the East of Europe) more help. Other studies[19] have already highlighted the preponderant role of daughters in informal support to parents. And the higher life expectancy of women implies they are more likely to be helped (they are also more numerous in the sample, see Table 4). If the child still has a brother or sister who lives with his parents, he will help less.

Insert Table 5 here

Table 5: Tobit model of informal help (All)

Looking more specifically at the characteristics of parents more likely to be helped, age influences positively receiving care[20] while having a partner decreases it. The partner would be the first supplier of informal care. The level of help also seems to depend on the age of the caregiver. The older the child, the more care is provided. Finally, the location distance of potential caregivers and the fact that they have siblings (substitutes) negatively impacts the help offered.

[19] Daughters have been shown in numerous studies to be much more likely to provide care to elderly parents than sons, and to provide more care (Mellor, 2001).

[20] As dependency increases with age (OCDE, 2013), it seems normal that help received raises with age.

V.2. Main drivers of downward financial transfers

The second model focuses on the drivers of transfers received by adult children from their parents in the last twelve months. These financial transfers are higher than 250 euros. The dependent variable is the logarithm of (amount of downward transfers + 1). As above, a Tobit model is applied. The intensive margins resulting from the five regressions are presented in Table 6, summarizing the results in 5 columns when children from all types of households are considered. The results from the first regression (endowments of children are fixed) seem to indicate that the wealthier the parents, the more the children receive from their parents, except in the East where there is no effect. The results from the second regression (endowments of parents are fixed) concern the impact of education of the child, as proxy for his/her wage, and no clear and significant relation appears from the regressions, except when we consider all regions together. Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child. Coefficients associated to the covariates may slightly vary but the significativity does not.

Insert Table 6 here

Table 6: Tobit model of downward transfers (All)

Being a daughter leads to receiving more transfer when North and East regions are considered. It is the opposite in the South. Mothers are less likely to make gifts. Results are now driven by Southern countries in view of the non-significance of the results for the countries of Central, Northern and Eastern Europe. The older one is, the less one receives (as an adult child, results driven by Northern and Central Europe) or the smaller financial transfer one makes (as a parent, results driven by Southern Europe). Being in a couple seems to have different impacts on the decision to give according to the region considered (significant differences exist between Northern -negative effect- and Central -positive effect- countries) while the distance from the parents influences positively the amount of financial transfers, except in the South and in the East. Finally, transfers decrease with the number of siblings[21], and particularly once one of them still lives with parents, and the fact of having a partner.

V.3. Summary of empirical findings

Table 7 illustrates the results from the empirical analyses by applying two Tobit models which take into account the fact that several observations of hours of help/amount of transfers are zero. Four key variables interact in the models: a, the care provided by adult

[21] For sibling rivalry, see Buchanan (1983), Bernheim et al. (1985), Behrman (1997) and Chang and Luo (2015).

children to parents; b, the financial *inter-vivos* transfer from parent to child; y, the wealth of the parent and w, the wage of the child, proxied here by the level of education.

Insert Table 7 here

Table 7: Summary of empirical findings (all)

Having determined empirically the signs of the four key relationships, namely, $\frac{da}{dy}, \frac{da}{dw}, \frac{db}{dy}$ and $\frac{db}{dw}$, we can now return to the comparative statics derived in the theoretical models of section III and verify which models best match the empirical findings. As mentioned before, to conclude that a model is compatible with the data we will require compatibility between the theoretical and empirical signs for all the four relationships in question and we will pay a particular attention to verifying whether no contradictions arise. We will proceed by considering each model in turn.

Let us begin with the model of exchange. This model provides an interesting case which highlights the importance of making sure that no contradictions arise. Indeed, if one compares the theoretical signs presented in Table 1 to the empirical ones indicated in Table 7 and simply counts the number of relationships that in the model of exchange could be compatible with the empirical findings, one might be tempted to conclude that there is a possible compatibility of all of them. However, if we consider the model as a whole (and in particular, consider together the child's and the parent's sides), we note that the theoretical model of exchange implies $\frac{da}{dy}$ and $\frac{db}{dy}$ always having the same sign (whether under the hypothesis of complementarity or of substitutability between formal and informal care), while we clearly see from Table 7 that for all SHARE countries together as well as for all regions separately, except for the East, the empirical signs of $\frac{da}{dy}$ and $\frac{db}{dy}$ are actually opposite. This clearly indicates that the exchange model does not apply to these countries. As far as the East is concerned, $\frac{da}{dy} = \frac{db}{dy} = 0$ could be compatible with exchange, but then another contradiction arises. In particular, it can be easily verified that in the model of exchange it is not possible to have $\frac{da}{dy} = 0$ and $\frac{da}{dw} = 0$ at the same time: $\frac{da}{dy} = 0$ implies that $\frac{da}{dw} < 0$ should hold.[22] Thus, the exchange model cannot apply to the Eastern countries either.

Let us now turn to the norm model. It is straightforward to see that this model is not compatible with the empirical findings for all SHARE countries together and all regions

[22] In particular, if we have $\frac{da}{dy} = \frac{-H_{mm}p + H_{am}}{-\Delta_a} = 0$, it must be that $H_{am} = H_{mm}p$. Using this, we get $\frac{da}{dw} = \frac{da}{dp} = \frac{-H_m}{-\Delta_a} < 0$.

separately, except for the East, since empirically we have $\frac{da}{dy} < 0$ whereas the child's aid should be constant according to the model of the norm. For the Eastern countries, on the other hand, the situation is substantially different: all the four empirical signs are zero indicating a strong compatibility with the version of the norm model in which the parent is not altruistic.

Finally, let us consider altruism and let us first look at the case of the model where the child is perfectly altruistic ($\alpha = 1$), i.e. the case of perfect two-sided altruism since, as mentioned in section III.1, in the model of altruism the parent is always assumed to be perfectly altruistic. It can be seen from Table 1 that in this case we have unambiguous theoretical signs $\frac{db}{dy} > 0$ and $\frac{db}{dw} < 0$. Comparing this to Table 9, we see that the theoretical sign of $\frac{db}{dy}$ is compatible with the empirical one for most of the regions, but the sign of $\frac{db}{dw}$ is not compatible for any. We thus conclude that the model of perfect two-sided altruism cannot be validated.

Let us now inspect the case of an imperfectly altruistic child ($0 < \alpha < 1$). In that case, as discussed in section III.1, the theoretical signs of $\frac{db}{dy}$ and $\frac{db}{dw}$ are generally ambiguous and different situations are possible. Moreover, the signs of $\frac{da}{dy}$ and $\frac{da}{dw}$ are generally ambiguous as well. Comparing the results in Tables 1 and 7, it can be seen that for all SHARE countries together and all regions separately, except for the East, all the four theoretical signs can be compatible with the empirical findings if we assume substitutability between formal and informal care. In addition to this, no contradictions seem to arise. Therefore, for these groups of countries, the altruism model with an imperfectly altruistic child and substitutability between formal and informal care seems to be compatible with the data. Due to the ambiguity of the theoretical signs, it would be somewhat too strong to assert that this model **is** the model underlying intergenerational transfers between parents and children, but rejecting this model is not possible either. On the other hand, for the Eastern countries, for which all the four empirical signs are zero, the altruism model seems to be contradicted by the data. Indeed, it can be seen from the results in section III.1 that $\frac{da}{dy} = 0$ can only be compatible with altruism if formal and informal care are independent of each other (i.e. $H_{am} = 0$). However, if that is the case, it can be verified that $\frac{db}{dy}$ must be positive[23], which is not the case empirically. It therefore seems that the prevalent motive in the Eastern countries is the norm, as discussed above.

V.4. Robustness tests

We performed robustness tests to verify that the results obtained were valid for different samples. Looking at the negative relationship between the child's support and the fact the

[23] It can be verified that if $H_{am} = 0$, $\frac{db}{dy}$ reduces to $\frac{-H_{mm}}{-\Lambda_b} > 0$.

parent has a partner; we felt it was essential to analyze the case where the parent was alone, widow(er) or single, in the household. We first used exactly the same method as for the analyses with the complete sample. Table 8 summarizes in 5 columns the results for informal help when children whose parents are single are considered. The results from the first regression (endowments of children are fixed) seem to indicate no effect of the wealth of the parents on help provided by the child. The results from the second regression (endowments of parents are fixed) concern the impact of education of the child, as proxy for his/her wage, and no clear and significant relation appears from the regression, regardless of the region considered.

Insert Table 8 here

Table 8: Tobit model of informal help (single parent households)

Table 9 summarizes in 5 columns the results for downward transfers when children whose parents are single are considered. The results from the first regression (endowments of children are fixed) seem to indicate that the wealthier the parent, the more the children receive from their parents, except in the South and in the East where there is no effect. The results from the second regression (endowments of parents are fixed) concern the impact of education of the child, as proxy for his/her wage, and no clear and significant relation appears from the regressions, regardless of the region considered.

Insert Table 9 here

Table 9: Tobit model of downward transfers (single parent households)

Table 10 clearly summarizes these results. It can first be noticed from Table 10 that the results for the Eastern countries remain the same as when all households are considered. The norm model with a non-altruistic parent thus seems to be the underlying model for single parent households as well. Interestingly, this model now also becomes relevant for the Southern countries, for which the results of single parent households are the same as those for the East. Thus, while in the case of all households the findings for the South are compatible with altruism, single parent households rather exhibit norm related behavior.

Insert Table 10

Table 10: Summary of empirical findings (single parent households).

This seems to be quite intuitive since in the case of the parent being alone, children might be more obliged to help him/her than in the case where the two parents have each other. If the parent is alone, taking care of him might become more a necessity than a choice of the child. Likewise, an elderly person living alone might be obliged to be more cautious and to think more about himself/herself, which could explain the underlying model with a non-altruistic parent.

The results for the other regions and for all SHARE countries together also seem to become somewhat closer to the norm in the sense that the child's caregiving becomes invariant with respect to the parent's wealth. However, overall, the model of the norm cannot be validated in these cases since the signs of $\frac{db}{dy}$ and $\frac{db}{dw}$ are not coherent with this model neither assuming an altruistic nor a non-altruistic parent. The model of exchange is also rejected since $\frac{da}{dy}$ and $\frac{db}{dy}$ do not have the same sign, while perfect two-sided altruism cannot be compatible either due to a "wrong" sign of $\frac{db}{dw}$. However, just like considering all households, the altruism model with an imperfectly altruistic child cannot be rejected. Nevertheless, it is interesting to note that now this model can be compatible with the data only if we assume that formal and informal care are independent of each other (i.e. $H_{am} = 0$), whereas with all households they had to be substitutes. This seems to make sense since one can expect informal care to be more valuable and less substitutable for parents who are alone than for those who live in a couple and thus always have a relative close to them.

Up to now, the empirical method used was to report separately the results obtained, assuming either given parents' endowments, either children's endowments, differentiating the case of single parents. Conceptually, we follow our theoretical model and we are partially tackling the potential problem of the correlation of the error terms of children of the same parent, i.e. siblings. However, we perform other and complementary robustness tests in order to deal with the potential bias in the estimated coefficients. We decided to test our models using the Mundlak (1978) methodology. As Alessie et al. (2014) where units of observation in their "transfer sample" are respondents' children, we treat the dataset as a panel, where the units dimension is given by the different households, while the "longitudinal" one represents children within the same households. This procedure allows us to control for correlated household-specific effects. The wealth characteristics of the parent do not vary within households but well only between households. That prevents us to use household fixed effect and lead us to consider "random" effects. Mundlak (1978) provides an alternative estimation procedure overcoming disadvantages of random effects. His approach may be used when the errors are heteroskedastic or have intragroup correlation and consists to add the averages within-groups of the regressors. This is the reason why we added averages by household of children's education, location, age, gender and partnership.

We decided also to include the average of age and education of the parents by household when we consider the whole sample in order to take into account heterogeneity inside the household since we duplicate information about help they receive and transfers they can give. We remove these last two averages considering single parent households. It should be noted that for this first "Mundlak approach" method, we use only one regression where the two main explanatory variables are continuous (deciles of wealth (y) and ISCED codes of education(w)).

The last method was the combination of the first method (report separately the results obtained, either assuming given parents' endowments, either children's endowments) and the second one ("Mundlak approach" correction). The summary of these two alternative methods as robustness tests is presented in Table A.6 in Appendix. We will discuss the implications of the two changes (w.r.t to our own methodology) in section V.5. Complete tables of the regressions' results are given in Appendixes A.2-A.6. Beyond these two important tests, if we change our two main explanatory variables (from deciles to percentiles for the wealth of the parent, from a continuous variable to three categorical variables for the education of the child), the results remain identical.

V.5. Discussion

To summarize, our results suggest that the underlying model for the Eastern countries and the single parent households in the South is that of family norm (and in particular, its version with a non-altruistic parent), whereas for the other regions and all SHARE countries together, the only compatible model seems to be the one of altruism with an imperfectly altruistic child and either substitutability (when all households are considered) or independence (when only single parent households are considered) between formal and informal care. It should be noted that very similar conclusions can be made if we consider the empirical signs obtained using Mundlak correction and the combination of the two methods. The only differences in these cases are that 1) with the combination of the two methods, for the Central countries we expect independence between formal and informal care also when all households are considered, and 2) with both Mundlak correction and the combination of the two methods, the norm model is rejected for the Eastern countries when all households are considered (and no other model seems to be compatible for these countries), but remains valid when only single parent households are analyzed.

One of our main results is also the rejection of the model of exchange. Thus, our findings are opposite to those of Alessie et al. (2014) who, also using SHARE data, on the contrary conclude in favour of exchange and reject altruism. An important reason for these differences is our strategy to adopt a "global" view of the results, that is, to consider the results from the parent's and the child's sides together and to verify whether no contradictions with the theoretical models arise. This way, as explained above, we identify a contradiction which allows us to reject the model of exchange. It is interesting to note that in the theoretical model of exchange of Alessie et al. (2014), as in ours, the parent's transfer

and the child's aid also change to the same direction when the parent's wealth increases. Empirically, Alessie et al. (2014) find that the parent's transfer increases with his wealth, but their results for the child's aid are mostly insignificant (thus showing no change) or showing a negative relationship with the parent's wealth. This would seem to contradict the model of exchange. However, Alessie et al. (2014) do not make such a conclusion since they do not adopt this "global" point of view and, using separate samples for children and for parents, rather look separately at the aid and the transfer sides. Their conclusion in favour of exchange is made on the basis of the comparative statics with respect to the child's education.

It should, however, be noted that the "global" approach is not the only reason why our conclusions differ from those of Alessie et al. (2014). Another reason is the difference in the theoretical models considered, especially those concerning altruism. Alessie et al. (2014) consider a bargaining model in which the parent is assumed to have all the bargaining power and thus a control over all choice variables. We rather opt for a two stage game between the parent and the child in which at first the parent chooses his transfer and then the child determines his aid. Among the differences between our models there is also the fact that in Alessie et al. (2014) the exogenous variable characterizing the child (empirically proxied by the child's education) is his income which in their model is independent of the child's caregiving time, whereas our exogenous variable (also proxied by education) is the child's wage rate. The child's income in our model is endogenous and depends on the time spent providing care to the parent. Our model thus captures the fact that better educated children not only earn more but also face a higher opportunity cost of providing care.

VI. Conclusion

The purpose of this paper was to test three alternative models of long-term caring motives: pure altruism, exchange and family norm. For the design of LTC public policy but also for that of private insurance contracts this distinction is extremely relevant. Depending on the prevailing motives, the extent of crowding out of informal care will vary and this will affect the desirability of either private or public insurance. Our database is the second wave of SHARE which provides for each family comprising elderly parents and their children a full range of information concerning financial transfers and informal care and the characteristics of the family members. The main result is the rejection of the exchange model while the empirical figures seem to lean towards family norm in the Eastern and, for single parent households, also in the Southern countries. For the other regions, the only compatible model seems to be that of moderate altruism, especially if we assume that informal and formal care are substitutes.

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Compliance with Ethical Standards:

The authors declare that they have no conflict of interest.

VII. References

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VIII. TABLES and FIGURES

Table 1: Summary of theoretical models

	Child's help side		Parent's transfer side	
	da/dy	da/dw	db/dy	db/dw
Altruism	*> 0 if comp* *< 0 if subs* *= 0 if indep*	*⋛ 0*	*> 0 if α=1* *⋛ 0 if 0<α<1*	*< 0 if α=1* *⋛ 0 if 0<α<1*
Exchange	*> 0 if comp or indep* *⋛0 if subs (but same as db/dy)*	*< 0 if comp or indep* *⋛0 if subs*	*> 0 if comp or indep* *⋛0 if subs (but same as da/dy)*	*⋛ 0*
Family Norm	*= 0*	*= 0*	*> 0 (P altruist)* *= 0 (P not altruist)*	*< 0 (P altruist)* *= 0 (P not altruist)*

Table 2: Interest variables from SHARE wave 2 questionnaire

Key variables	Question
Informal Care	Now please think of the last twelve months. Has any family member from outside the household, any friend or neighbour given you (or your partner) any kind of help? (*1. Dressing, bathing or showering, eating, getting in or out of bed, using toilet; 2. With home repairs, gardening, transportation, shopping, household chores; 3. Filling out forms, settling financial or legal matters.*)
Financial Transfer	Now please think of the last twelve months. Not counting any shared housing or shared food, have you (or your partner) given any financial or material gift or support to any person inside or outside this household amounting to 250 euro (in local currency) or more?

Source: SHARE Wave 2 questionnaire

Table 3: Informal Help (hours per month) & Transfers (PPP euros)

		Help (%)	**Informal help given by a child to a parent if help (Hours by month)**				*Transfer (%)*	**Transfer received by a child from a parent if transfer (PPP euros)**			
			Mean	***50th***	***90th***	***95th***		***Mean***	***50th***	***90th***	***95th***
North	**SW**	9.1	10.8	2.0	13.0	30.4	19.3	2,814	830	6,459	18,453
	DK	10.0	4.1	0.8	12.0	17.4	16.4	2,398	1,211	4,845	8,576
	NL	4.9	7.3	1.2	15.2	17.4	10.7	2,572	982	5,891	9,818
Center	**AT**	10.1	23.2	6.5	60.8	89.0	15.4	1,942	590	4,916	7,374
	DE	12.5	17.0	4.1	30.4	60.8	16.1	2,312	722	4,812	9,625
	FR	7.3	22.0	5.0	60.8	91.2	11.0	5,054	1,170	13,201	24,001
	BE	10.5	15.8	4.3	30.4	45.6	12.3	7,067	1,195	15,890	35,846
	CH	6.4	11.5	2.1	30.4	34.7	11.2	7,194	1,802	11,266	32,446
South	**ES**	7.3	33.7	6.5	121.6	173.6	2.6	1,817	662	5,199	6,631
	IT	8.2	33.6	7.6	91.2	152.1	12.9	3,249	481	4,810	9,619
	GR	15.1	37.6	8.7	91.2	152.1	7.6	1,535	678	3,515	5,859
East	**CZ**	30.3	24.0	6.5	60.8	91.2	9.1	840	332	1,824	3,316
	PL	10.4	20.7	6.5	45.6	60.8	9.3	536	243	1,375	2,188
All		10.8	21.2	4.3	60.8	91.2	12.0	3,166	721	6,760	11,949

Source: SHARE Wave 2 release 2.6.0, own computations

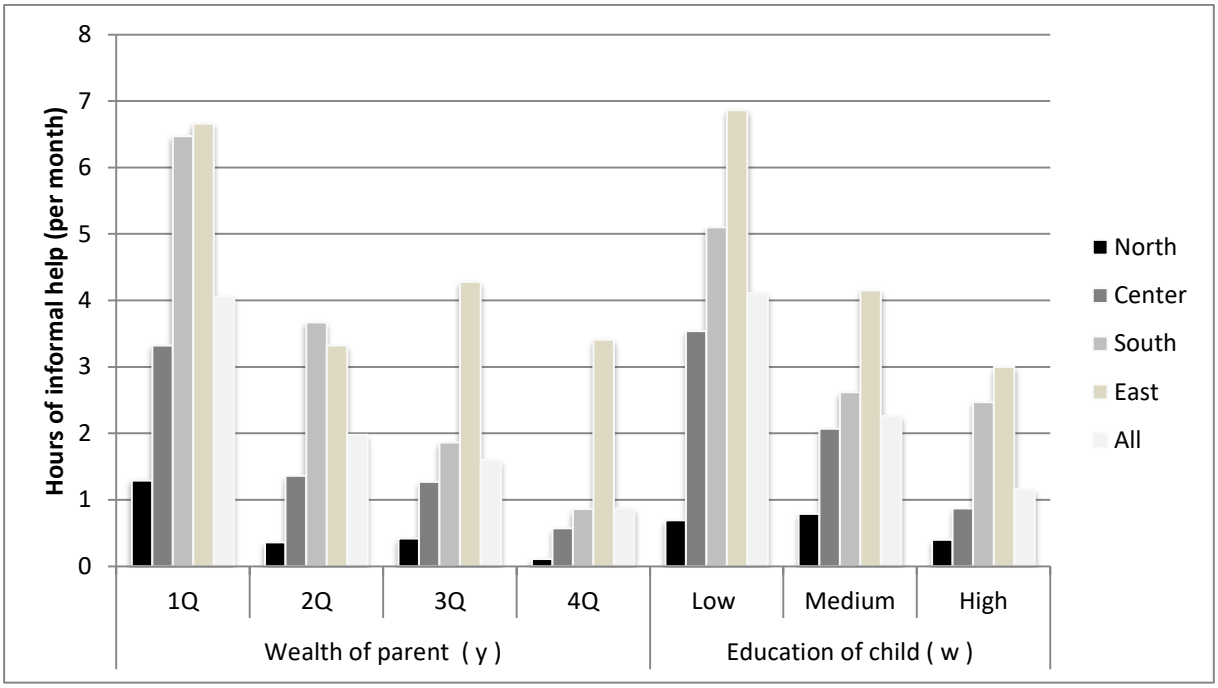
Table 4: Summary Statistics

			North			Center					South			East		All
			SW	DK	NL	AT	DE	FR	BE	CH	ES	IT	GR	CZ	PL	
Observations			2,787	2,359	2,475	1,188	2,330	2,465	2,838	1,279	2,046	2,644	2,295	1,929	2,145	28,780
Dependent variables	**Ascending Informal Help**	*Mean (Hours per month)*	0.98	0.41	0.36	2.35	2.13	1.61	1.66	0.74	2.45	2.76	5.68	7.27	2.16	2.29
	Downward Monetary Transfers	*Mean (€ PPP)*	542.2	394.4	274.4	299.2	372.1	553.6	871.6	804.4	47.1	420.2	116.4	76.6	50.0	380.1
Parent	**Net worth in € of the parent**	*Median (€ 1000 PPP)*	131.9	129.8	176.2	100.7	135.1	222.9	215.1	198.3	187.9	155.8	100.8	62.7	30.8	135.3
		Mean (€ 1000 PPP)	274.2	231.4	269.2	165.8	215.8	398.8	300.1	475.2	278.9	260.8	156.5	87.3	52.1	243.8
	Limited in activities because of a health problem	*Severely limited (%)*	16.4	16.1	21.0	16.0	21.1	23.9	20.6	11.2	9.0	21.1	12.6	26.6	44.5	20.3
		Limited but not severely (%)	31.9	28.8	29.5	40.7	37.7	26.7	29.3	29.9	43.1	34.7	32.8	44.7	35.4	33.8
		Not limited (%)	51.7	55.1	49.5	43.3	41.2	49.4	50.1	58.9	47.9	44.2	54.6	28.7	20.1	45.9
	Age	*Mean*	74.3	74.3	74.0	73.5	72.8	74.8	74.6	75.1	74.3	73.5	75.5	73.6	74.3	74.2
	Gender	*(% of woman)*	49.4	55.3	52.5	59.6	52.0	57.2	55.7	55.4	52.2	51.5	58	56.9	53.8	54.2
	Child in HH	*Yes (%)*	1.3	2.0	1.9	7.3	4.2	5.8	6.1	3.1	24.8	19.6	10.3	5.9	28.3	9.24
	Partner	*Yes (%)*	75.2	66.7	73.9	56.0	77.1	65.6	69.4	65.6	79.6	78.8	60.3	61.5	72.2	70.2
Child	**Education (ISCED 1997)**	*Low (0-2) (%)*	17.6	10.8	29.7	8.8	2.7	17.5	16.6	3.6	56.3	41.4	30.2	38.6	11.8	22.7
		Medium (3) (%)	38.2	40.5	33.4	49.2	54.2	42.3	36.5	55.8	23.5	39.1	39.5	41.8	66.4	42.2
		High (4-6) (%)	44.2	48.7	36.9	42.0	43.1	40.2	46.9	40.6	20.2	19.5	30.3	19.6	21.8	35.1
	Employment status	*Full employed (%)*	79.5	81.1	61.1	72.6	68.8	76.2	71.4	66.1	77.6	72.5	74.5	85.3	69.3	73.7
		Partially employed (%)	9.3	5.4	22.9	12.6	14.3	5.1	10.8	21.1	2.1	4.2	3.5	0.9	1.8	8.5
		Not employed (%)	10.2	10.3	13.2	14.4	15.7	16.4	15.2	11.7	19.8	23.2	21.7	12.5	24.1	16.1
		Disabled (%)	1.0	3.2	2.8	0.4	1.2	2.3	2.6	1.1	0.5	0.1	0.3	1.3	4.8	1.7
	Age	*Mean*	45.1	46.0	44.5	45.2	44.1	45.8	46.0	45.1	43.6	43.9	45.7	46.8	46.4	45.2
	Gender	*(% of woman)*	50.0	50.7	50.9	49.6	49.9	51.4	49.8	52.5	47.8	49.5	49.4	52.4	50.2	50.2
	Partner	*Yes (%)*	79.5	78.2	83.6	78.5	79.5	78.6	83.2	78.0	88.8	89.1	85.6	86.8	88.4	83.1
	Siblings	*Mean*	1.88	1.99	2.33	1.87	1.82	2.10	2.24	2.07	2.45	2.01	1.60	1.43	2.39	2.02
	Distance from parents	*Mean (in kilometers)*	132.8	96.6	70.6	83.4	103.7	154.4	44.0	81.7	66.7	70.8	88.0	52.4	70.1	86.9

SW: Sweden, DK: Denmark, NL: Netherlands, AT: Austria, DE: Germany, FR: France, BE: Belgium, CH: Switzerland, ES: Spain, IT: Italy, GR: Greece, CZ: Czech Republic, PL: Poland

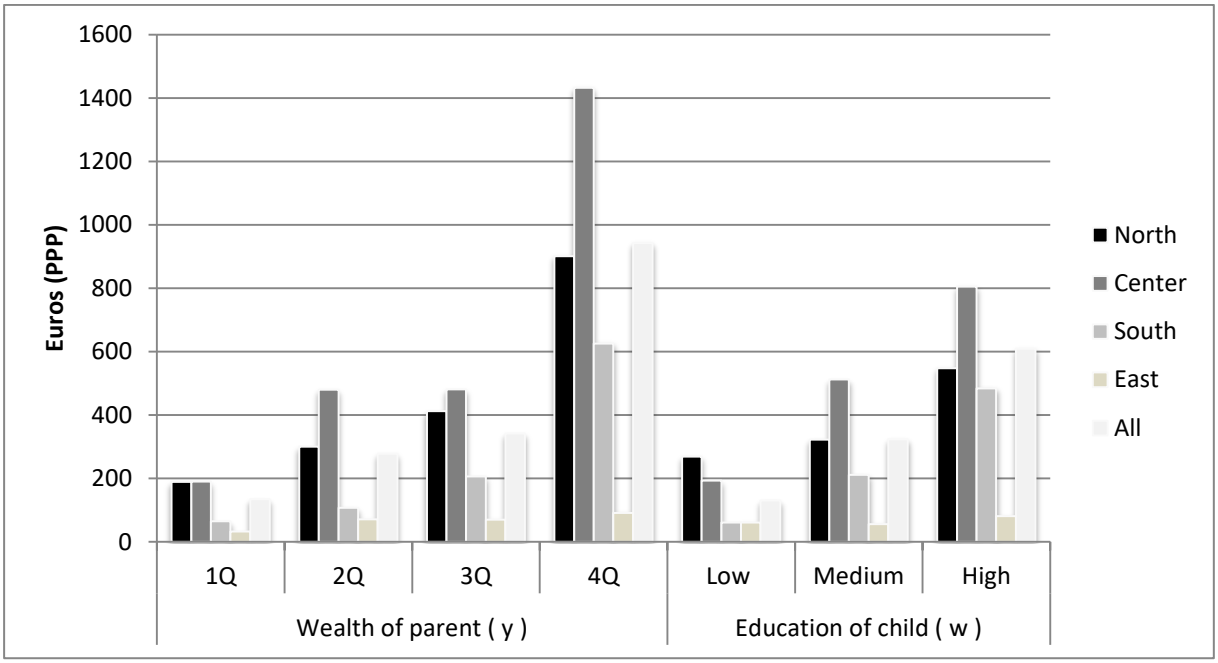
Source: SHARE Wave 2 release 2.6.0, own computations

Figure 1: Informal help from children to parents



Source: SHARE Wave 2 release 2.6.0, own computations

Figure 2: Transfers to children from parents



Source: SHARE Wave 2 release 2.6.0, own computations

Table 5: Tobit model of informal help (All)

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies					
Parent characteristics					
Wealth	**-0.064*** **	**-0.065*** **	**-0.059***	**-0.182*** **	**0.0397**
Woman	0.259**	0.282*	0.368*	-0.060	0.250
Child in HH	-0.972***	0.083	-0.870**	-0.998***	-1.148***
Partner	-0.988***	-0.589***	-1.175***	-1.255***	-0.849***
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.500***	0.061	0.464***	1.273***	0.372*
Location	-0.648***	-0.450***	-0.709***	-0.797***	-0.555***
Siblings	-0.195***	-0.152***	-0.169***	-0.261***	-0.206**
Log likelihood	-12,047.2	-2,294.6	-3,769.6	-2,921.4	-2,909.7
Model controlling with parents wealth deciles dummies					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.267**	0.299*	0.388**	-0.060	0.241
Child in HH	-0.975***	0.079	-0.929**	-1.003***	-1.152***
Partner	-1.018***	-0.633***	-1.181***	-1.289***	-0.861***
Children characteristics					
Education	**0.022**	**0.016**	**-0.038**	**0.103**	**0.066**
Woman	0.494***	0.074	0.458***	1.259***	0.373*
Location	-0.652***	-0.464***	-0.714***	-0.808***	-0.552***
Siblings	-0.193***	-0.159***	-0.170***	-0.274***	-0.221***
Log likelihood	-12,040.8	-2,284.4	-3,767.9	-2,905.1	-2,912.2
Observations	28,780	7,621	10,100	6,895	4,074

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001*

Source: SHARE Wave 2 release 2.6.0, own computations

Table 6: Tobit model of downward transfers (All)

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies					
Parent characteristics					
Wealth	**0.686*** **	**1.010*** **	**0.752*** **	**0.562*** **	**0.144**
Woman	-0.457*	-0.518	0.151	-1.190*	-0.816
Child in HH	-1.557***	-2.375	0.191	-2.205**	-1.764*
Partner	-0.148	-2.428**	1.228**	-0.581	1.248
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.165	0.936*	-0.331	-1.233*	1.346*
Location	0.046	0.377**	0.225*	-0.349*	-0.443*
Siblings	-1.490***	-1.398***	-1.586***	-2.002***	-0.959***
Log likelihood	-19,277.4	-6,361.9	-7,315.9	-3,308.7	-2,177.6
Model controlling with parents wealth deciles dummies					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	-0.431	-0.470	0.175	-1.271*	-0.805
Child in HH	-1.511***	-2.472	0.359	-2.152**	-1.742*
Partner	-0.241	-2.677***	1.165*	-0.778	1.174
Children characteristics					
Education	**0.237***	**0.195**	**0.121**	**0.412**	**-0.036**
Woman	0.177	0.955*	-0.350	-1.223*	1.375*
Location	0.045	0.357**	0.231*	-0.352*	-0.451**
Siblings	-1.494***	-1.406***	-1.568***	-1.998***	-0.918***
Log likelihood	-19,253.6	-6,355.5	-7,304.6	-3,284.2	-2,165.4
Observations	2,8780	7,621	10,100	6,895	4,074

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001*

Table 7: Summary of empirical findings (all)

Countries	*All HHs sample (28,780)*	Child's help		Parent's transfer	
		da/dy	*da/dw*	*db/dy*	*db/dw*
SHARE		< 0	= 0	> 0	> 0
North		< 0	= 0	> 0	= 0
Center		< 0	= 0	> 0	= 0
South		< 0	= 0	> 0	= 0
East		= 0	= 0	= 0	= 0

Table 8: Tobit model of informal help (single parent households)

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies					
Parent characteristics					
Wealth	**0.015**	**0.026**	**-0.017**	**-0.057**	**0.087**
Woman	0.366*	0.250	0.644*	-0.171	0.491
Child in HH	-1.522***	-0.511	-1.260**	-1.920***	-1.569***
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.900***	0.032	0.826***	1.623***	1.263***
Location	-0.736***	-0.461***	-0.809***	-0.946***	-0.558***
Siblings	-0.340***	-0.155*	-0.372***	-0.511***	-0.333***
Log likelihood	-5,587.6	-1,079.7	-1,945.7	-1,263.1	-1,228.4
Model controlling with parents wealth deciles dummies					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.382*	0.307	0.668*	-0.216	0.409
Child in HH	-1.512***	-0.602	-1.286**	-1.885***	-1.748***
Children characteristics					
Education	**-0.033**	**0.039**	**-0.110**	**0.093**	**-0.171**
Woman	0.893***	0.068	0.813***	1.581***	1.218***
Location	-0.740***	-0.466***	-0.816***	-0.937***	-0.539***
Siblings	-0.335***	-0.154*	-0.367***	-0.523***	-0.326***
Log likelihood	-5,584.5	-1,075.4	-1,943.4	-1,255.9	-1,229.1
Observations	8,563	2,123	3,213	1,887	1,340

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001*

Source: SHARE Wave 2 release 2.6.0, own computations

Table 9: Tobit model of downward transfers (single parent households)

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies					
Parent characteristics					
Wealth	**0.614*** **	**1.067*** **	**0.747*** **	**0.016**	**-0.115**
Woman	-2.705***	-3.146***	-0.863	-3.672*	-4.629**
Child in HH	-1.029	-2.050	2.942	-1.521	-4.404*
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.154	-1.583*	0.369	1.956	3.573*
Location	-0.234	0.219	-0.468	-0.218	-0.625
Siblings	-1.373***	-0.951**	-1.823***	-2.475***	-0.909
Log likelihood	-4,559.7	-1,691.2	-1,609.8	-669.0	-514.6
Model controlling with parents wealth deciles dummies					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	-2.571***	-2.774***	-0.654	-3.559*	-4.826**
Child in HH	-0.817	-2.371	3.168	-0.578	-4.515*
Children characteristics					
Education	**0.286**	**0.429**	**0.314**	**-0.485**	**-0.193**
Woman	0.188	-1.408	0.484	1.868	3.707**
Location	-0.220	0.243	-0.489	-0.234	-0.512
Siblings	-1.307***	-0.862**	-1.771***	-2.240***	-0.652
Log likelihood	-4,543.5	-1,683.9	-1,599.6	-660.4	-511.5
Observations	8,563	2,123	3,213	1,887	1,340

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001*

Source: SHARE Wave 2 release 2.6.0, own computations

Table 10: Summary of empirical findings (single parent households)

Countries	*Single parent HHs sample (8,563)*	Child's help		Parent's transfer	
		da/dy	*da/dw*	*db/dy*	*db/dw*
SHARE		= 0	= 0	> 0	= 0
North		= 0	= 0	> 0	= 0
Center		= 0	= 0	> 0	= 0
South		= 0	= 0	= 0	= 0
East		= 0	= 0	= 0	= 0

Appendix

Table A.I: Descriptive statistics for single parent households

	Wealth of parent (y)					Education of child (w)		
	1Q	2Q	3Q	4Q		Low	Medium	High
Hours of provided informal help (Single HHs)								
North	2.27	0.78	0.40	0.66		1.59	2.31	0.77
Center	5.87	3.24	3.78	2.17		6.82	5.21	2.35
South	12.61	10.40	6.81	1.16		12.21	7.02	9.00
East	11.84	7.04	8.84	10.18		13.40	9.28	5.32
All	7.08	5.17	4.51	2.97		8.82	5.67	3.11
Amount of received financial transfers (Single HHs)								
North	276	487	713	1,334		306	536	513
Center	181	427	357	2,600		257	503	752
South	98	70	214	254		77	137	223
East	33	128	125	83		75	80	99
All	171	299	369	1,463		168	367	538
Observations	4,071	2,102	1,543	847		2,340	3,570	2,653

Source: SHARE Wave 2 release 2.6.0, own computations

Table A.2: Tobit models with Mundlak approach (all)

Help Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Parent characteristics					
Wealth	**-0.056*** **	**-0.054***	**-0.052***	**-0.169*** **	**0.040**
Woman	0.183	0.242	0.300	-0.229	0.255
Child in HH	-0.951***	0.057	-0.868**	-0.954***	-1.152***
Partner	-0.979***	-0.583***	-1.150***	-1.286***	-0.819***
Children characteristics					
Education	**0.182*** **	**0.135**	**0.103**	**0.266**	**0.276***
Woman	0.519***	-0.005	0.356*	1.745***	0.325
Location	-0.834***	-0.575***	-0.867***	-0.991***	-0.804***
Siblings	-0.223***	-0.169***	-0.180***	-0.317***	-0.250***
Log likelihood	-12,019.3	-2,292.6	-3,763.6	-2,291.8	-2,904.2
Observations	28,780	7,621	10,100	6,895	4,074

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; *** Significant at 1% threshold; ** 5% threshold; applying Mundlak corrections*

Source: SHARE Wave 2 release 2.6.0, own computations

Transfers Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Parent characteristics					
Wealth	**0.651*** **	**0.985*** **	**0.700*** **	**0.546*** **	**0.135**
Woman	-0.549*	-0.665	0.156	-1.121	-1.236
Child in HH	-1.571***	-2.354	0.182	-2.214**	-1.778*
Partner	-0.268	-2.540***	1.143*	-0.666	1.079
Children characteristics					
Education	**-0.126**	**0.025**	**-0.338**	**-0.071**	**-0.207**
Woman	0.321	0.772	0.044	-1.143	1.478
Location	-0.290**	-0.222	0.000	-0.630**	-0.796**
Siblings	-1.491***	-1.386***	-1.573***	-2.045***	-0.953***
Log likelihood	-19,244.5	-6,347.9	-7,308.7	-3,303.5	-2,170.9
Observations	28,780	7,621	10,100	6,895	4,074

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak corrections*

Source: SHARE Wave 2 release 2.6.0, own computations

Table A.3: Tobit models with Mundlak approach (single parent households)

Help Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Parent characteristics					
Wealth	**0.018**	**0.029**	**-0.014**	**-0.049**	**0.087**
Woman	0.320	0.224	0.635*	-0.304	0.408
Child in HH	-1.511***	-0.569	-1.267**	-1.880***	-1.615***
Children characteristics					
Education	**0.078**	**0.081**	**0.011**	**0.227**	**0.160**
Woman	0.869***	-0.022	0.997***	1.844***	0.738
Location	-0.972***	-0.646***	-0.998***	-1.222***	-0.903***
Siblings	-0.363***	-0.164*	-0.386***	-0.542***	-0.375***
Log likelihood	-5,571.2	-1,073.3	-1,943.2	-1,260.5	-1,226.7
Observations	8,563	2,123	3,213	1,887	1,340

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak corrections*

Source: SHARE Wave 2 release 2.6.0, own computations

Transfers Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Parent characteristics					
Wealth	**0.575*** **	**1.015*** **	**0.698*** **	**-0.043**	**-0.136**
Woman	-2.515***	-2.821***	-0.799	-3.438*	-4.625**
Child in HH	-1.074	-2.297	2.842	-1.285	-4.528*
Children characteristics					
Education	**-0.234**	**-0.043**	**-0.193**	**-1.677**	**0.116**
Woman	0.577	0.079	0.753	1.272	1.106
Location	-0.602*	-0.215	-0.662	-1.373*	-0.426
Siblings	-1.364***	-0.901**	-1.833***	-2.498***	-0.940
Log likelihood	-4,542.8	-1,679.7	-1,604.5	-667.5	-511.4
Observations	8,563	2,123	3,213	1,887	1,340

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak corrections*

Source: SHARE Wave 2 release 2.6.0, own computations

Tables A.4: Tobit models with fixed endowments method and Mundlak approach (all)

Help Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies and Mundlak correction					
Parent characteristics					
Wealth	**-0.055*** **	**-0.055***	**-0.049**	**-0.169*** **	**0.040**
Woman	0.184	0.245	0.287	-0.226	0.259
Child in HH	-0.942***	0.084	-0.828**	-0.961***	-1.152***
Partner	-0.983***	-0.589***	-1.160***	-1.288***	-0.818***
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.519***	0.014	0.343*	1.729***	0.319
Location	-0.832***	-0.572***	-0.863***	-0.989***	-0.798***
Siblings	-0.218***	-0.166***	-0.181***	-0.305***	-0.236***
Log likelihood	-12,011.6	-2,286.9	-3,757.6	-2,910.7	-2,897.3
Model controlling with parents wealth deciles dummies and Mundlak correction					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.196*	0.267*	0.314*	-0.228	0.262
Child in HH	-0.946***	0.079	-0.895**	-0.966***	-1.157***
Partner	-1.013***	-0.633***	-1.165***	-1.325***	-0.826***
Children characteristics					
Education	**0.183*** **	**0.142**	**0.269**	**0.277**	**0.271***
Woman	0.514***	0.023	0.347*	1.729***	0.334
Location	-0.835***	-0.580***	-0.867***	-0.998***	-0.803***
Siblings	-0.218***	-0.173***	-0.181***	-0.316**	-0.254***
Log likelihood	-12,005.5	-2,276.9	-3,756.2	-2,984.2	-2,898.4
Observations	28,780	7,621	10,100	6,895	4,074

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak correction*

Transfers Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies and Mundlak correction					
Parent characteristics					
Wealth	**0.065*** **	**0.989*** **	**0.703*** **	**0.546*** **	**0.135**
Woman	-0.552*	-0.659	0.185	-1.112	-1.243
Child in HH	-1.570***	-2.369	0.214	-2.236**	-1.782*
Partner	-0.288	-2.553***	1.127*	-0.686	1.087
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.326	0.784	0.079	-1.153	1.457
Location	-0.289**	-0.222	0.014	-0.630**	-0.793**
Siblings	-1.488***	-1.390***	-1.583***	-2.012***	-0.953***
Log likelihood	-19,241.9	-6,345.8	-7,303.1	-3,302.3	-2,170.6
Model controlling with parents wealth deciles dummies and Mundlak correction					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	-0.518*	-0.608	0.221	-1.206	-1.285
Child in HH	-1.528***	-2.463	0.375	-2.183**	-1.761*
Partner	-0.362	-2.794***	1.062**	-0.884	0.999
Children characteristics					
Education	**-0.127**	**0.026**	**-0.338**	**-0.060**	**-0.187**
Woman	0.332	0.780	0.046	-1.180	1.473
Location	-0.290**	-0.222	0.005	-0.619**	-0.775**
Siblings	-1.491***	-1.399***	-1.563***	-2.009***	-0.909***
Log likelihood	-19,218.8	-6,340.0	-7,292.1	-3,277.7	-2,158.3
Observations	28,780	7,621	10,100	6,895	4,074

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak correction*

Tables A.5: Tobit models with fixed endowments method and Mundlak approach (single parent households)

Help Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies					
Parent characteristics					
Wealth	**0.019**	**0.028**	**-0.010**	**-0.047**	**0.085**
Woman	0.320	0.221	0.626*	-0.277	0.453
Child in HH	-1.502***	-0.559	-1.201**	-1.854***	-1.599***
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.871***	-0.012	0.965***	1.834***	0.764
Location	-0.970***	-0.645***	-0.995***	-1.230***	-0.906***
Siblings	-0.362***	-0.160**	-0.386***	-0.553***	-0.367**
Log likelihood	-5,567.6	-1,072.6	-1,940.1	-1,258.2	-1,220.1
Model controlling with parents wealth deciles dummies					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.338*	0.275	0.659*	-0.317	0.378
Child in HH	-1.491***	-0.648	-1.123**	-1.821***	-1.775***
Children characteristics					
Education	**0.079**	**0.085**	**0.011**	**0.226**	**0.165**
Woman	0.867***	-0.005	0.992***	1.824***	0.756
Location	-0.972***	-0.648***	-0.998***	-1.211***	-0.891***
Siblings	-0.357***	-0.160*	-0.382***	-0.564***	0.362**
Log likelihood	-5,565.1	-1,068.1	-1,938.1	-1,251.1	-1,221.0
Observations	8,563	2,123	3,213	1,887	1,340

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak correction*

Transfers Side

Explanatory variables	**All**	**North**	**Center**	**South**	**East**
Model controlling with children education dummies					
Parent characteristics					
Wealth	**0.575*** **	**1.018*** **	**0.703*** **	**-0.009**	**-0.133**
Woman	-2.508***	-2.809***	-0.753	-3.472*	-4.758**
Child in HH	-1.097	-2.069	2.898	-1.309	-4.514*
Children characteristics					
Education	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	0.565	0.068	0.690	1.480	1.106
Location	-0.603*	-0.209	-0.645	-1.430*	-0.414
Siblings	-1.378***	-0.907**	-1.865***	-2.581***	-0.971
Log likelihood	-4,540.7	-1,679.0	-1,602.1	-663.7	-510.2
Model controlling with parents wealth deciles dummies					
Parent characteristics					
Wealth	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Fixed**
Woman	-2.384***	-2.470**	-0.541	-3.334*	-4.901**
Child in HH	-0.877	-2.338	3.143	-0.450	-4.624*
Children characteristics					
Education	**-0.237**	**-0.046**	**-0.181**	**-1.656**	**0.038**
Woman	0.558	0.060	0.699	1.001	1.175
Location	-0.592*	-0.188	-0.680	-1.319*	-0.388
Siblings	-1.313***	-0.825**	-0.183***	-2.300***	-0.710
Log likelihood	-4,525.3	-1,672.5	-1,592.2	-655.7	-507.5
Observations	8,563	2,123	3,213	1,887	1,340

*Notes: Country dummies are also included in the model; controlling for health, age and education of the parent, employment status, partner and age of the child; * p < 0.05, ** p < 0.01, *** p < 0.001; applying Mundlak correction*

Tables A.6: Summary of empirical findings (Mundlak approaches robustness tests/all vs. single parent households)

Mundlak approach

Countries	***All HHs sample (28,780)***	**Child's help**		**Parent's transfer**		***Single parent HHs sample (8,563)***	**Child's help**		**Parent's transfer**	
		da/dy	***da/dw***	***db/dy***	***db/dw***		***da/dy***	***da/dw***	***db/dy***	***db/dw***
SHARE		< 0	> 0	> 0	= 0		= 0	= 0	> 0	= 0
North		< 0	= 0	> 0	= 0		= 0	= 0	> 0	= 0
Center		< 0	= 0	> 0	= 0		= 0	= 0	> 0	= 0
South		< 0	= 0	> 0	= 0		= 0	= 0	= 0	= 0
East		= 0	> 0	= 0	= 0		= 0	= 0	= 0	= 0

Fixed endowments + Mundlak approach

Countries	***All HHs sample (28,780)***	**Child's help**		**Parent's transfer**		***Single parent HHs sample (8,563)***	**Child's help**		**Parent's transfer**	
		da/dy	***da/dw***	***db/dy***	***db/dw***		***da/dy***	***da/dw***	***db/dy***	***db/dw***
SHARE		< 0	> 0	> 0	= 0		= 0	= 0	> 0	= 0
North		< 0	= 0	> 0	= 0		= 0	= 0	> 0	= 0
Center		= 0	= 0	> 0	= 0		= 0	= 0	> 0	= 0
South		< 0	= 0	> 0	= 0		= 0	= 0	= 0	= 0
East		= 0	> 0	= 0	= 0		= 0	= 0	= 0	= 0