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Money and time: what would you give back to me? Reciprocity between children and their elderly parents in Europe

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Abstract

Using data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) (2004, 2006, 2011, 2013 and 2015), we analyse the determinants of adult children's transfers of money and time to their parents. Specifically, we focus on reciprocity: analysing resource transfers, in term of both time (i.e., informal care) and money (i.e., financial transfers), helps us understand how parent-to-child transfers may influence the probability of child-to-parent transfers. A multivariate probit model for 10 EU countries is used to simultaneously estimate the probabilities that informal care or financial transfers will be given by children to their parents and, conversely, by parents to their children. Using the longitudinal structure of the data, we consider both concurrent and intertemporal reciprocity. The evidence for reciprocity is different based on the type of transfer: we do not find evidence of reciprocity for time transfers (informal care provided to parents) except in the case of sons, for which a positive link between informal care given to parents and current financial transfers received from parents emerges. In contrast, we find a positive effect of parent-to-child transfers (both time and money) on the probability of child-to-parent financial transfers.

Keywords Informal care · Time transfers · Money Transfers · Reciprocity · Responsibility

JEL classification D10 · I10 · D64 · J14

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1 Introduction

Studies on intergenerational resource transfers between elderly parents and their adult children have concentrated their attention on three currencies of transfers: space (co-residence), money (gifts, financial support) and time (time-help, caregiving). This paper focuses on the latter two (i.e., money and time[1]); in particular, it documents the determinants of adult children's financial and time transfers to their elderly parents by simultaneously considering the effect of transfers of money and time from parents to their children (i.e., the same unobserved characteristics may affect the probabilities of giving and receiving transfers of both money and time). We emphasize the effect of reciprocity in shaping giving behaviour. A number of hypotheses have been advanced concerning the motivation for transfers within families, and consequently, different theoretical models have been analysed (Lillard and Willis 1997; Silverstein et al. 2002; Raut and Tran 2005). In particular, two types of models can be underlined: the first is based on the fact that transfers can occur as a kind of savings in old age or borrowing during youth or as a form of exchange (Lillard and Willis 1997). In this case, the two-way transfers reflect two different aspects that conceptualize support from children: a return on an investment made earlier by the parents and an insurance policy in which earlier transfers to children are returned to needy parents (Silverstein et al. 2002). The second type of model, is based on the fact that transfers are motivated by two-sided altruism, and parents and children are altruistic and benevolent towards each other.

It is difficult to empirically distinguish between transfers that reflect efficient contracting or exchange among family members and transfers that arise because of altruism. In particular, our data provide little information on children and do not register the amount of money and time transferred after 2006. For this reason, we consider any exchange or two-side transfer as reciprocity, without exploring the underlying motives. Here, reciprocity is considered a behavioural trait rather than a feature of preferences. That is, this paper investigates whether individuals show reciprocal responses rather than whether they have reciprocity motives. We are aware that analysing reciprocity motives should be important in terms of the effectiveness of redistributive public policies; in fact, economic models of reciprocity and altruistic behaviour highlight some important policy considerations. They have shown that public programmes that command intergenerational transfers, such as social security and debt-financed fiscal policy, have different levels of effectiveness when intergenerational relationships operate under principles of altruistic reciprocity: altruistic children will make up the difference with private voluntary contributions to their parents, keeping the total transfer constant (Barro 1974; Becker 1974). The empirical literature has found evidence of both altruism (Raut and Tran 2005) and exchange motives (Cox 1987).[2]

[1] The transfer of space (i.e. co-residence) is used as a determinant in our model (given that it affects the probability of receiving time-help); see par. 5.

[2] Two measures can be used to disentangle the two models predicting reciprocity motives: parental income (the recipient's income) and the amount of the financial transfer or the number of hours of informal care that children supply. The prediction of the exchange model is that there is a positive relation-

The dynamic of care is receiving more attention from activists, researchers and policy actors now than it received 20 or even 10 years ago.[3] One of the reasons is that health care (HC) and long-term care (LTC) spending is a first-order policy issue for most governments in OECD countries given that such spending is putting pressure on public budgets. The ratio of HC and LTC expenditure to GDP has been steadily rising for several decades. This gradual increase has been due to several factors. First, the share of older people in the population is growing faster than that of any other age group as a result of both longer life spans and a lower birth rate, increasing both the demand for care and the elderly dependency ratio[4] in most industrialized countries (Bettio and Verashchagina 2012). Additionally, a higher share of elderly citizens translates into worse health conditions (Schwarzkopf et al. 2012), reducing the provision of informal care supplied within the family and once again increasing the demand for care. Second, as HC spending improves the probability of survival at old age, it can also boost LTC spending (Bettio and Verashchagina 2012; de la Maisonneuve and Martin 2013). Although the need for both formal and informal care is likely to increase due to the ageing population (Gray 2005), fiscal austerity, imposed after the financial crisis, has resulted in a contraction of the public budget at central and local levels (Fernández et al. 2016), causing a reduction in LTC provision. In this context, provisions of informal care may be very important due to its effect on LTC and HC as a whole: informal care may be viewed as a substitute for public and formal care, thus reducing the probability that elderly parents will enter a nursing home (Charles and Sevak 2005) and decreasing the fiscal cost of public LTC expenditure programmes.[5] On the other hand, the provision of care by adult children may also have a negative impact on adult labour market participation and career prospects, especially for women (Bolin et al. 2008; Mazzotta et al. 2019a, b). The supply of informal care is likely to decrease for two reasons: first, women, who are over-represented as primary caregivers, are more active in the labour market (Pickard et al. 2000); second, the increase in distance between residential family members (Spiess and Schneider 2002). All these economic, social and structural

Footnote 2 (continued)
ship between the recipient's income and the financial transfer from givers to the recipient (Cox 1987 p. 519). Unfortunately we do not have these data on children. Even if we do not find a positive relationship (between parental income and transfers by children [prob(t > 0)]), this result may be a prediction of both the altruism and exchange motive hypotheses (Cox 1987).

[3] There are no universal definitions for distinguishing between informal and formal care. Informal care is a somewhat heterogeneous commodity in terms of the differences in time investment and duration, the (number of) care tasks provided, its different components, such as house work (for instance, cleaning and cooking), personal care, including dressing, support with mobility, and administrative tasks and socializing (van den Berg, Brouwer, and Koopmanschap 2004; Arber et al. 1990).

[4] A person is dependent if he/she has limitations in activities of daily living (ADLs) or instrumental activities of daily living (IADLs).

[5] However, other studies have found evidence of neither a "crowding in" nor a "crowding out" effect of informal care on professional care. Instead, they have found evidence of a modification of private transfers depending on public transfers, suggesting a specialization hypothesis: professional providers take over medically demanding and regular physical care, whereas the family is more likely to provide less demanding, spontaneous help (see Brandt et al. 2009; Deindl and Brandt 2011).

changes call the current institutions into question and make clear that governments are facing an immense task in ensuring that in the future, elderly individuals will be cared for.

The growing proportion of the elderly population may also increase the demand for monetary resources that the younger generation must shoulder, calling on researchers to focus their attention on financial transfers from middle-aged adult children to their elderly parents. Typically, private financial transfers flow from old persons to young ones (for instance, from parents to children). Several studies have argued that this type of support from the family is important in determining capital accumulation for younger generations (Gale and Scholz 1994; Ermisch 2003; Altonji et al. 2012) as a form of insurance against income shocks (Altonji et al. 1997) and that it also facilitates the creation of cohesion and solidarity among family members (Chen et al. 2016). However, it has become increasingly common for adult children to provide financial transfers to their elderly parents for the acquisition of market services instead of providing them directly; in particular, if they have high opportunity costs, adult children prefer to substitute time transfers with financial transfers (Sarasa and Billingsley 2008).

When analysing resource transfers it is important to understand whether the child/parent relationship may be modelled as a behavioural response to perceived kindness, also defined as reciprocity. Reciprocity governs intergenerational exchange such that the more parents gave in the past and/or give in the present, the more support they receive from their children (Sarasa and Billingsley 2008).

Analysing reciprocity is by no means an easy task since decisions on the intergenerational transfer of money and time are likely to be jointly determined. If financial support is given as a consequence of the amount of informal care received or that will be received, then potential caregivers may base their decision to look after their parents on their expectations of a future reward or financial transfer received in the past. Furthermore, the choices of both parents and children may be influenced by unobserved characteristics, such as generosity.

Several studies have analysed reciprocity among family members (Cox 1987; Koh 2002; Sarasa and Billingsley 2008; Brugiavini et al. 2013; Jiménez-Martín and Vilaplana Prieto 2015); however, there are several gaps that we aim to fill. None of these studies simultaneously considered the intergenerational transfers of money and time from children to parents, which can be closely related: unobserved characteristics, such as generosity or kindness, may affect the probabilities of giving both resource transfers. Thus, first, using a multivariate probit model, we simultaneously estimate the probability that children will give informal care to their parents and the probability that children will give financial transfers to them. This simultaneous estimation may also allow us to examine the interdependence between transfers, i.e., whether they are complements or substitutes. Second, using recent and long panel data (i.e., from 2004 to 2015), in contrast to Leopold and Raab (2011), we consider not only concurrent reciprocity (i.e., transfers made in the same year) but also intertemporal or long-term reciprocity (i.e., child-to-parent transfers in 2015 in relation to parent-to-child transfers made 2, 4, 9 or 11 years prior). Considering intertemporal transfers is a crucial enhancement with respect to other studies, especially when considering time-help; parents who receive informal care in the present may be

unable to reciprocate in the present but could have given to their children (in terms of babysitting) in the past.

The analysis of this paper is based on data drawn from five waves (2004, 2006, 2011, 2013 and 2015) of the Survey of Health, Ageing and Retirement in Europe (henceforth SHARE) and covers 10 EU member states (Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, the Czech Republic and Belgium).

The evidence for reciprocity is different depending on whether transfers of time or money are examined. In particular, we do not find evidence of reciprocity for time transfers (informal care provided to parents), except in the case of sons, for which, a positive link between informal care given to parents and current financial transfers received from parents emerges. In contrast, we find a positive effect of parent-to-child transfers (both time and money) on the probability of child-to-parent financial transfers.

This paper is organized as follows: Sect. 1 presents our literature review on resource transfers and it is followed by a discussion of the sample and data analysed in Sect. 2. Section 3 establishes the econometric strategy. Section 4 discusses the findings, and finally, Sect. 5 concludes.

2 Literature review on resource transfers

2.1 Theoretical and empirical evidence of resource transfers

Individuals transfer resources among themselves in various ways, i.e., through voluntary exchange, by force or as gifts. Studies have emphasized different types of transfers: exchange (the private market), coercive planning or command (the public sector), gift-giving, reciprocity and social exchange (Serge-Christophe Kolm 1994; Molm 2003). Typically, economic theories are built on the assumption that people are selfish (they do not care about the well-being of others); however, experimental evidence suggests that actual behaviour is also shaped by unselfish actions: people may help others according to how generous these others are being.[6] This aspect has been captured by models that focus on a concern for reciprocity.[7]

Economists have also analysed models, including altruistic (Becker 1974; Altonji et al. 1997a; Villanueva 2003; Hochguertel and Ohlsson 2009), non-altruistic or exchange (Cox 1987; Cox et al. 1998) and reciprocal behaviour models (Rabin 1993; Dufwenberg and Kirchsteiger 2004; Falk and Fischbacher 2006), in a variety of contexts, including household formation (Manser and Brown 1980; Dufwenberg 2002), investment in education (Raut and Tran 2005) and labour supply decisions (McElroy 1985; Akerlof and Yellen 1990; Apps and Rees 1996; Gachter and Falk 2002). Additionally, sociologists hold that gift-giving and reciprocity are the central

[6] For an overview of these studies, see Fehr and Gächter (2000), Fehr and Schmidt (2006) and Cappelen and Tungodden (2019).

[7] See for instance Rabin (1993) Dufwenberg and Kirchsteiger (2004) Falk and Fischbacher (2006) L.K. Raut (1990) Jiang and Wu (2019) Raut and Tran (2005).

essence of people in society, i.e., the basic glue that holds individuals together (Blau 1964). Reciprocity (as defined by Serge-Christophe Kolm 1994 pp. 69–74) between two agents is a set of independently voluntary (free) but psychically related two-way transfers. It can be considered an intermediary between exchange (they both imply several related two-way transfers) and pure gift-giving (in both, the transfers are independently voluntary) (Serge-Christophe Kolm 1994). Reciprocal exchange concerns interactions among family and friends, while negotiated exchange involves business and economic transactions (Molm 2003; Molm et al. 2012). Families, which are the unit of analysis of this paper, are essentially a network of reciprocities. Families display all forms of relationships—altruism, force and exchange—but are better viewed as a network of reciprocities, where other types of relationships are in fact moments in this broader framework (Serge-Christofer Kolm 2006).

Regarding the empirical literature on intergenerational resource transfers, it is clear that studies have directed their attention to three currencies of transfers between elderly parents and their adult children: space (co-residence),[8] time (time-help or caregiving) and money (gifts or financial support) (Soldo and Hill 1995).

Economists are mostly interested in private resource transfers among households from the perspective of resource redistribution or the transmission of wealth. They mainly focus on financial transfers that usually flow from older people to younger people, and the individual from whom the transfer is most commonly received is a parent (McGarry 2016; Gale and Scholz 1994). Recent empirical studies have drawn on the concept of reciprocity to account for the exchange patterns of intergenerational support (see Henretta et al. 1997; Silverstein et al. 2002; Grundy 2005; Lowenstein et al. 2007; Lennartsson et al. 2010).

The main idea of reciprocity in parent-to-child relationships refers to long-term exchange: adult children feel indebted to their old and frail parents, who supported them in the past, and they use time transfers of help and care as repayments for the earlier parental investments (Hollstein and Bria 1998). Parent-to-child transfers are "longer term deposits [that] can be drawn on in future times of need" (Antonucci and Jackson 1990 p. 179). Some analysts, however, focus on short-term patterns of concurrent giving and receiving, labelling these patterns reciprocal, although it remains unclear why the observed behaviour constitutes a reciprocal exchange and how it differs from long-term reciprocity (e.g. Grundy 2005; Albertini et al. 2007; Lowenstein et al. 2007; Martina Brandt et al. 2008). A concept of short-term reciprocity in parent–child relationships has recently been offered by Leopold and Raab (2011), who indicate that it remains largely unclear why and under which conditions concurrent giving and receiving constitute reciprocity. However, Brandt et al. (2008), defining simultaneous or slightly deferred giving and receiving in any currencies as "direct reciprocity" (p. 375), conclude that this exchange pattern is a rarity, as it occurred in only 2% of all parent–child dyads.

Some studies reveal that transfers to children are made to offset the children's inequality (Behrman et al. 1982), thus, they are not motivated by exchange motives

[8] This issue is not the focus of this paper; see, for instance, Borsch-Supan et al (1992), Aquilino and Supple (1991).

(McGarry and Schoeni 1995). However, other studies found that financial transfers made by adult children are correlated with the care they received when they were young; thus, this finding may be interpreted as evidence of reciprocal exchange behaviour (Cox 1990; Cox and Rank 1992). Additionally, in the intergenerational literature, transfers from children to their parents are positively correlated with the children's educational level, which has been interpreted as evidence that parental educational investment in children is paid back during old age (Lillard and Willis 1997; Raut and Tran 2005).

Resource transfers can be conceived as particular activities of social support for family members. In this context, caregiving is crucial to understand why so many adult children give their time freely given that it may be very costly for them (Do et al. 2015) and may require a loss of income for the caregiver, thus worsening his/her health (Coe and van Houtven 2009). For this reason, transfers of time to the older generation may be balanced by financial transfers to the younger generation; in fact, several studies have started to analyse the interdependence between transfers. Some studies have found evidence that inter-vivo transfers are larger for children who provide informal care (van Houtven and Norton 2006), while others have found evidence that unobserved factors influence both time and financial transfers to parents: in particular, they suggest that time and financial transfers complement each other (Couch et al. 1999). Additionally, examining the interdependence of three types of resource transfers (providing time, giving money and sharing space), Boaz et al. (1999) found that co-residence and financial transfers are related to an increase in the amount of caregiving and marginally complement caregiving. When transfers are inter-related (i.e., there is a two-way relationship of giving and receiving), they may be a case of pure two-sided altruism (Koh and MacDonald 2006) or a reciprocal behaviour that is a response to perceived kindness. In other words, distinguishing between pure altruism and reciprocity is not an easy task, and as stated above, it is not an aim of this paper to analyse the motives underlying the choice to make transfers. However, we argue that a one-way transfer from parents to children or from children to parents without an inter-related or mutual relationship can be identified as gift-giving (Laitner 1997). Thus, based on this result, if there is a positive relationship between child-to-parent transfers and parent-to-child transfers, i.e., the more support parents give their children, the more support they will receive, then we are under reciprocity (Sarasa and Billingsley 2008); alternatively, if there is a negative sign or no positive sign, then we are not.

Some of the empirical studies are closely related to this paper, most of them find evidence of reciprocity, see for instance Koh and McDonald (2006) and Evandrou et al. (2016); additional studies use SHARE data as in the present paper. For instance, Sarasa and Billingsley (2008) find that children in Europe who provide informal care to their parents also give financial transfers, however, they do not find evidence of reciprocity (SHARE 2004). With the same data, Leopold and Raab (2011) find that parents give financial transfers to the children who support them with help and care; thus, reciprocal patterns emerge when parents have sufficient cash holdings to reciprocate financially.

Using SHARE data from 2004, 2006 and 2010, Brugiavini et al. (2013) find the presence of reciprocity: previously provided grandparental childcare results in a

higher probability that adult children will later reciprocate by providing informal care to their older parents. Finally, using only the first two waves of the SHARE, Jiménez-Martín and Vilaplana-Prieto (2015)[9] find that the current provision of informal care decreases the probability of receiving financial transfers and their amounts, although lagged caregiving (only wave 2004 for wave 2006) has a small, albeit positive, effect. They also control for potential endogeneity and problems of unobserved heterogeneity between parent-to-child financial transfers and child-to-parent care transfers.

Starting from these results, we make a twofold contribution: first, we simultaneously consider the intergenerational transfers of time and money from children to their parents that can be closely related (i.e., unobserved characteristics, such as generosity or kindness, may affect the probabilities of giving both financial and time transfers). Second, using recent and long panel data (i.e., from 2004 to 2015), we are able to consider both the current reciprocity (i.e., transfers made the same year) and intertemporal reciprocity (i.e., transfers made in 2015 related to those made 2 4, 9 and 11 years earlier). Intertemporal transfers are a crucial enhancement with respect to other studies, especially when considering time-help; parents who receive informal care in the present may be unable to reciprocate in the present but could have given to their children (in term of babysitting) in the past.

2.2 Determinants of the demand and supply of resource transfers

Reciprocity cannot be fully understood if we do not control for all of the relevant variables that can affect the demand and supply of resource transfers. Whether, how much and why resource transfers are provided can be conceived as a function of sometimes contradictory underlying structures of supply and demand. The demand is determined mainly by two broad factors: first, individual disability or indigence and the consequent need for support (time and money, respectively); and, second, the availability and cost of formal care and/or publicly available social benefits.[10] On the supply side, the resource transfers received by older people can be explained by theoretical models, which explain the choice between the time used for household production and the time used for paid work. In the unitary household model, the supply of informal care is a competing use of time that has the same opportunity cost as leisure (i.e., the marginal utility of income), proxied by earnings: higher earnings imply a higher opportunity cost of caregiving and, thus, a reduction in the

[9] Our sample is perfectly comparable with their sample given that we also have parent–child dyads; however, the amount given and the amount received are available in only two waves of the panel (2004 and 2006). To include in our model intertemporal transfers from parents to children, we need to use a longer version of the panel that imposes the limitation of not being able to consider the amount of transfers but only the dummy outcome variable.

[10] Formal care and the social benefits received by parents play a controversial role. Public opinion seems to support the substitution idea (Daatland et al. 2011), i.e., the negative effect between formal and informal provision. However, research has largely supported the complementarity approach Other have written about informal and formal care, finding that in some cases, they are complements (Bolin, Lindgren, and Lundborg 2008; Bonsang 2009).

supply of informal care (Spiess and Schneider 2002; Carmichael and Charles 2003; Bell et al. 2007). Gender, education and employment (capturing potential earnings) are variables that may capture the work-care trade-off. The utility-maximizing level includes the optimal living arrangement (separate households, a shared household or an institution) for providing informal care. Consequently, household type and marital status are important aspects for the availability of informal care (Silverstein and Bengtson 1994). According to the bargaining approach, the allocation mechanism between family members is argued to take various forms: cooperative bargaining (McElroy and Horney 1981; Manser and Brown 1980), non-cooperative bargaining (Browning et al. 2009) or a "collective" approach based on Pareto-efficient outcomes (Chiappori 1992). For these approaches, caregivers' taste for home care and their relative power in asserting this preference are crucial variables. Non-labour income, or wealth, is a key proxy of bargaining power and the distribution of control over the resources among co-resident adult caregivers (Mazzotta et al. 2019b). The bargaining approach also allows strategic interactions and conflicts of interest among family members, e.g., a brother's decision to care for his parent(s) may depend on his expectations of the extent to which his brother or sister will commit to caregiving. Thus, the presence of brothers and sisters is another key determinant of resource transfers. The same approach also explains the effect of social norm (SN) and beliefs and the filial/parental obligations emphasized by cultural explanations.

The patterns of provision of informal care and financial transfers are very different among European countries. Consequently, this paper also includes a welfare dummy as a SN indicator.

Finally, it is undeniable that there is a significant gender difference in the time allocated to helping parents (Sarkisian and Gerstel 2004) as gender specialization continues to grow (Blossfeld et al. 2005). Furthermore, parental gender is an important indicator of whether parents will receive care from their adult children. In general, mothers have been found to receive more support than fathers (Ikkink et al. 1999), possibly due to life expectancy and because old men receive informal care from their wives, whereas wives are widowed and have to rely on their children.

3 Sample, variable definitions and descriptive statistics

Our analysis is based on the SHARE, a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks that are representative of the population aged 50 and over.[11] Only one age-eligible member plus his/her partner/spouse was interviewed within a household. The longitudinal survey consists of all original sample members who were interviewed in any previous wave of the SHARE and their current partners or spouses.

[11] For more details, see https://www.share-project.org.

In this paper, we use the longitudinal structure of the data from waves 1, 2, 4, 5 and 6 (2004, 2006, 2011 2013 and 2015, respectively[12]). Ten countries (Sweden, Denmark, Germany, France, Austria, Belgium, Switzerland, Italy, Spain and the Czech Republic) are selected because their data are available in all of the waves.

The sample is restricted to parents who have living children and who participated in wave 6 (i.e., 2015) and in at least prior one wave. For each household, we select one respondent who gave information about care and financial transfers received from children; doing so made the variables for the time-help and money-help received comparable.[13] We connect each parent to his/her children in 2015. Consequently, we explore the effects of the characteristics of both parents and children on the probability of receiving help at old age. In the 2015 wave, we have 30,180 parents who had at least one interview in the previous years. We connect them with all of the children they have[14]; accordingly, we analyse 69,353 parent–child dyads.[15]

The first dependent variable analysed is the probability that adult children will give daily informal care to their elderly parents (time transfers). We consider general care, which includes helping with personal care (such as dressing, bathing or showering, eating, getting in or out of bed, and using the toilet), practical household work (such as home repairs, gardening, transportation, shopping, and household chores) and paperwork (filling out forms and settling financial or legal matters on an almost daily basis). The second dependent variable analysed is the probability that adult children will give financial transfers to their parents. We consider transfers, financial or monetary, from children to parents higher than 250 euros during the previous 12 months, excluding any shared housing and shared food.

Exploiting the panel data structure, we then construct the other four variables, which aim to capture the reciprocal behaviour between parents and children. The first is whether the parent had provided assistance with grandchildren (i.e., babysitting) both in the same year (i.e., current time transfers) and in one of the previous years of the survey (i.e., intertemporal time transfers). The second is whether the parent had provided financial transfers to his/her children both in the same period (i.e., current financial transfers) and in one of the previous years of the survey (i.e., intertemporal financial transfers).

Table 1 shows the descriptive statistics for the variables described above, specifically the share of children giving resources in terms of time (elderly care) and money (financial transfers) and the share of children receiving resources from their parents.

[12] Recently, wave 7 (i.e., 2017) was carried out. We explored the possibility of updating the data. However, doing so was not possible because not all of the data on the children of the families that participated in wave 7 were available.

[13] Different from Brugiavini et al. (2013), we focused on all types of families: single, couple or extended-type families.

[14] And for whom we have all the necessary information (until the four children selected).

[15] Parents could be associated more than once with their children given that they can have more than one child; thus, they may contribute to the sample more than once. However, in the empirical strategy, we estimate the model for children (thus, the dependent variables relate to children) to avoid the problem of repeated observations.

A total of 1.46% of children give financial transfers, and 1.47% give informal care.[16] We observe differences across gender: the percentage of daughters giving informal care to their parents is higher than that of sons who give care (there are almost no differences in the probability of giving financial transfers). Parent-to-child transfers are much more frequent than child-to-parent transfers; in fact, approximately 11% of children receive financial transfers from their parents, and 12% of them receive help in the form of babysitting. The percentage of children who currently receive time transfers (babysitting) is higher than that who receive current financial transfers, and this difference is statistically significant only in the case of daughters. Regarding intertemporal transfers, the percentage of children who receive time transfers (babysitting) is higher than that who receive money, and this difference is again wider for daughters than for sons: 15% (21%) of daughters receive financial (time) transfers compared to 14% (17%) of sons, and the differences between transfers of time and money are all statistically significant.

Table 2 presents the descriptive statistics for reciprocity, that is, the share of children giving money (financial transfers) and time (informal elderly care) to their parents based on whether they receive or have received money and time from their parents. We find that the percentage of children giving informal care to their parents who received (or have received) any type of transfer is always lower than the percentage of children who did not. The result for time transfers may be due to the fact that parents who give help to their grandchildren may have no need to receive informal care given that the assistance that they provide to their grandchildren reveals their ability to perform ADLs and/or parents who are economically better off can take care of themselves without the help of their children.

Regarding financial transfers, we find the opposite result: the percentage of children giving financial transfers is higher for those who received (or have received) resource transfers (in terms of both money and time) than for those who did not. The difference between those who received and those who did not receive transfers was always significantly different.

4 Methodology and model specification

Transfers of time and money from adult children to their elderly parents may be either complementary or substitute activities. Some adult children may have no time to devote to the care of elderly parents and prefer to transfer money to them so that they are able to pay for informal or formal care. In contrast, some children give both money and time to their parents (Sarasa and Billingsley 2008). In both cases,

[16] The share of children giving money and time transfers is below 2%. This result suggests that transfers from children are a phenomenon of minor relevance in the sample considered. However, as Leopold and Raab (2011) state, there is still room for exploring short-term reciprocity despite its current rarity because doing so might lead to new insights into the link between relationship quality and transfer behaviour and because short-term reciprocity might become more prevalent in ageing societies (see p.117). Moreover, this 2% of the sample consists of approximately 1,000 observation, which allows us to estimate a multivariate probit model without any problem of convergence.

Table 1 Share of children giving or receiving resources transfers (%)

	All sample	Daughters	Sons
Dependent variable			
Children giving money transfer to parents	1.46	1.49	1.43
Children giving time transfer (care) to parents	1.47	1.73	1.22
Independent variable			
Children receiving money transfers from parents			
Current transfers	10.66	10.94	10.4
Intertemporal transfer	14.76	15.15	14.39
Children receiving time transfer (babysitting) from parents			
Current transfers	12.15	14.22	10.16
Intertemporal transfer	19.38	21.42	17.42
No. of observations	69,353	34,231	35,122

unobservable factors may influence both the probability that children will give informal care and the probability that they will give financial help. The aim of this paper is to estimate the determinants of transfers of time and money given to elderly parents by their adult children and to control for reciprocal intergenerational transfers. The core variables are the care/babysitting services and financial transfers received by children from their elderly parents. Both the dependent variables and the core variables could be affected by problems of endogeneity that are simultaneous with reciprocal transfers. Therefore, we estimate a multivariate probit model with six variables. The first dependent variable is the probability of giving general informal care (time) (GT_t); the second is the probability of giving financial (money) transfers to elderly parents (GM_t); the third is the probability of receiving babysitting services (time) from elderly parents (RT_t); the fourth is the probability of receiving financial transfers from elderly parents (RM_t); the fifth is the probability of receiving babysitting services (time) from elderly parents in the past (RT_{t-1}); and, finally, the sixth is the probability of receiving financial transfers from elderly parents in the past (RM_{t-1}). The model controls for the mutual correlations among the six outcomes, feedback effects, unobserved heterogeneity, the non-random selection of the sample and unobserved cross-process correlations between the transfers of time and money between parents and children.

The determinants of the probability of giving time and money-help are grouped into dyad characteristics, parental characteristics (PCs) and child characteristics (CCs). The main variables of interest are included in the dyad characteristics, which are those variables indicating whether there is reciprocity. Among the dyad characteristics, in fact, we include variables that indicate whether the children receive (thus, the parents give) financial transfers in the present (RM_t) and whether the children received (thus, the parents gave) financial transfers in the past (RM_{t-1}), i.e., in one of the previous waves. We also include variables for whether the children receive (thus, the parents give) babysitting services in the present (RT_t) and whether they received babysitting services in the past (RT_{t-1}). As described above, transfers that are inter-related with a positive sign indicate the presence of intergenerational

Table 2 Share of children (%) giving money and time transfers to their parents by whether they receive or have received money or time transfers from their parents i.e. reciprocity

		Children giving care to parents	Children give money transfers to parents
Children receive current money transfers from parents	No	1.55**	1.16***
	Yes	0.88	3.94
Children received intertemporal money transfers from parents	No	1.53*	1.31***
	Yes	1.14	2.30
Children receive current time transfers (babysitting) from parents	No	1.61***	1.20***
	Yes	0.48	3.34
Children received intertemporal time transfers (babysitting)	No	1.60***	1.31***
	Yes	0.97	2.09

Differences between children receiving and not receiving transfers are statistically significant at 1% level (***), 5% level (**) and 10% level (*)

reciprocal transfers between parents and children. The model of intergenerational transfers of time and money is written as follows:

$$GT_t = \alpha_0 + \alpha_1 RM_t + \alpha_2 RM_{t-1} + \alpha_3 RT_t + \alpha_4 RT_{t-1} + +\alpha_5 SN_t + \alpha_6 PC_t + \alpha_7 CC_t + u_t \quad (1)$$

$$GM_t = \beta_0 + \beta_1 RM_t + \beta_2 RM_{t-1} + \beta_3 RT_t + \beta_4 RT_{t-1} + \beta_5 SN_t + \beta_6 PC_t + \beta_7 CC_t + v_t \quad (2)$$

$$RT_t = \gamma_0 + \gamma_1 X_{t1} + \gamma_2 SN_t + \gamma_3 PC_t + \gamma_4 CC_t + e_t \quad (3)$$

$$RM_t = \delta_0 + \delta_1 X_{t2} + \delta_2 SN_t + \delta_3 PC_t + \delta_4 CC_t + n_t \quad (4)$$

$$RT_{t-1} = \eta_0 + \eta_1 X_{01} + \eta_2 SN_0 + \eta_3 PC_0 + \eta_4 CC_0 + z_t \quad (5)$$

$$RM_{t-1} = \chi_0 + \chi_1 X_{02} + \chi_2 SN_0 + \chi_3 PC_0 + \chi_{34} CC_0 + q_t \quad (6)$$

where GT_t, GM_t, RM_t, RT_t, RM_{t-1}, and RT_{t-1} are estimated simultaneously; thus, u_t, v_t, e_t, n_t, z_t and q_t can be freely correlated. α_1, α_2, α_3 and α_4 in Eq. 1 and β_1, β_2, β_3 and β_4 in Eq. 2 are the coefficients of interest indicating whether there is reciprocity.

We also include in the model (among dyad's characteristics) control variables that aim to measure social norms (SNs). We consider, as measure of SNs, welfare regime dummies: the selected countries represent a wide range of welfare regimes and different family cultures. We group countries following the welfare regime classification suggested by Ferrera (1996) and modified by Fenger (2007),[17] who considers post-communist countries to be a distinct welfare state. Thus, we analyse Social Democratic countries (i.e., Sweden and Denmark), Continental countries (i.e., Germany, France, Austria, Belgium and Switzerland), Mediterranean countries

[17] As explained in the Appendix A.

(i.e., Italy and Spain), and one Eastern European post-communist country (i.e., the Czech Republic). The welfare regime may help take into account the ethical values shared by families. Additional SN indicators may be the intensity of religious practice (the number of times the parent prays: daily, weekly and less than weekly) and a fourfold categorical dummy recording own political views (left, right, intermediate, and no opinion or missing).

Among the PCs, we consider gender, age (less than 65 years old—the reference category, between 65 and 75 and more than 75 years old), whether the parent lives with a partner, the number of living children, whether the parent has difficulty performing more than one ADL, self-perceived health (good health—the reference category), whether the parent receives professional help (in particular, whether he/she has been in a nursing home overnight during the previous twelve months), whether the parent gives care to someone else inside or outside the household, whether the parent receives transfers of money or time from his/her children other than the child considered in the dyad and income (four dummies where the boundaries are expressed in terms of a percentage of the median: less than 60%—the reference category, from 60 to 99%, from 100 to 149% and equal to or more than 150%).

Among the CCs, we consider gender, the presence of children younger than six, educational level[18] (lower than upper secondary education—the reference category, upper secondary education and a university degree), marital status (married—the reference category, never married or previously married but then widowed, separated and divorced), employment status (whether working), the place of the child in the birth order among his/her siblings (whether he/she is the first-born child) and whether the child has an educational level higher than that of his/her parent.

The multivariate probit model can be described as an instrumental variable framework for categorical variables and can be estimated using the simulated maximum likelihood method, even if identification is, in principle, by functional form (see Wilde 2000), we introduce two different variables in Eq. 3 and Eq. 4, that affect the probability of receiving informal care and the probability of receiving financial transfers, respectively, but that should not affect the probabilities of giving, to improve identification (Maddala 1983, p. 123). In Eq. 3, we include the economic status of parents, which may affect the time they are available to provide babysitting services; in Eq. 4, we include the number of years since the child left his/her parental home, which is a measure of independence and, therefore, affects the probability of receiving money.[19] Finally, we include in Eq. 5 and Eq. 6 all the variables included in Eq. 3 and Eq. 4, respectively, but considering their initial condition, that is, their values the first time a transfer was made.[20] However, we are aware that controls and simultaneous estimation can hardly account for the possibility that some

[18] To avoid collinearity with the children's education level, we did not consider the parents' educational level due to the higher correlation between them.

[19] The results of eqs. 3, 4, 5 and 6 are available in Appendix A.

[20] For individuals who do not make any transfers, this variable is calculated for their first interview. Finally, we interpolate missing values for the previous period with values from the last interview (2015).

Table 3 Multivariate probit model for the probability of Giving Time transfer (i.e. care) and for the probability of Giving Money transfers of adult children to their elderly parents (whole sample and by child's gender)

Dyad's characteristics	Children Give Time GT_t (Care)			Children Give Money GM_t		
	(1) All	(2) Daughters	(3) Sons	(4) All	(5) Daughters	(6) Sons
Reciprocity						
Children receive current money RM_t	0.121	0.027	0.428**	0.145*	0.211*	0.182
Children receive intertemporal money RM_{t-1}	− 0.008	0.188	− 0.165	0.129	0.114	0.213*
Children receive current time RT_t (babysitting)	− 0.199	− 0.051	− 0.520**	0.344***	0.340***	0.459***
Children receive intertemporal time RT_{t-1} (babysitting)	− 0.176**	− 0.171	− 0.240*	− 0.199***	− 0.125	− 0.096
Social norms						
Continental	0.452***	0.508***	0.406*	− 0.052	0.024	− 0.144
Mediterranean	0.793***	0.956***	0.670***	− 0.232**	− 0.109	− 0.354**
Eastern°	0.888***	0.869***	0.950***	0.428***	0.508***	0.388***
Left political opinion	− 0.019	− 0.043	0.012	− 0.021	− 0.099	0.063
Int. political opinion	− 0.036	− 0.111	0.073	− 0.037	− 0.124	0.055
No political opinion[$]	− 0.071	− 0.124	− 0.017	0.242***	0.075	0.431***
Daily religion intensity	0.019	0.03	0.013	0.066	0.001	0.118
Weekly religion intensity	0.063	0.223**	− 0.194	0.146**	0.095	0.185*
Missing religion intensity[%]	0.292*	0.583***	0.022	− 0.096	0.216	− 0.269
Parent's characteristics						
Female	0.212***	0.248***	0.196**	0.071	0.187**	− 0.027
Age between 65 and 75	0.299***	0.366***	0.238*	0.164***	0.077	0.258***
Age greater than 75[#]	0.798***	0.935***	0.679***	0.167**	0.188	0.191*
Children lives in the same hh or building	0.345***	0.493***	0.174*	− 0.02	− 0.053	0.000
Not living with partner	0.351***	0.288***	0.444***	0.219***	0.11	0.322***
Whether gives care to other	0.092	0.136	0.017	0.075	0.023	0.132*
Number of children alive	0.011	0.009	0.018	− 0.117***	− 0.049	− 0.191***
Other children give care	1.330***	1.158***	1.489***	0.009	0.359	− 4.730***
Other children give money	0.063	0.071	0.082	3.571***	3.641***	3.639***

Table 3 (continued)

Dyad's characteristics	Children Give Time GT_t (Care)			Children Give Money GM_t		
	(1) All	(2) Daughters	(3) Sons	(4) All	(5) Daughters	(6) Sons
More than one ADL	0.814***	0.804***	0.855***	0.224*	0.188	0.319*
Bad Health	0.361***	0.370***	0.351***	− 0.054	0.154	− 0.391**
Have been in a nursing home	0.228	− 0.148	0.510**	− 0.601*	− 0.345	− 1.167
Income > 150% of median	− 0.223**	− 0.497***	0.08	0.033	− 0.052	0.065
Income between 100%—149% median	− 0.093	− 0.228**	0.074	− 0.018	0.018	− 0.112
Income between 60%—99% median£	− 0.011	− 0.121	0.122	0.076	0.075	0.042
Child's characteristics						
Female	0.206***			0.06		
Having children less than 6	0.183	0.23	0.049	− 0.001	0.03	− 0.109
Upper secondary	− 0.141**	− 0.148*	− 0.146	− 0.035	0.007	− 0.045
University degree!	− 0.075	0.01	− 0.227*	0.078	0.127	0.098
Never married	0.142*	0.076	0.211*	− 0.012	0.03	0.009
Separated. widowed or divorce?	0.037	0.053	0.051	0.037	0.019	0.042
Working	− 0.101*	− 0.065	− 0.139	0.255***	0.233**	0.339**
Whether child is first child	0.946***	0.852***	1.118***	− 0.062	− 0.081	− 0.039
Education of child higher than parent	0.064	0.028	0.123	0.085	− 0.085	0.244***
Constant	− 4.565***	− 4.475***	− 4.668***	− 2.919***	− 2.974***	− 3.027***
Rho (money and time trasnfers)	0.005	0.017	− 0.054			
No. of dyads	69,353	34,231	35,122	69,353	34,231	35,122

All transfers (given and received, current and intertemporal) are estimated simultaneously. P-value *** 1% ** 5% * 10% Reference category: ° Social democratic countries, $ Right political opinion, % Less than weekly religion intensity, # Age lower than 65, £ Income less than 60% of Median, ! Lower than Upper secondary, ? Married

external factor causes both giving by parents and the reciprocal response, thus the paper does not aim to make casual claims.

5 Results and discussion

This section discusses the results of eqs. 1 and 2 of the model described in Sect. 3, i.e., the probability that children will give time transfers (informal care) and financial transfers to their elderly parents (aged 50 years old or more).

Table 3 reports the estimates for the whole sample and separately for daughters and sons. The error terms of eqs. 1 and 2 are not statistically significant, meaning that we do not find evidence of either substitution or complementarity effects of the transfers of time and money given by children.[21] However, the overall likelihood ratio test of equality to zero of the six correlations is never accepted with a $\text{prob} > \chi^2 = 0.0000$.

In this analysis, the key variables are those used as proxies of reciprocity. We do not find evidence of reciprocity for the probability of giving informal care, i.e., the provision of informal care to parents does not depend on whether the parents give or gave money to their children (see col. 1 of Table 3). Examining the probability that children will give financial transfers, we find evidence for reciprocity: children are more likely to give financial transfers if they receive time transfers (the result is slightly significant if they receive financial transfers) in the same year (see col. 4 of Table 3). In terms of marginal effects (Table 4), the probability that children will give financial transfers increases by 0.85 percentage points (p.p.) if children receive babysitting services (the increase is above 1 p.p., specifically 1.17 p.p. for sons).

For the overall sample, the probability that children will give financial transfers to their parents increases by 0.32 p.p. if the parents give financial transfers to their children (the corresponding figure for daughters is 0.49 p.p.). For sons, the result is not significant for current transfers but is significant for intertemporal transfers (which increase the probability of giving money by 0.47 p.p.).

In contrast, we found that the intertemporal babysitting services given by parents is negatively associated to the probability that adult children will give time (care) and the probability that adult children will give financial transfers to their parents (see col. 1 and 4 of Table 3). This result may indicate that parents who gave babysitting services in the past are not in need of transfers in the present; these parents are healthier and better off, as shown in eqs. 5 and 6 (Appendix A, Table A3). Alternatively, if parents provided babysitting services to care for their grandchildren at some point in the past, they do not currently receive care from their adult children, possibly due to the children's engagement, in terms of both time and money, with their young children. Regarding this negative link between both care and financial transfers provided by children to their parents and babysitting services received in

[21] However, we find that the unobservable characteristics of parents similarly affect the probability of giving money and time to their children (in both cases, the effect is positive; see Appendix A, Table A4).

Table 4 Marginal effect for relevant variables indicating whether there is reciprocity (percentage points)

	All Sample				Daughters				Sons			
	Children Give Time GT_t (Care)		Children Give Money GM_t		Children Give Time GT_t (Care)		Children Give Money GM_t		Children Give Time GT_t (Care)		Children Give Money GM_t	
	ME	Coeff	ME	Coeff	ME	Coeff	ME	Coeff	ME	Coeff	ME	Coeff
Children receive current money RM_t	**0.27**	0.121	**0.32**	0.145*	**0.06**	0.027	**0.49**	0.211*	**1.00**	0.428**	**0.40**	0.182
Children receive intertemporal money RM_{t-1}	**− 0.02**	− 0.008	**0.27**	0.129	**0.47**	0.188	**0.25**	0.114	**− 0.26**	− 0.165	**0.47**	0.213*
Children receive current time RT_t (babysitting)	**− 0.35**	− 0.199	**0.85**	0.344***	**− 0.11**	− 0.051	**0.85**	0.340***	**− 0.64**	− 0.520**	**1.17**	0.459***
Children receive intertemporal time RT_{t-1} (babysitting)	**− 0.33**	− 0.176**	**− 0.36**	− 0.199***	**− 0.35**	− 0.171	**− 0.24**	− 0.125	**− 0.37**	− 0.240*	**− 0.18**	− 0.096

Marginal Effect (ME) are calculated as the difference of the mean of the overall predicted probabilities of receiving or not any transfer

the past, we find that the probability of giving transfers of time (money) decreases by 0.33 (0.36) p.p. (Table 4).

The gender of children is strongly significant with regard to the probability of giving elderly care to parents; however, it is not significant with regard to financial transfers. To disentangle any potential gender differences, we estimate the model and distinguish between sons and daughters (see cols. 2 and 3 and cols. 5 and 6 of Table 3). Regarding the provision of care by daughters, we do not find evidence of any reciprocity.

Regarding sons, the negative link between the elderly care that they provide and the babysitting services received from their parents persists. This result indicates that sons give elderly care to their parents only if the parents' condition is so bad that they are unable to provide help for their grandchildren. Moreover, sons provide elderly care to their parents if they receive current financial transfers from them (with a marginal effect of + 1 p.p. on average, thus doubling the probability of providing elderly care[22]). Concerning the financial transfers given by children, concurrent reciprocity is strongly confirmed for both sons and daughters: children provide financial transfers to their parents if the parents provide current babysitting services to them. We interpret these results as short-term reciprocity between children and parents. Additionally, intergenerational financial transfers are weakly confirmed for children, with differences between daughters and sons: we find a positive link in concurrent reciprocity for daughters, while for sons, it is deferred given that the link between the child-to-parent financial transfers and parent-to-child financial transfers made in the past is positive.

Regarding SNs, parents in all countries register a higher probability of receiving informal elderly care with respect to Social Democratic regimes, and for the Eastern European country, the impact is higher. This result may reflect the peculiarity of Social Democratic regimes: on the one hand, there is a universalistic approach to social rights, and there is a high level of inclusion of the middle classes in social programmes; on the other hand, the family plays a minimal role in providing help to elderly individuals. Regarding the probability that children will give financial transfers to their parents, there are differences among welfare regimes. In particular, compared to Social Democratic countries, parents receive more in the Eastern European country and less in the Mediterranean countries. Perhaps in the Mediterranean countries, children have more economic difficulties, and the financial transfers that they give decrease; in contrast, in the Eastern European country, it is the children who economically help their parents. Moreover, the variable indicating the political views of parents (again, used as a proxy of SNs) is not statistically significant; however, parents who declare that they do not have any political views are more likely to receive money-help (above all, from sons). Regarding the variable indicating religious intensity, we find that parents who are involved at least weekly in religious activity are more likely to receive care from daughters and money from sons.

With regard to the other control variables (see Table 3), we find that almost all of the results are in line with the predictions of the theoretical and empirical literature.

[22] In other words, there is evidence of short-term reciprocity, as in Leopold and Raab (2011).

Parental gender is associated to both the probability of receiving informal care and the probability of receiving financial transfers. Mothers need more help than fathers, and daughter prevalently help their mothers financially. Parental age is an indicator of the severity of need; older parents are more likely to receive informal help from their adult children. Parents with poor health have a higher probability of receiving daily help. Furthermore, when parents do not cohabitate with a partner, the probability that their children will have to provide informal care increases; several findings corroborate the hypothesis that the partner is the first source of support for elderly individuals (Dykstra 1993). Co-residence is an important determinant of the provision of informal care, and its importance is evident in our estimates because we find that children living in the same building (or apartment) as their parents are more likely to give informal care.[23] Moreover, even if children share the same level of commitment to caring (and the financial transfers) for their elderly parents, the first-born child is the one most involved, as shown by the variables for whether other children give care and whether he/she is the first-born child. There is a cooperative effect: the more other siblings give in term of care, the more the child gives care; additionally, the more other siblings give in term of money, the more the child gives financial transfers.

Disposable personal equivalent income is used as an indicator of parental socio-economic status. Socio-economic status is measured in terms of parental disposable personal equivalent income,[24] situating this income with respect to some boundaries expressed in terms of a percentage of the median (less than 60%—the reference category, between 60 and 99%, between 100 and 149% and equal to or more than 150%). The probability of receiving elderly care decreases when the income is higher.

Regarding the CCs, we refer to theories that predict that children must confront a trade-off between caring for their parents and other responsibilities. Consequently, we expect that looking after children younger than six, being married and being employed will limit the amount of time allocated to helping parents. For the first two variables, the trade-off does not appear in our estimates; in fact, the coefficients are not significant. In contrast, the trade-off exists for employment status: working is positively associated to the probability of giving money because children with a job (and, therefore, a salary) are more likely to give money to their parents.

Given that we find evidence of reciprocity in financial transfers, it is interesting to analyse which parents are less likely to give time and financial transfers to their adult children. Such an analysis may help us understand which parents are in need of formal care when they become elderly given that children may not reciprocate. Examining the PCs (see Table A2 in Appendix A), we find that the parents who give time transfers (babysitting) to their children are women, do not work (they are unemployed, housewives or retired and thus have more time available), live close to

[23] This result is similar to that of Leopold and Raab (2011), who found that living within a 5-km radius of their parents increases the probability that their children will give informal care.

[24] We used the OECD-modified scale first proposed by Hagenaars et al. (1994) to assign a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child.

their children, have an income above 60% of the median and do not have a partner. In contrast, the parents who are less likely to give babysitting services are older than 75 years of age, have more than one child, are unhealthy (either with difficulty performing more than one ADL or with time spent in a nursing home) and have leftist political views with respect to the right and, in particular, with respect to their sons. Parents who give elderly care to others also give babysitting to their children, particularly their daughters, which may indicate the fact that when there is the need and the time is available, people may combine different types of care for their elderly parents and their children together.[25] Regarding financial transfers, the parents who are more likely to give have an income above 60% of the median and live close to their children. The parents who are less likely to give financial transfers are male, are younger than 65 years of age, and have children who have left home more recently.

6 Robustness checks

This section provides robustness checks of our empirical estimates. In particular, we test the robustness of the econometric output by replicating the analysis including in the sample, instead of welfare dummies, (a) a proxy of culture with regard to familial obligation (which we name the familial obligation score, FOS)[26] and (b) country dummies.

The inclusion of the FOS aims to help us understand the additional role of culture. Families may differ in terms of unobserved characteristics, such as ethical values (e.g., solidarity). Thus, the positive association observed between parent-to-child and child-to-parent transfers may be because both elderly parents and their adult children share the same set of values: including the FOS we may take into account this common unobserved characteristic. The inclusion of country dummies may help us take into account the heterogeneity among countries because the empirical analysis considers various European countries that differ in terms of their underlying demand and supply side factors and institutional factors.

Table 5 reports the results for the main variables of interest, i.e., reciprocity. Controlling for the strength of perceived child-parent and child-grandparent obligations, we find that the evidence of reciprocity is weaker, but the result holds for elderly care provided by sons to their parents if they received concurrent financial transfers. In particular, we find evidence of current and intertemporal reciprocity for financial transfers. Moreover, when controlling for country dummies, we found also that daughters provide elderly care to their parents if they received financial transfer in the past. Anyhow, time transfers are associated more with SNs and a sense of

[25] This is in regard to the "pivot generation," which provides help to their partially dependent adult children and to their elderly parents (Železnà 2018), or, also used in much the same way, the "sandwich generation"" (Miller 1981).

[26] The FOS is an ordinal variable that captures the strength of perceived child-parent and child-grandparent obligations. It was computed applying an ordinal principal component analysis to the questions on questionnaire about duty and responsibility (for questionnaires submitted in 2004 and 2006); details on the construction of this variable are available from the corresponding author.

Table 5 Multivariate probit model for the probability of Giving Time transfer and for the probability of Giving Money transfers of adult children to their elderly parents

	All		Daughters		Sons	
	(a)	(b)	(a)	(b)	(a)	(b)
Children Give Time GT_t (Care)						
Reciprocity						
Children receive current money RM_t	0.085	0.123	− 0.029	0.034	0.411**	0.417**
Children receive intertemporal money RM_{t-1}	− 0.04	− 0.004	0.14	0.206*	− 0.206	− 0.174
Children receive current time RT_t (babysitting)	− 0.201	− 0.203	− 0.057	− 0.044	− 0.517**	− 0.504**
Children receive intertemporal time RT_{t-1} (babysitting)	− 0.166**	− 0.177**	− 0.161	− 0.155	− 0.232*	− 0.229
Social norms						
Familial obligation score	0.121**		0.144*		0.08	
Familial obligation score missing	0.018		0.002		0.055	
Country dummies	No	Yes	No	Yes	No	Yes
Parent's characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Child's characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Children Give Money GM_t						
Reciprocity						
Children receive current money RM_t	0.148*	0.138	0.215*	0.200*	0.188*	0.159
Children receive intertemporal money RM_{t-1}	0.111	0.13	0.108	0.125	0.222**	0.207*
Children receive current time RT_t (babysitting)	0.342***	0.346***	0.340***	0.337***	0.454***	0.463***
Children receive intertemporal time RT_{t-1} (babysitting)	− 0.196***	− 0.194***	− 0.114	− 0.119	− 0.08	− 0.093
Social norms						
Familial obligation score	− 0.046		− 0.035		− 0.067	
Familial obligation score missing	0.065		0.061		0.104	
Country dummies	No	Yes	No	Yes	No	Yes
Parent's characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Child's characteristics	Yes	Yes	Yes	Yes	Yes	Yes

Table 5 (continued)

	All		Daughters		Sons	
	(a)	(b)	(a)	(b)	(a)	(b)
No. of dyads	69,353		34,231		35,122	

Col. (a) with the inclusion of FOS and col. (b) with the inclusion of country dummies

See Note Table 3

familial obligation than with reciprocity. In fact, the greater the sense of obligation within the family, the greater the likelihood that elderly parents will receive time transfers (i.e., the FOS is positive and significantly different from zero). We confirm the results for males: sons who receive current time transfers (babysitting services) from their parents are less likely to reciprocate.

7 Conclusion

This paper focused on transfers of time and money between parents and children; in particular, it analysed the determinants of the probabilities that adult children would give financial transfers and informal care to their elderly parents. Among all the determinants, this study emphasized reciprocity, defined as the behavioural response to perceived kindness and unkindness such that the more parents gave in the past or give in the present, the more support they receive from their children. Analysing reciprocity is an important task for policy concerns given that it may shed light on the quality of parent–child relationships. If family support is promoted by private incentives in intergenerational relationships, then it is likely that it will not erode, even in the face of increasing demand for help and care (Leopolod and Raab 2011).

Additionally, this paper showed that parent–child reciprocity entails two corresponding patterns of exchange, long-term and short-term reciprocity: children give to their parents based on what they receive or have received. Furthermore, this analysis helped us understand which parents are more likely to give to their children, that is, the parents more likely to receive (if reciprocity holds). In contrast, if giving is associated more with SNs and a sense of familial obligation, that is, there is no evidence of reciprocal exchange, then those policies focuses on reciprocity may have no effect.

From a methodological perspective, we stated that the decisions of intergenerational (child-to-parent and parent-to-child) transfers of money and time are likely to be jointly determined and that they may also be influenced by the same unobserved characteristics. We therefore used a multivariate technique to take into account the correlations between unobservable factors that affect both child-to-parent and parent-to-child transfers. Transfers of money and time given by children are not correlated because the error term between the two equations is not statistically significant. In contrast, we find that parents usually give both money and care to their adult children; in fact, the error terms of eqs. 3 and 4 are positively correlated.

As regards to results, the evidence of reciprocity was different depending on whether we examined transfers of time or money. We did not find evidence of reciprocity for the probability of giving informal care for the whole sample and for daughters, i.e., the provision of informal care to parents does not depend on whether the parents give or gave time and money to their children. A positive reciprocal transfer emerged only for sons who give informal care to their parents if they receive current financial transfer from their parents; in other words, there was evidence of short-term reciprocity, as in Leopold and Raab (2011). However, we also found evidence for intergenerational reciprocity for financial transfers given by children: parents are more likely to receive financial transfers if

they give time in the same year. In contrast, we found that intertemporal babysitting services given by parents is negatively associated to the probability that their adult children will give both time and money, particularly for sons. Controlling for the strength of perceived child-parent and child-grandparent obligations (FOS), we found that the evidence of reciprocity is weaker but the result holds for elderly care provided by sons to their parents if the sons receive current financial transfers. Moreover, when controlling for country dummies, we also found that daughters provide elderly care to their parents if they have received financial transfer in the past from them. However, we found that the probability of giving time transfers is associated more with SNs, (i.e., a sense of familial obligation), than with reciprocity. In fact, the greater the sense of obligation within the family is, the greater the likelihood that elderly parents will receive time transfers (i.e., the FOS is positive and significantly different from zero).

According to the points highlighted above, we conclude that parents cannot buy informal care in old age with transfers of money or time given to their children when they were younger, except in the case of sons for which it could be useful provide them of more financial transfer and promote private incentives in intergenerational relationships. However, parents can buy financial transfers: they can receive more monetary support if they contextually give assistance with their grandchildren (+ 1.17 p.p. for sons and + 0.85 for daughters).

Having found evidence of reciprocity for financial transfers, we analysed which parents are more likely to give time transfers to their adult children and, conversely, which parents do not give babysitting services to their grandchildren (i.e., those who are men, still work, live far away from their children, have an income less than 60% of the median, have a partner, are older than 65 years of age and have health problems) and financial transfers to their children (i.e., those who are women, have an income less than 60% of the median, live far away from their children, are older than 65 years of age, and have children who left home a long time ago). These individuals are the parents who may not receive monetary help from their children even if they have provided babysitting in the past, and they may be the parents whom policy makers should consider.

Also, parents who gave baby-sitting services in the past (i.e., those who are women, not working, lived far away from their children, with high income, not living with a partner, younger than 65 years of age and with not health problems) do not receive neither financial transfer and informal care. Thus again, they should be the target of policy makers given they are likely to not receive any assistance from their children.

Moreover, we highlight that one aspect that should be taken into account is the proximity of children. Additionally, Leopold and Rabb (2011) found that proximity positively affects the probability that parents will receive informal care from their children. Therefore, particular attention should be given to parents whose children leave the motherland, and a policy that fosters bringing fathers/mothers closer to their children or that fosters bringing children closer to their father/mothers who are needy, poorer, older and alone, could be promoted.

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