

# Intergenerational Transfer and Child Care

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## Abstract

This paper analyses the effects of inter-generational transfers and public transfers on individual welfare in both marriage and divorce situations. We assume three generations within the family; as well as that wage rates, non-labour income, and productivity in household production determine bargaining power in marriage. We develop a sequential game that, in a first stage, determines the optimum level of the transfer under a relationship of mutual altruism between the donor and the recipient; in the second stage, the levels of a household good and effort are deduced by way of a Nash bargaining solution. After proving that individual preferences matter for intergenerational transfers, we have found that private transfers will interact with public transfers in a way quite different from the Beckerian altruist model, and that increases in spouses' wages have greater effects on welfare in the situation of divorce than in the situation of marriage.

JEL classification: C70, D10, D13, J12.

*Keywords:* Family Transfers, Altruism, Labour Decisions, Bargaining and Welfare.

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## **I. Introduction**

The organization of families, and family members' economic roles, has varied over time, and the decisions taken by a family are characterized by a complicated process resulting from the heterogeneous nature of the family. This can be represented by the multiplicity of generational compositions, the multi-decision-maker structure of the family, the heterogeneity of preferences, the geographical distance, the disparate phenomena, etc. The multidimensional choices emphasize the heterogeneity of inter-vivo transfers which use different forms of transmission, occur at distant dates over the lifetime<sup>1</sup> which imply bargaining environments that change, and involve more participants. Therefore, to shed additional light on the multigenerational family we assume three generations within the family, with only two adult generations. These two adult generations live in independent households.

Private transfers between families are common throughout the world and are one of the most important modes of economic interaction between family members, Cardia and Ng (2003) and Arrondel and Masson (2001b) consider that intergenerational transfers take place in the form of space, time (when the transportation cost are high, time transfers will be inoperative), education, assistance (these transfers are received by children still in the first part of their working life, to overcome borrowing constraints), and transmission (these transfers are part of the wealth transmission process and these are received later in life).

Existing studies that describe the size of private transfers are, for example, Kotlikoff and Summers (1981), who estimate that four-fifths of wealth comes through private transfers. Gale and Scholz (1994), using data from the 1983 wave of the Survey of Consumer Finances, report that inter-vivo transfers are the source of at least 11 percent of aggregate net worth. Guiso and Jappelli (2002) document that 25.9 percent of households have received transfers over their lifetime and one-third of Italian homeowners got the house itself as a bequest, or received financial support in making the purchase.

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<sup>1</sup> Arrondel and Laferrère (2001a) describe when inter-vivo transfers occur in France: 'Gifts for a wedding or a majority are the earliest (40 years old), then comes the altruistic motive (58). Retirement and the transmission of the family business takes place around 60–65. The sharing motive starts after 60 and the fiscal motive is maximum at the late age of 70.'

The study of transfers between parents and children has given rise to an abundant literature, reflected in the so-called inter-generational transfer models (see Laferrère, 1999).<sup>2</sup> These works focus on studying the inter-relations between parents and children from the exclusively individual point of view. To the best of our knowledge, this analysis of intergenerational transfers has not been extended by considering the situation whereby one or other of the individual recipients takes the decisions, in turn, either within the family or by way of bargaining with his/her spouse.

The unitary model is considered the traditional economic approach to modelling family behaviour, taking the family as the relevant decision-making unit maximizing a single utility function. In Samuelson's (1956) consensus approach, spouses agree to maximize a family utility function, subject to a pooled family budget constraint. The economist's standard model of distribution within the family is Becker's (1973, 1974a, 1991) altruist model, wherein an altruistic family member is shown to generate outcomes that provide a theoretical rationale for the assumption that the family acts as a single unit even with family members with different preferences.

Non-unitary models give explicit consideration to intra-family allocation, including cooperative bargaining models (McElroy and Horney, 1981; Manser and Brown, 1980), non-cooperative bargaining models (Lundberg and Pollak, 1994), and collective models (Chiappori, 1988, 1992). Cooperative bargaining models are the dominant models in the bargaining literature. In the cooperative equilibrium, incomes received by the husband and wife enter separately, because they affect both the feasible set and the threat point. Control of the resources on the part of each spouse is a crucial aspect in the bargaining process and has a clear effect on family allocation.<sup>3</sup>

The results of the bargaining depend on the threat point that is fixed, that is to say, the status quo. Traditionally, family bargaining models have identified this threat point with divorce (Manser and Brown, 1980; McElroy and Horney, 1981). However, divorce is not the only threat point that is possible in a family bargaining model. More

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<sup>2</sup> By contrast, some specific transfers, such as dowries, legacies and inheritances, have not benefited from any great attention in this context. By way of exception, we can point to the work of Suen et al. (2003) and Andaluz and Molina (2006).

<sup>3</sup> The unitary model implies resource pooling, in such a way that the influence of an increase in family resources on the allocation within the family will be independent of precisely who is the recipient of these resources. In the 1990s, a growing body of empirical evidence tested unitary models using non-labour

recently, for example, a number of papers have appeared in which the status quo is defined by a non-cooperative equilibrium, internal to the marriage (Lundberg and Pollack, 1993; Chen and Woolley, 2001).

We concentrate on inter-vivo transfers, since these are the most voluntary, assuming that the intergenerational transfers are financial assistance. Such an approach would allow us to analyse the important aspect of the influence of the inter-dependency between father and child on the decisions taken by the latter, either jointly with his/her spouse or within his/her own family. In this way, we try to connect the two lines of research that we have cited earlier, namely that of inter-generational transfer models and that of family bargaining models. To that end, we develop a family bargaining model in which one of the spouses receives a family transfer as the result of a process of mutual altruism between him/her and the parent.

There are more strands in the economics of the family literature to which this paper is related. We consider that wage rates<sup>4</sup>, non-labour income, and productivity in household production, determine bargaining power in marriage. The theory of home production is an indispensable analytical tool to understand the allocation of goods and time within the household, despite some problematic assumptions. Becker (1965) explained that combining time and market goods, households produce commodities, which are the source of utility. However, Household Production has received little attention in the family bargaining literature (e.g., Konrad and Lommerud, 1995).

In this framework, we can also study the effect of private income transfers on the labour decision. There is little evidence for the connection between these variables in developing countries (e.g., Joulfaian and Wilhelm, 1994). In our case, the parent and child may not see eye-to-eye as to the level of effort that depends on the bargaining process between the spouses. As in Chami's (1998, 2000) work, the parent is not only altruistic; there are certain expectations for the child, and concern for 'merit good'.

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income, suggesting that the ownership of property and relative spousal incomes are important in family decisions and intra-household allocations. (e.g., Thomas, 1990 and Lundberg et al., 1997).

<sup>4</sup> Pollak (2005) points that the relationship between bargaining power and earnings is 'opaque and ambiguous'. He explains that 'a spouse whose earnings are high because of a high wage rate does have more bargaining power and a spouse who produces more commodities because he or she is highly productive does have more bargaining power.' In contrast, Lundberg (2005) explains that bargaining power discrepancies between men and women appear with gender division of labour, women have less alternatives outside the household which implies disadvantages in the distribution of resources.

We consider the production of a household good, i.e. the quality of the children. The child-care in our model can affect the quality of the children. In the situation of divorce, these factors are not enjoyed in common and either ex-spouse can be excluded. This standard household production model implies that the inputs to child quality are a function of the child-care mode (which includes father care and mother care). Each spouse will then choose between working in the market, or for the household good.

As regards the main results, we should first mention that individual preferences matter for intergenerational transfers<sup>5</sup>. Secondly, private transfers will interact with public transfers in a way quite different from the Beckerian altruist model and the exchange model of transfer. This suggests that observing the relationship between recipient's income and intergenerational transfer is not sufficient to deduce that altruistic motives or exchange motives are at work. Finally, an increase in wages has a greater effect on welfare in the situation of divorce than in the situation of marriage, which increases the spouses' bargaining power.

The paper is organised as follows. In Section 2 we provide an overview of the theoretical literature and empirical studies on private transfers. In Section 3 we describe both the model employed in the study and the resolution process. Section 4 is devoted to an analysis of the equilibrium and to deducing the most important results. Finally, Section 5 closes the paper with a review of the main conclusions and the possible extensions of the work.

## **2. Theoretical Literature and Empirical Studies**

What motivates individuals to transfer income to family members? The private transfer literature contains several alternative motives, because motives are mixed in the population. We provide an overview of these strands of thought.

It is difficult to identify a single motive because strategic considerations may play a role in some families. Arrondel and Laferrère (2001a), based on the 'Actifs financiers' survey, describe motives as organizing the sharing between the children, the fiscal motive, the altruistic motive, the gift after a windfall gain, the motive of the survival of the family firm, and the motive of giving on retirement. Cox (1990) has

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<sup>5</sup> McElroy (1990) shows that individual preferences matter for intra-household allocation of resources.

described an alternative motive: he argues that inter-vivo transfers help individuals constrained to increase current consumption.

Güth et al. (2004) and Arrondel and Masson (2001b) consider that interaction among family members of different generations is often characterized by reciprocity – i.e. indirect reciprocity (the recipient does not give back to the initial giver but to a third person) and direct reciprocity (the recipient is kind to the donor in relation to how kind the donor is to the recipient). The former did not find much evidence of direct reciprocity; in the latter, they show that for each transfer, parents are strongly influenced by the corresponding behaviour of their own parents. Cox and Stark (2005) consider the demonstration-effect hypothesis. They document that tied transfers for housing constitute an encouragement by the donor, to the recipient for the production of children.

Many studies seek to test among competing motives for private transfers. In the studies on private transfer, the bulk of the literature focuses on two main competing hypotheses; altruism (Becker, 1991) and exchange (Bernheim et al., 1985, Cox 1987). According to Cox (1987), the key to identifying transfer motives is the relationship between the recipient's pre-transfer income and the transfer amounts received.

## **2.1 Altruism and Exchange**

Modern analysis of altruism stems from Becker's (1974b) research on social interactions. Becker introduced altruism in the context of the preferences of parents regarding their children's consumption. He explains that a parent is effectively altruistic towards another member of the family, (i.e. their children), when the parent's utility function depends positively on the well-being of the children, and that the parent's behaviour is changed by his/her altruism (Becker, 1981).

Becker characterized the family as an income-equalizing institution, where transfers are used to equate the donor's marginal utility of consumption, with the recipient's marginal utility of consumption from the donor's perspective; i.e. transfers tend to equalize the resources of the donor and the recipient. With family income held constant, the altruism model predicts that an increase in the recipient's income is always met with a reduction in transfers received, suggesting a compensatory role for these transfers. Altruism is found when the recipients are young adults. Altruism is more difficult to detect when we analyse total private transfers. For example, Kang and Lee

(2003a) and Kang and Sawada (2003b) show that private transfers are altruistically motivated in Korea.

Some authors emphasize the importance of interdependent preferences, for example Bergstrom (1999), who also studied systems of utility functions in which each individual's utility does not solely depend on his or her own private consumption (systems of interdependent utility functions are normally considered benevolent).<sup>6</sup>

Another body of research treats family members as non-altruistic; transfers from the parent are means of purchasing services from the children, that is, transfer is a means to pay for services provided by the recipient. In the exchange model, Cox (1987) analyses inter-vivo transfers in a model in which parents maximize their utility subject to the constraint that no child can be made worse off than they would be out of the family.

The exchange motive admits a positive relationship between the recipient's income and the transfers received. The recipient's market opportunity cost rises and the donor has to compensate the recipient for spending more time with the donor by increasing the transfers. Cox (1987), Cox et al. (1998), Kotlikoff and Spivak (1981), and Bernheim et al. (1985) all find empirical evidence that is consistent with the configurations predicted by exchange.

## 2.2 Crowding-out

Understanding private transfer is important because operative intergenerational transfers can neutralize the effects of some government policies. Many nations apply public programs to the achievement of social objectives; changes in private inter-household transfers could render ineffective public welfare programs, because the crowding-out effect implies that public transfers do not change the total income. Ignoring crowding-out may overstate the effects of those public programs.

Barro (1974) and Becker (1974b) have studied the crowding-out hypothesis. The distributional effect of these policy changes depends on the motivation of

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<sup>6</sup> 'A system of interdependent utilities with private subutility functions  $u_i(c_i)$  and interdependent utility functions  $U_i = F_i(u_i(c_i), U_{-i})$  is normally benevolent if it induces a unique system of independent utility functions  $G_i : C_i \rightarrow \mathfrak{R}$  for  $i \in S$  such that  $G_i(c) = F_i(u_i(c_i), u_{-i}(c_{-i}))$ , where each  $G_i$  is a monotone increasing function of each of the  $u_j$ 's.' (Bergstrom, 1999).

intergenerational transfers. On the one hand, altruistically motivated private transfers can neutralize completely the effects of public transfer. Kang and Lee (2003a) and Kang and Sawada (2003b) use the Korean Household Panel Survey (KHPS) data, and they find a strong crowding-out relationship between private and public transfers. Jensen (2003) focuses on an increase in state old-age pensions in South Africa and finds that government pensions for the elderly lead to a reduction in the level of private transfers received from children living away as migrants. Güth et al. (2004) study crowding-out in an experimental setting. They see that transfers to the young are crowded out, but crowding out is less than complete. Villanueva (2005) documents that inter-vivo transfers may displace public transfers: he finds that the impact is higher in the United States than in West Germany, and that crowding-out is less than complete.

On the other hand, if exchange-motivated transfers interact with public transfers, crowding-out between private and public transfers does not necessarily occur. For example, Cox et al. (1998) find that public income redistribution might not be neutralized by private-transfer responses.

### 3. The model

Let us consider a model of mutual altruism in which there is the donor of a transfer, the grandparent, and the recipient of that transfer, his son/daughter. Let  $U_p$  and  $V_l$  be the utility functions of the grandparent and of his son/daughter<sup>7</sup>, respectively, so that, for the sake of simplicity, we assume them to be additive and of the form:

$$U_p(C_p, V_l, e_l) = u_p(C_p) + \beta_p V_l(q_1, q_2, X_l, U_p) + g(e_l) \quad (1)$$

$$V_l(q_1, q_2, X_l, U_p) = v_l(q_1, q_2, X_l) + \beta_l U_p(C_p, V_l, e_l) \quad (2)$$

where  $u_p$  and  $v_l$  denote the levels of sub-utility,  $C_p$  and  $X_l$  represent the consumption of the grandparent and of his son/daughter, respectively,  $q_1$  and  $q_2$  correspond to the level of provision of the household good and  $\beta_j \in (0, 1)$ ,  $j = p, l$ , indicates the degree of altruism of each agent. We further assume that  $U_p$  and  $V_l$  are both strictly quasi-concave, increasing with respect to both the level of consumption and the amount of the household good. We assume that  $e_l$  is the child's effort, thus enters the grandparent's utility directly and indirectly through its effect on the child's utility. The grandparent's

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<sup>7</sup> Taubman (1991) documents that sons and daughters are treated similarly in transfers.

attitude towards the effort level expended by his child is captured by  $g(\cdot)$ , which is a concave and strictly differentiable function, and  $g'(0)=0$ . Furthermore, each agent has a perfect knowledge of the preferences of the other.

The above equations can be expressed in an equivalent form as follows:

$$U_p(C_p, V_1, e_1) = \frac{u_p(C_p) + \beta_p [v_1(q_1, q_2, X_1)] + g(e_1)}{1 - \beta_p \beta_1} \quad (3)$$

$$V_1(q_1, q_2, X_1, U_p) = \frac{v_1(X_1, C_1) + \beta_1 [u_p(C_p)] + \beta_1 g(e_1)}{1 - \beta_p \beta_1} \quad (4)$$

Furthermore, the levels of effort of the son/daughter, and the provision of the household good are determined by way of a bargaining process between each agent and his/her spouse, with the result coming from the application of the Nash solution.

For a simple example, consider the derivation of Stone-Geary utility functions, which are used in the “separate spheres” model (Lundberg and Pollak, 1993), to carry out comparative static analyses. What is more, preferences may be asymmetric, and both spouses get utility from the private consumption and the household good. The spouses’ utility function takes the logarithmic functional form, that specification of the utility function is standard in representative agent models with home production:

$$v_1(q_1, q_2, X_1) = X_1 + \alpha \ln q_1 + (1 - \alpha) \ln q_2 \quad (5)$$

$$0 \leq \alpha \leq 1$$

$$v_2(q_1, q_2, X_2) = X_2 + \gamma \ln q_2 + (1 - \gamma) \ln q_1 \quad (6)$$

$$0 \leq \gamma \leq 1$$

where  $X_i$ ,  $i = 1, 2$ , denotes the private consumption of each spouse and  $q_i$  the household good in such a way that  $q_i = c_i h_i$ , let  $c_i$  be the productivity in household production and  $h_i$  represents hours working for the household good<sup>8</sup>. We should point out that there is no mutual altruism between the two spouses, with the interrelations between them being reflected solely by way of the household good. Each spouse

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<sup>8</sup> Gronau (1973), Ben-Porath (1973), among others have adapted the framework of Becker (1965) and modeled child care as a home-produced good using two inputs: the parents’ time and market inputs.

allocates his or her working time  $m$  between working in the labour market  $e_i = m - h_i$ , and working for the household good,  $h_i$ .

Spouses take the effects of their actions into account, so they consider the consequences of father care for child development, they provide time to produce positive child outcomes or child quality. So, child output<sup>9</sup> affects the time allocation of parents; increasing time input by spouses has the potential to positively affect child outcomes. In this case, each spouse is specialized in particular tasks. We suppose that there are differences between father care and mother care, so we introduce them separately.<sup>10</sup> Each spouse has something different to offer and that affects the development of their children. Traditionally, it has been the mother who opts to be primary child care provider, but in our case the role of father's time is important too. Therefore, we use different productivities because mother's and father's time are qualitatively different. We do not differentiate between child gender, but spouses can have different preferences<sup>11</sup> with respect to the child outcome<sup>12</sup> or desired child attributes - that is, the household good - and, therefore, to the allocation of the time they spend with their child.

Our objective is to analyse a two-stage game whose time structure takes the following form. In the first stage, the grandparent decides the optimum level of transfer  $T$  to donate to his son/daughter. In the second, and given the amount of the transfer, both spouses participate in a labour market and decide the levels of effort and the hours working for the household good by way of a Nash bargaining process. Applying the backward induction procedure, we begin by obtaining the equilibrium corresponding to the second stage in which the optimum provision of the household good is determined. Subsequently, we obtain the optimum level of transfer fixed by its donor.

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<sup>9</sup> Consider that household good and child outcome is the same.

<sup>10</sup> Averett et al., (2005) show that the outcomes of paternal care are different by the age of the child, using the child data from the National Longitudinal Survey of Youth 1979 Cohort (NLSY79).

<sup>11</sup> In traditional societies appears child gender discrimination. In contrast, in wealthy societies discrepancies have disappeared.

<sup>12</sup> Lundberg (2005) shows that fathers spend more time with their sons and mothers spend more time with their daughters in the U.S. that imply different preferences.

#### 4. Analysis and results

With  $T$  and  $s$  being the intergenerational transfer and a transfer made by one spouse to the other (we assume that it is donated by 2 and received by 1), respectively, and where  $y_i$  represents the non-labour income of each spouse, the private consumption can be given as:

$$X_1 \leq y_1 + s + T + w_1(m - h_1) + Z_1 \quad (7)$$

$$X_2 \leq y_2 - s + w_2(m - h_2) + Z_2 \quad (8)$$

where  $Z_i$  is a public transfer. Assume that these constraints are binding. The productivity in the labour market is described by the hourly market wage,  $w_i$ .

Each spouse allocates his or her own time between two activities, (market labour and household production), and allocates his or her own resources, (non-labour income). We first examine the spouses' choice of hours working for the household good, (or the choice of effort, which is similar). Therefore, the utility possibilities frontier is defined by way of the conditioned optimisation programme:

$$\underset{h_1, h_2, s}{\text{Max}} V_1(q_1, q_2, X_1, U_p) = \frac{X_1 + \alpha \ln q_1 + (1 - \alpha) \ln q_2 + \beta_1 [u_p(C_p)] + \beta_1 g(e_1)}{1 - \beta_p \beta_1} \quad (9)$$

$$\text{s. to } X_2 + \gamma \ln q_2 + (1 - \gamma) \ln q_1 = v_2,$$

whose first order conditions are:

$$\frac{\partial V_1}{\partial h_1} = (1 + \alpha - \gamma) \left( \frac{1}{h_1} \right) - \beta_1 g'(e_1) - w_1 = 0 \quad (10)$$

$$\frac{\partial V_1}{\partial h_2} = \frac{(1 - \alpha + \gamma) \left( \frac{1}{h_2} \right) - w_2}{1 - \beta_p \beta_1} = 0 \quad (11)$$

Let us denote the solution to the maximization problem as  $h_1^*, h_2^*$ , which will depend on the wages rates, on the weight each one assign to the child output and on the degree of altruism. Solving the first order condition implicitly for  $h_1^*, h_2^*$ , we find that <sup>13</sup>

$$h_1^* = h_1(m, w_1, \beta_1, \alpha, \gamma) \quad (12)$$

$$h_2^* = h_2(w_2, \alpha, \gamma) \quad (13)$$

Introducing the optimum values in the objective function of the above maximisation problem, we determine the set of efficient allocations or utility possibilities frontier:

$$V_1^{UPF} = V_1(y_1, y_2, T, m, w_1, w_2, c_1, c_2, v_2, u_p, Z_2, Z_1, \beta_p, \beta_1, \alpha, \gamma) \quad (14)$$

With  $y_p$  representing the income level of the grandparent, the private consumption of the donor of the transfer will be given by  $C_p = y_p - T + Z_p$  where that is the net consumption,  $y_p$  is his exogenous income, and  $Z_p$  is a public transfer. Taking this relationship into account and applying the envelope theorem, we can easily obtain the equations:

$$\frac{\partial V_1^{UPF}}{\partial T} = \frac{1 - \beta_1 [u_p']}{1 - \beta_p \beta_1} \quad (15)$$

$$\frac{\partial V_1}{\partial v_2} = \frac{-1}{1 - \beta_1 \beta_p} \quad (16)$$

with equation (16) being the slope of the utility possibilities frontier.

Important family decisions such as labour supply choices can be resolved by the cooperative bargaining model, because we need that model to study what happens after a complex social interaction, which includes the ability of the players to punish one another. As stated earlier, the allocation of resources within the family follows a bilateral bargaining process; more specifically, the allocation of the welfare between

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<sup>13</sup> Note that second-order condition is satisfied.

both spouses is the result of obtaining the symmetric Nash bargaining solution. Therefore, the equilibrium is obtained by resolving the following maximisation problem:

$$\underset{v_2}{Max} .J = (V_1 - \bar{v}_1)(v_2 - \bar{v}_2) \quad (17)$$

where  $\bar{v}_i$ ,  $i = 1, 2$ , denotes the level of utility obtained at the threat point. The utility a spouse receives in the Nash bargaining solution is an increasing function of the utility the spouse receives at the threat point. Taking into account (16), the first order condition of that problem is given by:

$$-v_2 + \bar{v}_2 + (1 - \beta_1 \beta_p)(V_1 - \bar{v}_1) = 0 \quad (18)$$

from which we obtain the optimum level of utility of 2,  $v_2^*$  which, in turn, determines the level of utility of 1:

$$v_1^* = v_1(y_1, y_2, T, v_2^*, u_p). \quad (19)$$

If we now assume that the dissolution of the marriage represents the threat point of the bargaining, then the utility functions of the spouses will adopt the following expressions<sup>14</sup>:

$$\bar{v}_1 = \frac{(y_1 + T + w_1(m - h_1) + Z_1) + \beta_1 u_p + \beta_1 g(m - h_1) + \alpha \ln q_1}{1 - \beta_p \beta_1} \quad (20)$$

$$\bar{v}_2 = X_2 + \gamma \ln q_2 \quad (21)$$

In the situation of divorce we consider that each ex-spouse spends time in child care and that this does not affect the other ex-spouse utility. From this formulation, neither of the agents obtains any utility from the contribution to the household good contributed by the other once the marriage has been dissolved.

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<sup>14</sup> We consider a separate property agreement. We do not consider that threat points may shift because the opportunities outside of the marriage change, for example an increase in the ratio of men to women in the remarriage market (e.g. McElroy and Horney, 1981) and we do not introduce money transfers between divorced individuals and so we do not include the resources of both agents in each threat point, so child support do not affect dissolution risk.

The optimum behaviour of each of these two agents consists in determining the level of provision of the household good that maximises his/her individual utility, given the budget constraint. Applying that process to the behaviour of the recipient of the transfer, it is straightforward to obtain the optimum levels of provision of the public good and of the utility:

$$\tilde{h}_1 = \tilde{h}_1(w_1, \alpha, m, \beta_1); \quad (22)$$

$$\bar{v}_1^* = \bar{v}_1^*(y_1, T, w_1, c_1, m, u_p, \beta_1, Z_1, \alpha) \quad (23)$$

$\bar{v}_1^*$  is the recipient's threat point utility level, whilst, for the other agent, these levels will depend on his/her own non-labour income and productivity and on the weight he/she assigns to the child outcome:

$$\tilde{h}_2 = \frac{\gamma}{w_2}; \quad (24)$$

$$\bar{v}_2^* = \bar{v}_2^*(y_2, w_2, c_2, m, Z_2, \gamma) \quad (25)$$

In what follows, we will analyse the equilibrium corresponding to the first stage of the game. We begin by determining the behaviour of the grandparent at the threat point, with his objective being to specify an amount of transfer that maximises his individual utility subject to the budget constraint. Formally:

$$\begin{aligned} \underset{T}{Max} U_p &= u_p(C_p) + \beta_p \bar{v}_1^* + g(m - \tilde{h}_1) \\ s.t. C_p &= y_p - T + Z_p \end{aligned} \quad (26)$$

whose first order condition is given by:

$$-\tilde{u}'_p + \beta_p \frac{\partial \bar{v}_1^*}{\partial T} = 0 \quad (27)$$

We focus on the case where private transfers are operative, and thus assume  $y_p + Z_p$  is sufficiently large that  $T > 0$  in equilibrium.

Furthermore, compliance with the second order condition of the above maximisation problem leads to the inequality:

$$u_p'' + \beta_p \frac{\partial^2 \bar{v}_1^*}{\partial T^2} < 0 \quad (28)$$

Solving (27) implicitly for T, we find that

$$\tilde{T} = \tilde{T}(y_p, \beta_p, Z_p) \quad (29)$$

Let us now consider the equilibrium of the first stage assuming that, in the second, the level of provision of the household good are determined in accordance with the Nash bargaining solution:

$$\begin{aligned} \underset{T}{\text{Max}} U_p &= u_p(C_p) + \beta_p v_1^* + g(e_1^*) \\ \text{sa. } C_p &= y_p - T + Z_p \end{aligned} \quad (30)$$

whose first order condition is given by the equation:

$$u_p' = \beta_p \frac{\partial v_1^*}{\partial T} \quad (31)$$

Finally, compliance with the second order condition of the above maximisation problem requires that the inequality:

$$u_p'' + \beta_p \frac{\partial^2 v_1^*}{\partial T^2} < 0 \quad (32)$$

be satisfied.

Solving (31) implicitly for T, we find that

$$T^* = T^*(y_p, \beta_p, Z_p) \quad (33)$$

On the basis of the above, we are in a position to draw a series of conclusions on the influence of the amount of the transfer on the welfare in both situations - marriage and divorce - and the conditions under which there is no crowding-out.

**Proposition 1.** *For both spouses, an increase in the amount of the transfer has the same effect in the situation of marriage, and that of divorce. So the bargaining power of the spouses is not affected.*

**Proof.**

Differentiating expression (18) and (19) in equilibrium, and considering equation (15), we can deduce the influence of the transfer on the level of welfare of each spouse in the situation of marriage. Formally, we obtain the expressions:

$$\frac{\partial v_1^*}{\partial T} = \frac{1}{2} \left[ \frac{\partial V_1^{UPF}}{\partial T} + \frac{\partial \bar{v}_1}{\partial T} - \frac{1}{(1 - \beta_1 \beta_p)} \frac{\partial \bar{v}_2}{\partial T} \right] \quad (34)$$

$$\frac{\partial v_2^*}{\partial T} = \frac{1}{2} \left[ \frac{\partial \bar{v}_2}{\partial T} + (1 - \beta_1 \beta_p) \left( \frac{\partial V_1^{UPF}}{\partial T} - \frac{\partial \bar{v}_1}{\partial T} \right) \right] \quad (35)$$

We can separate the welfare impact into two components, i.e. changes along the utility possibilities frontier and changes in the threat point. Therefore, the effect of an intergenerational transfer on the allocation of the welfare derived from the marriage will depend crucially on the definition of the threat point implicit in the bargaining process.

From (25) we can deduce that, at the threat point, the transfer has a null effect on the level of utility of 2:

$$\frac{\partial \bar{v}_2^*}{\partial T} = 0 \quad (36)$$

Furthermore, applying the envelope theorem and knowing that  $C_p = y_p - T + Z_p$  where  $y_p$  is the parent's exogenous income, and  $Z_p$  is a public transfer, the influence of the transfer on the level of welfare achieved by its recipient at the threat point is given by the expression:

$$\frac{\partial \bar{v}_1^*}{\partial T} = \frac{1 - \beta_1 u'_p}{1 - \beta_p \beta_1} \quad (37)$$

It is straightforward to deduce that a change in the amount of the transfer has the same effect on the situation of marriage and divorce for the recipient and for the spouse of the recipient:

$$\frac{\partial(v_1^* - \bar{v}_1^*)}{\partial T} = 0 \quad (38)$$

$$\frac{\partial(v_2^* - \bar{v}_2^*)}{\partial T} = 0 \quad (39)$$

That occurs because of the relationship between the change in the welfare obtained in marriage and in divorce, when the private transfer increase (or decrease) is the same. This implies that the same changes in intergenerational transfer in both situations do not affect the bargaining power of the spouses.<sup>15</sup>

**Proposition 2.** *The relationship between the amount of transfer received and the public transfers is zero in both marriage and divorce; there is not a crowding-out in our model.*

**Proof.**

Differentiating expressions (33) and (29) in equilibrium, we can deduce the influence of the public transfer on the amount of transfer received in both situations: marriage and divorce, respectively.

$$\frac{\partial T^*}{\partial Z_1} = \frac{\partial T^*}{\partial Z_2} = 0 \quad (40)$$

$$\frac{\partial \tilde{T}}{\partial Z_1} = \frac{\partial \tilde{T}}{\partial Z_2} = 0 \quad (41)$$

In this case, public transfers change the total income. Increases in the income of the child, due to a public transfer, are not met with a reduction in private transfers from children. This finding has important implications for the effects of public transfer programs on the distribution of economic welfare. In that case, public transfers and private transfers are independent.

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<sup>15</sup> Suen et al. (2003) study the implications of intergenerational transfers on the allocation of resources within a conjugal household. They work with other preferences and present a Nash-bargaining analysis of the effect of a dowry on the allocation of resources within family with private and public consumption goods. They find that altruistic parents have greater incentive to give transfers to married daughters than to divorced because change on the amount of the transfer has greater effect on the situation of marriage than on the situation of divorce.

Considering expressions (16), (18), (19) and (31) is straightforward to deduce, in a general approach, under what conditions there is no crowding-out, which occurs when this relationship is satisfied:

$$\frac{\partial V_1^{UPF}}{\partial T} = 2 - \left[ \frac{\partial \bar{v}_1}{\partial T} + \frac{\partial \bar{v}_2}{\partial T} \frac{\partial V_1}{\partial v_2} + (v_1^* - \bar{v}_1) \frac{\frac{\partial^2 V_1}{\partial T \partial v_2}}{\left( \frac{\partial V_1}{\partial v_2} \right)} \right] \quad (42)$$

In our case, this relationship is satisfied:

$$\frac{\partial V_1^{UPF}}{\partial T} = 2 - \left[ + \frac{\partial \bar{v}_1}{\partial T} - \frac{1}{(1 - \beta_1 \beta_p)} \frac{\partial \bar{v}_2}{\partial T} \right] \quad (43)$$

So, “crowding out” depends on the changes in the welfare in both situations (marriage and divorce) when the intergenerational transfer changes.

We have supposed that there is no relationship between the hours working for the household good and the public transfer and private transfer. In our model, this relationship is satisfied.

Differentiating expressions (10) and (12) in equilibrium, we can deduce the influence of different variables on the hours working for the household good of each spouse in the situation of marriage.

$$\begin{aligned} \frac{\partial h_1^*}{\partial T} &= \frac{\partial h_1^*}{\partial Z_2} = \frac{\partial h_1^*}{\partial Z_p} = \frac{\partial h_1^*}{\partial Z_1} = \frac{\partial h_1^*}{\partial \beta_p} = 0 \\ \frac{\partial h_1^*}{\partial w_1} &< 0; \frac{\partial h_1^*}{\partial \alpha} > 0; \frac{\partial h_1^*}{\partial \gamma} < 0; \frac{\partial h_1^*}{\partial \beta_1} < 0 \end{aligned} \quad (44)$$

$$\begin{aligned} \frac{\partial h_2^*}{\partial T} &= \frac{\partial h_2^*}{\partial Z_2} = \frac{\partial h_2^*}{\partial Z_p} = \frac{\partial h_2^*}{\partial Z_1} = \frac{\partial h_2^*}{\partial \beta_p} = \frac{\partial h_2^*}{\partial \beta_1} = 0 \\ \frac{\partial h_2^*}{\partial w_2} &< 0; \frac{\partial h_2^*}{\partial \alpha} < 0; \frac{\partial h_2^*}{\partial \gamma} > 0 \end{aligned} \quad (45)$$

Differentiating expressions (22) and (24) in equilibrium, we can deduce the influence of different variables on the hours working for the household good of each spouse in the situation of divorce.

$$\frac{\partial \tilde{h}_1}{\partial T} = \frac{\partial \tilde{h}_1}{\partial Z_2} = \frac{\partial \tilde{h}_1}{\partial Z_p} = \frac{\partial \tilde{h}_1}{\partial Z_1} = \frac{\partial \tilde{h}_1}{\partial \beta_p} = \frac{\partial h_1^*}{\partial \gamma} = 0$$

$$\frac{\partial \tilde{h}_1}{\partial w_1} < 0; \frac{\partial \tilde{h}_1}{\partial \alpha} > 0; \frac{\partial \tilde{h}_1}{\partial \beta_1} < 0$$
(46)

$$\frac{\partial \tilde{h}_2}{\partial T} = \frac{\partial \tilde{h}_2}{\partial Z_2} = \frac{\partial \tilde{h}_2}{\partial Z_p} = \frac{\partial \tilde{h}_2}{\partial Z_1} = \frac{\partial \tilde{h}_2}{\partial \beta_p} = \frac{\partial \tilde{h}_2}{\partial \beta_1} = \frac{\partial \tilde{h}_2}{\partial \alpha} = 0$$

$$\frac{\partial \tilde{h}_2}{\partial w_2} < 0; \frac{\partial \tilde{h}_2}{\partial \gamma} > 0;$$
(47)

The lack of a labour supply response on the part of the spouses may simply reflect that, with those preferences, the households are still quite poor and such transfers are complements to wage income. We also obtain that the public transfers do not affect the level of child care. This can represent that transfers are a response to liquidity constraints.

These findings cast doubt on testing alternative hypotheses concerning motivation for inter-vivo transfers with the relationship between the recipient's income and the transfers received. That is, the relationship between transfer amounts and pre-transfer income does not allow us to test for transfer motives.

Our altruistic model of transfer behaviour conforms more closely to the reciprocity hypothesis. That is, the interaction among family members of different generations could be characterized by reciprocity. In our case, transfers are used to

equate the parent's marginal utility of consumption, with the parent's level of altruism, that is:<sup>16</sup>

$$u'_p = \beta_p \quad (48)$$

$$\tilde{u}'_p = \tilde{\beta}_p \quad (49)$$

The parents' behaviour toward their children is strongly influenced by the behaviour of their own parents, the level of altruism,  $\beta_p$ , can represent this behaviour.

**Proposition 3.** *The hours working for the household good (and the effort) in both cases (in marriage and in divorce) are not necessarily the same.*

**Proof.**

Comparing the first order condition (10) and (22), we can deduce that the hours working for the household good in the situation of marriage can exceed the hours working for the household good in the situation of divorce by the recipient:

$$(1 + \alpha - \gamma) \left( \frac{1}{h_1^*} \right) - \beta_1 g'(m - h_1^*) - w_1 = \alpha \left( \frac{1}{\tilde{h}_1} \right) - \beta_1 g'(m - \tilde{h}_1) - w_1 = 0 \quad (50)$$

When  $1 < \gamma \Rightarrow h_1^* > \tilde{h}_1$ . For the recipient, the hours working for the household good in the situation of marriage are greater than the hours working for the household good in the situation of divorce.<sup>17</sup>

Comparing the expressions (11) and (24), we can obtain, for the spouse of the recipient, that the hours working for the household good in the situation of marriage exceed the hours working for the household good in the situation of divorce, only when the recipient does not consider the hours working for the spouse of the recipient. The spouse of the recipient works the same hours for the household good in both situations.

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<sup>16</sup> When  $u'_p > \tilde{u}'_p$ , that implies that the transfer is higher in marriage than in divorce, which implies different levels of altruism in the situation of marriage and divorce. When  $u'_p = \tilde{u}'_p$ , the transfers and the level of altruism are the same in both situations.

<sup>17</sup> When  $\gamma = 1 \Rightarrow h_1^* = \tilde{h}_1$ .

$$\text{If } \alpha < 1 \Rightarrow \frac{(1-\alpha+\gamma)}{w_2} > \frac{\gamma}{w_2} \Rightarrow h_2^* > \tilde{h}_2 \quad (51) \text{If .}$$

$$\alpha = 1 \Rightarrow h_2^* = \tilde{h}_2 \quad (52)$$

**Proposition 4.** *For the spouses, a change (increase) in the wages of both affects bargaining power by increasing the bargaining power of each of them. In addition, a change in the productivities of the household affects the stability of the marriage.*

**Proof.**

Differentiating expressions (19) and (23) in equilibrium, it is straightforward to deduce that a change in wages affects the stability of the marriage for the recipient. When the hours working for the household good are the same in both situations (marriage and divorce), the bargaining power is not affected:

$$\forall 0 \leq \gamma < 1 \Rightarrow \frac{\partial(v_1^* - \bar{v}_1^*)}{\partial w_1} = \frac{\tilde{h}_1 - h_1^*}{2(1 - \beta_1 \beta_p)} < 0 \quad (53)$$

$$\gamma = 1 \Rightarrow \frac{\partial(v_1^* - \bar{v}_1^*)}{\partial w_1} = 0$$

In the case of the spouse of the recipient, we obtain the same results:

$$\forall 0 \leq \alpha < 1 \Rightarrow \frac{\partial(v_2^* - \bar{v}_2^*)}{\partial w_2} = \frac{\tilde{h}_2 - h_2^*}{2} < 0 \quad (54)$$

$$\alpha = 1 \Rightarrow \frac{\partial(v_2^* - \bar{v}_2^*)}{\partial w_2} = 0$$

For both spouses a change in the productivity of the household good also affects the stability of the marriage increasing the welfare gains of marriage:

$$\forall 0 \leq \gamma < 1 \Rightarrow \frac{\partial(v_1^* - \bar{v}_1^*)}{\partial c_1} = \frac{1-\gamma}{2(1 - \beta_1 \beta_p)} > 0 \quad (55)$$

$$\forall 0 \leq \alpha < 1 \Rightarrow \frac{\partial(v_2^* - \bar{v}_2^*)}{\partial c_2} = \frac{1-\alpha}{2c_2} > 0$$

Differentiating expressions (18), (19) (23) and (25) in equilibrium, it is straightforward to deduce that a change in the amount of these public transfers do not affect the stability of the marriage for the recipient and for the spouse of the recipient:

$$\frac{\partial(v_1^* - \bar{v}_1^*)}{\partial Z_1} = \frac{\partial(v_1^* - \bar{v}_1^*)}{\partial Z_p} = \frac{\partial(v_2^* - \bar{v}_2^*)}{\partial Z_1} = \frac{\partial(v_2^* - \bar{v}_2^*)}{\partial Z_2} = \frac{\partial(v_2^* - \bar{v}_2^*)}{\partial Z_p} = \frac{\partial(v_1^* - \bar{v}_1^*)}{\partial Z_2} = 0 \quad (56)$$

Therefore, in our case, changes in the wages affect the bargaining power of both of them, (stability of the marriage), but this result depends on the relationship between the hours working for the household goods in both marriage and divorce.

## 5. Conclusions and extensions

In this paper we have analysed the effects that the intergenerational transfers and public transfers have on welfare in both marriage and divorce situations; we have expanded the framework of the intergenerational interaction, considering bargaining power, and we have also studied the relationship between intergenerational transfers and public transfers.

We have chosen a family with three generations, with two adult generations (the donor and the recipient) living apart. The third generation is the children of the recipient. We have considered that they could be babies or they could be in their childhood. We have concentrated on inter-vivo transfers from the old to the young. Those take place in the form of financial assistance. We have gone more deeply into the altruism model because altruism is found when the recipients are young adults.

The characterisation of the equilibrium of the game allows us to draw the following conclusions. First, our findings cast doubt on testing alternative hypotheses concerning motivation for inter-vivo transfers with the relationship between the recipient's income and the transfers received. This suggests that observing the relationship between recipient's income and intergenerational transfer is not sufficient to deduce that altruistic motives or exchange motives are at work.

We have also compared the hours working in both marriage and divorce, and we have found that the hours working for the household good in the situation of marriage are greater than the hours working for the household good in the situation of divorce, for both spouses.

Secondly, we have found that private transfers will interact with public transfers in a way quite different from the Beckerian altruist model (altruistically motivated

private transfers can neutralize completely the effects of public transfer). There is not a crowding-out in our altruism model; in that case government transfer programs might not be neutralized by private-transfer responses.

Thirdly, for both spouses, an increase in the amount of the transfers has the same effect on the situation of marriage and divorce. Furthermore, for the spouses, an increase in wages has a greater effect on welfare in the situation of divorce than in the situation of marriage, which increases the spouses' bargaining power.

Fourthly, transfers are used to equate the parent's marginal utility of consumption, with the parent's degree of altruism. This altruistic model of transfer behaviour conforms more closely to the reciprocity hypothesis. The parents' behaviour toward their children is strongly influenced by the behaviour of their own parents. The level of altruism,  $\beta_p$ , can represent this behaviour.

Finally, in a general approach, "crowding out" depends on the changes in welfare in both situations (marriage and divorce) when the intergenerational transfer changes.

In closing, it should be noted that the results obtained depend on some of the assumptions introduced in the model, whose modification represents the main potential extension to this work. Thus, the game could consider another time structure in which the optimum amount of the transfer is decided after fixing the levels of consumption and provision of the household good in a bargained form. Analogously, we can consider that the third generation could decide. Finally, the mutual relationship of altruism between the donor and the recipient of the transfer could be substituted for a relationship of exchange, where the donor of the transfer would receive, in exchange, some type of service from the recipient, and vice versa.

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