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Leaving Home as a Self-selection Device

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We develop a model of intergenerational co-residence and transfers within the family in a setting of asymmetric information. Following an exchange motive, altruistic parents receive services from their children, who may make them financial gifts in return. However, parents do not know the privacy cost to children of home-sharing. Hence they make additional transfers in order to discipline their children and give them incentives to reveal their true privacy cost. We show that only children who stay at the parental home receive an informational rent, and that this rent is greater for recipients with a low privacy cost.

INTRODUCTION

Intergenerational transfers of income within the family are of central importance in understanding patterns of aggregate capital accumulation and wealth inequality. Whereas a few years ago economic research was especially interested in bequest behaviour, it is now well acknowledged that the bulk of private transfers between the generations occurs *inter vivos*. An illustration is given by the controversy between Kotlikoff and Summers (1981), who claim that almost 80% of the US wealth accumulation would be due to intergenerational transfers, and Modigliani (1988), according to whom life-cycle accumulation accounts for the main share of wealth. A feature of this unsettled debate concerns the motives for private transfers within the family, an issue that has strong implications for the effectiveness of public policies.

The numerous factors that are able to explain the discrepancy between these measures of inherited wealth have been put in a prominent position by Blinder (1988) and Kessler and Masson (1989). A significant effect relates to the definition of private intergenerational transfers included in the analysis. Indeed, the results that are in favour of the life-cycle hypothesis take account only of bequests and large financial transfers; hence the measure of the share of inherited wealth largely neglects the weight of the other types of *inter vivos* solidarities. Intergenerational transfers are however an important resource for various family members, since they may affect a variety of behaviours within the family, such as labour supply or geographic location.[1] Three types of *inter vivos* assistance can be seen to exist: financial gifts, time-related services (provision of contact and services, care to the elderly), and co-residence.

To date, the numerous theoretical and empirical studies that have attempted to infer the motives behind private transfers have focused especially on transfers in the form of money and to a lesser extent on non-market services and attention (see Laferrère 1999). Conversely, the question of the motives for co-residence between parents and their children has been largely neglected by economists, with a few exceptions (Ermisch 1996;

Ermisch and Di Salvo 1997; McElroy 1985; Rosenzweig and Wolpin 1993). A plausible explanation for this neglect is related to the difficulties in evaluating shared-housing arrangements compared with financial gifts, as it often seems problematical to separate the donor from the recipient of the housing transfer. In any case, it is unclear which generation benefits from co-residence, the parents or the children. Moreover, these arrangements are more likely to involve other types of transfer in the same or in the reverse direction, in the form of either money or services.

Therefore, the possibility of strong substitutions among the various transfer currencies suggests that home-sharing differs from the provision of non co-resident financial gifts and services. As claimed by Rosenzweig and Wolpin (1993), the provision of private assistance in the form of co-residence is characterized by the two following properties.

1. Because of the (quasi-) public good nature of housing services, co-residence is a cheaper mechanism for parents to transfer resources to their children than paying for another independent home.
2. Home-sharing entails a cost to the generations in terms of privacy, each generation having a strong preference to live in an independent home.

Two motives for financial transfers from parents to children need to be distinguished. On the one hand, altruistic transfers are explained by the donor's concern for the well-being of the recipient (Becker 1991), and generations perfectly pool their resources when transfers are strictly positive. On the other hand, the donor may be motivated by an exchange whereby services are expected in return for the financial gifts bestowed, so that the transfer amount can rise with the children's income when the demand of time-related resources by the parents is inelastic (Cox 1987). Children may also be induced to enter a system of familial loans when their borrowing on the credit market is constrained.[2]

As we consider housing transfers in the form of co-residence, the few models that have been proposed in the economic literature focus mainly on altruistic feelings within the family. Rosenzweig and Wolpin (1993, 1994) set out an overlapping-generations model where benevolent parents engage in a non-cooperative game with their children. In a static framework, Dunn and Phillips (1998), Ermisch and Di Salvo (1997) and Wolff (1999) extend the standard altruistic model by including co-residence which corresponds to a pure public good for households, non-housing consumption being a private good.[3] Finally, Ermisch (1996) considers a two-period model where parents decide on the level of financial and housing transfers conditional on the human capital investment decisions of their children, motives for transfers being relevant either from altruism or from exchange.

Recently, a few papers have attempted to relax the prevalent assumption of perfect information in models of private intergenerational transfers. In a setting of asymmetric information, Chami (1996, 1998) proves that an observability problem gives rise to a serious moral hazard problem, such that financial transfers are hence state-contingent.[4] The argument that parents are unable to observe perfectly the amount of effort provided by children also explains why altruistic parents have a strong preference for late bequests rather than early financial *inter vivos* transfers (Cremer and Pestieau 1996, 1998).

While *inter vivos* gifts occur prior to the realization of children's earnings, bequests are conversely conditioned on the children's realized income and hence provide incentives for the children to reveal their true ability. Using a model of altruism with endogenous labour supply, Fernandes (2000) proves that the redistributive neutrality property associated with altruistic feelings from parents does not hold when the work effort of children is privately observed. Finally, Cigno *et al.* (2000) examine the relationship between government and families in an imperfect information setting.

The purpose of this paper is twofold. First, we develop a model of intergenerational transfers that encompasses the three currencies of *inter vivos* solidarities: money, services and co-residence. Second, drawing on the most recent developments in the economics of the family, we assume asymmetric information between the parents and their children and consider that parents are not perfectly informed about the privacy cost to the offspring entailed by the home-sharing arrangements. Our aim is to get a better understanding of how the pattern of co-residence varies with the characteristics of children. In an altruistic model, it is expected that poorer children are more likely to live with their parents (Dunn and Phillips 1998; Ermisch 1996; Wolff 1999). The assumption of asymmetric information allows us to offer a different explanation for this prediction, relevant from a self-interest perspective rather than from altruistic feelings. Parents are induced to make transfers in order to discipline children and provide them with incentives to reveal their true privacy cost. Hence we prove that only the children who decide to stay at the parental home have the advantage of an informational rent, and that the rent is greater for those recipients characterized by a low privacy cost.

The remainder of this paper is organized as follows. Section I outlines a basic model of intergenerational transfers along with the notation. It includes the possibility of financial gifts, services and co-residence between parents and children. The full information solution is briefly discussed. In Section II, we assume that the children's cost of privacy involved by the home-sharing arrangement is privately known. Hence, following the theory of incentives contracting, the compensation structure that induces a truthful revelation leads to an informational rent that is derived only by co-resident children. In Section III, we study in greater detail the optimal solutions of the transfers currencies. Concluding comments are presented in Section IV.

I. A Model of Private Transfers

In this section we examine a theoretical static model of private transfers that accounts for three transfer currencies. We consider a family consisting of two generations, each being represented by only one individual. The parent and the child are, respectively, denoted by subscripts p and k.

Following Becker (1991), we make the assumption that the parent is altruistic. Hence he cares about the well-being of his child. The parental utility also depends on his non-housing private consumption, C_p, and his consumption of housing, H_p. Because of altruistic feelings, the parent can enhance the child's level of satisfaction by making a cash transfer T ($T \geqslant 0$). In return, the child provides upstream services S in the form of contact and attention, as described in Cox (1987) and Cox and Rank (1992).[5] While the parent enjoys an

increase in services, the child suffers from a disutility in helping the parent. The child's level of satisfaction also depends on his private consumption C_k and housing consumption H_k. A final transfer concerns the residence state. Let h be a parameter that indicates whether the parent and child live in independent homes ($h = i$) or co-reside ($h = c$). It is important to note that the various types of consumption, as well as the time-related and financial transfers, are conditioned by this choice of h.

So the parent maximizes the following utility function U^h:

$$U^h = U(C_p, H_p, S^h, V^h(C_k, H_k, S^h, \theta^h)), \qquad h = i, c, \tag{1}$$

where V^h is the level of satisfaction for the child conditional on his location choice and θ^h indicates the privacy cost for the child who resides at the parental home such that $\theta^c = \theta$, but $\theta^i = 0$. The model has the following structure (see Ermisch and Di Salvo 1997). The parent chooses his private and public consumptions as well as financial transfers in order to maximize his own satisfaction. Then, the child takes as given the parental transfers rules and she decides on the residence state and on her private and public consumptions so as to maximize her own utility.

In this model, the definition of the budget constraints depends on the co-residence status. We assume that each agent is endowed with a fixed amount of income, Y_p and Y_k. While Y_p does not depend on h, the levels of income Y_k^c and Y_k^i are likely to be different. Indeed, leaving the parental home is associated with greater job opportunities. Rather than having a low income Y_k^c under co-residence, a mobile child may more likely find a job with a higher wage. Job search associated with mobility is an effective mechanism to benefit from high returns of human capital investment, and thus the inequality $Y_k^i > Y_k^c$ holds. Another interpretation deals with the following sequential decision. First, the child lives with the parent and receives Y_k^c. Then, an attractive job opportunity is proposed to the child, who has to decide whether she will coreside or choose an independent home and receive a higher income.

Let us examine the two cases for h. When the child lives away from the parent ($h = i$), the constraints are:

$$C_p + H_p = Y_p - T^i, \tag{2}$$

$$C_k + H_k = Y_k^i + T^i. \tag{3}$$

The two constraints collapse to $C_p + H_p + C_k + H_k = Y_p + Y_k$ when $T^i > 0$. When the two generations co-reside in the parental home ($h = c$), the constraints are different:

$$C_p + H_p = Y_p - T^c, \tag{4}$$

$$C_k = Y_k^c + T^c. \tag{5}$$

The modification in the latter case is related to the public good nature of the housing consumption H_p.[6] The child may devote all her income to her private consumption as she derives satisfaction from the parental housing consumption H_p, but in return she will suffer from a privacy cost θ.

Using this simple model, we can easily predict how the characteristics of both the parent and the child affect the likelihood of financial and time

transfers as well as co-residence.[7] For example, the probability of observing a home-sharing arrangement decreases when the child is characterized by a high value of privacy cost. A same result is expected when the utility of extra consumption or extra housing is low, which is more likely for a high income child. Because of the altruistic motive in this model, it is expected that the parent will devote a greater amount of resources in the form of gifts and/or co-residence when the recipient child is in a poor financial situation.

II. Co-residence under Unobservable Privacy Cost

We now extend the previous model by relaxing the perfect observability within the family. We assume that the parent does not perfectly know the value of the child's privacy cost θ entailed by the home-sharing arrangement. In this setting, we use the theory of incentives contracting to prove that a co-resident child benefits from an informational rent given by the parent. As usual in the theory of cost-reimbursement rules (Laffont and Tirole 1993), we are induced to restrict our analysis to the case of linear and separable utility functions, θ being an additive privacy cost. Hence the utility function U^h of the parent conditional on the residence state ($h = i, h = c$) takes the two following values:

$$U^i = (Y_p - H_p - T^i) + \phi(S^i) + \beta_p(Y_k^i + T^i - \psi(S^i) - H_k), \tag{6}$$

$$U^c = (Y_p - H_p - T^c) + \phi(S^c) + \beta_p(Y_k^c + T^c - \psi(S^c) - \theta), \tag{7}$$

where β_p ($0 < \beta_p < 1$) is the altruistic weight attached by the parent to the child's level of satisfaction, $\phi(S^h)$ is a function that indicates the parental utility from receiving the child's services with $\phi' > 0$ and $\phi'' < 0$, and $\psi(S^h)$ is the loss of well-being suffered from the child when providing services, where $\psi' > 0$, $\psi'' > 0$ and $\psi(0) = 0$.

We make the restrictive assumption that the cost of the child's services does not depend on the child's location and enters additively in the objective function.[8] This avoids any effects between the family contract and the rental agreement, so that the services contractual relationship does not suffer from any information asymmetry and an efficient exchange can be implemented. However, it is necessary to account for services in our model because of the underlying exchange motive: a parent receives services from her child in exchange for financial transfers and possibly co-residence.

The child's desire for privacy entails the cost θ only in the case of co-residence. This privacy cost parameter θ, which is known privately to the child, is supposed to be a continuous parameter that belongs to the closed interval $\Omega = [\underline{\theta}, \bar{\theta}]$, where $\bar{\theta} > \underline{\theta}$. The parameter θ is modelled as the realization of a random variable with distribution $F(\theta)$ and corresponding density $f(\theta) > 0$ on Ω. We make the following assumption on F, which may be seen as a decreasing returns assumption:[9]

Assumption 1. Monotone hazard rate of F:

$$\frac{\mathrm{d}}{\mathrm{d}\theta}\left(\frac{F(\theta)}{f(\theta)}\right) \geqslant 0$$

The structure of moves in the model is given by the following sequence.

(i) The privacy cost θ is revealed to the child only.
(ii) The parent proposes a complete contract to the child.
(iii) The child accepts or rejects the contract.
(iv) The payoffs for both familial players are determined.

In this setting, the parent's problem is to design a compensation structure that maximizes his expected utility while guarantying the child at least his reservation utility. We define the child's reservation utility as the level of satisfaction that she will obtain if she refuses all future contact with her parents.[10] In that case, the child chooses independent residence. Clearly, this level of utility is given by $Y_k^i - H_k$. This reservation payoff means that no transfers are expected when the child does not accept the contract.

From the literature on incentive contracting and the revelation principle (Laffont and Tirole 1993), it is well known that, without loss of generality, one can restrict the search to the class of mechanisms that induce a truthful revelation of the child's privacy cost parameter θ. In the context of our model, any optimal mechanism M that induces a truthful reporting can be represented as the following allocation:[11]

$$M_\theta = \langle T_\theta^c, T_\theta^i, q_\theta \rangle$$

where q_θ is the probability that the child leaves the parental home for an independent housing, T_θ^i is the financial compensation to be made by the parent to the child as a function of the report of θ when independence is chosen, and T_θ^c has a similar interpretation when a co-residence contract is implemented.

Considering a mechanism M_θ, let $R_{\tilde{\theta},\theta}$ be the net level of satisfaction that is achieved by the child of type θ if she reports the type $\tilde{\theta}$, given her reservation payoff $Y_k^i - H_k$. Hence $R_{\tilde{\theta},\theta}$ may be expressed as ($\forall\tilde{\theta}, \theta \in \Omega$):

$$(8) \qquad R_{\tilde{\theta},\theta} = (1 - q_{\tilde{\theta}})[Y_k^c + T_{\tilde{\theta}}^c - \psi(S^c) - \theta] + q_{\tilde{\theta}}[Y_k^i + T_{\tilde{\theta}}^i - \psi(S^i) - H_k] - (Y_k^i - H_k).$$

Thus, the net rent $R_{\tilde{\theta},\theta}$ is:

$$(9) \qquad R_{\tilde{\theta},\theta} = (1 - q_{\tilde{\theta}})[Y_k^c - Y_k^i + T_{\tilde{\theta}}^c - \psi(S^c) + H_k - \theta] + q_{\tilde{\theta}}[T_{\tilde{\theta}}^i - \psi(S^i)]$$

We note $R_\theta = R_{\theta,\theta}$, the situation where the child's utility is truthfully reported. The requirement of truthful reporting gives us the incentive compatibility constraint (IC):

$$(10) \qquad R_{\theta,\theta} \geqslant R_{\tilde{\theta},\theta} \qquad \forall\tilde{\theta}, \theta \in \Omega.$$

Moreover, imposing the condition of individual rationality (IR), we have

$$(11) \qquad R_{\theta,\theta} \geqslant 0 \qquad \forall\theta \in \Omega.$$

In this setting, the parent's problem is given by the maximization of his expected linear utility under the incentive compatibility and the individual

rationality constraints:

$$\max_{S,T,q} \int_{\underline{\theta}}^{\bar{\theta}} \{(1-q_\theta)[Y_p - H_p - T_\theta^c + \phi(S^c)] + q_\theta[Y_p - H_p - T_\theta^i + \phi(S^i)] + \beta_p R_\theta\}\, \mathrm{d}F(\theta)$$

$$\text{s.t.} \begin{cases} R_\theta \geqslant R_{\tilde{\theta},\theta} & \forall \tilde{\theta}, \theta \in \Omega \quad \text{(IC)} \\ R_\theta \geqslant 0 & \forall \theta \in \Omega \quad \text{(IR)} \end{cases}$$

We are now able to solve this model of intergenerational transfers with asymmetric information between the generations. To find the optimal solutions of the various transfer currencies, we begin by characterizing the class of familial contracts that satisfies the incentive constraints in order to implement M_θ in a dominant strategy.

Proposition 1. The contract M_θ satisfies the incentive constraints if and only if

(i) $R_\theta = \int_\theta^{\bar{\theta}} (1 - q(x))\, \mathrm{d}x$,
(ii) $q'_\theta \geqslant 0 \qquad \forall \theta \in \Omega$.

Proof. From the definition of R_θ such that

$$R_\theta = \max_{\tilde{\theta} \in \Omega} \{(1-q_{\tilde{\theta}})[Y_k^c - Y_k^i + T_{\tilde{\theta}}^c - \psi(S^c) + H_k - \theta] + q_{\tilde{\theta}}[T_{\tilde{\theta}}^i - \psi(S^i)]\},$$

R_θ is an upper envelope of a linear function in θ; then it is convex, and we have almost everywhere using the envelope theorem ($\forall \theta \in \Omega$),[12]

$$R'_\theta = -(1 - q_\theta) < 0,$$
$$R''_\theta = q'_\theta \geqslant 0.$$

Now, by integration of R'_θ such that $R_{\bar{\theta}} = 0$, we obtain

$$R_\theta = \int_\theta^{\bar{\theta}} (1 - q(x))\, \mathrm{d}x,$$

which corresponds to the informational rent left to the child by the parent. □

Because of asymmetric information about the child's privacy cost parameter, the parent is forced to give up a costly rent to the child in the case of a home-sharing arrangement. This informational rent is used to discipline the child into revealing her true cost of privacy entailed by the coresidence.

Proposition 1 gives us two additional pieces of information about the location choice and the subsequent informational rent. On the one hand, we remark that the rent R_θ from the parent is a decreasing function of the privacy cost parameter θ. Hence, to be willing to reveal her true type, this result means that the lower θ-type of child must be rewarded with a more important rent value than the higher θ-type. On the other hand, from the monotonicity condition such that $q'_\theta \geqslant 0$, this implies that a child with a low privacy cost θ is

characterized by an increased probability of staying at the parental home in order to extract informational rent. Indeed, R_θ is a decreasing function in the probability q_θ of moving away from the parental home.

In this model of intergenerational transfers, therefore, the introduction of asymmetric information between parent and child allows us to suggest a more subtle explanation for why a child in a poor financial situation is more likely to stay at the parental home. Rather than relying on a pure altruistic explanation, whereby the parent provides a greater amount of help to the less well-off child, the model conversely argues in favour of a self-interested motivation, where a child with a low privacy cost is able to extract a greater informational rent. This sets up a strong incentive for a child to behave as if she were forced to live with the parent.[13] We now examine in greater detail the optimal solutions for the three transfer currencies.

III. The Pattern of Intergenerational Transfers

To find the components T^h and q_θ $(h = i, c)$ of the optimal implemented contract M_θ, we have to determine the expected utility function of the parent. We begin by calculation of the expected financial transfer T_θ that depends on the two residence states, which may be expressed as

$$T_\theta = (1 - q_\theta)T^c_\theta + q_\theta T^i_\theta.$$

From the definition of R_θ, we arrive at the following expected compensation:

$$T_\theta = R_\theta + (1 - q_\theta)[Y^i_k - Y^c_k + \psi(S^c) + \theta - H_k] + q_\theta[\psi(S^i)] \tag{12}$$

Now, we can insert this previous expected financial gift into the expected utility of the parent, which accordingly becomes

$$\overline{U} = \int_\Omega \{(1 - q_\theta)[Y^c_k - Y^i_k + H_k - \theta + \phi(S^c) - \psi(S^c)] + q_\theta[\phi(S^i) - \psi(S^i)] + (Y_p - H_p) - (1 - \beta_p)R_\theta\}\, \mathrm{d}F(\theta).$$

From Proposition 1, we know that the information rent R_θ received by the co-resident child is defined by $R_\theta = \int_\theta^{\bar{\theta}} (1 - q(x))\, \mathrm{d}x$. Hence, by integrating by parts, we obtain the following value for the parental expected utility $\overline{U}$:

$$\overline{U} = \int_\Omega \left\{ (1 - q_\theta)[Y^c_k - Y^i_k + H_k - \theta + \phi(S^c) - \psi(S^c)] + q_\theta[\phi(S^i) - \psi(S^i)] + (Y_p - H_p) - (1 - \beta_p)\frac{F(\theta)}{f(\theta)}(1 - q_\theta) \right\} \mathrm{d}F(\theta). \tag{13}$$

In our framework, the location decision does not affect the provision of services by children, and the characterization of the optimal family contract is only a function of the probability of home-sharing (see Proposition 1). Thus, the parent expects a fixed amount of attention conditional on the compensations that he offers to her child.

So, the parent and the child implement an efficient exchange. Since the contracted services cannot be used to induce type-revelation, there is no reason to distort the level of attention from its first-best level. The first-order conditions for the expected utility (13) are $\partial\overline{U}/\partial S^c = \phi'(S^c) - \psi'(S^c) = 0$ and $\partial\overline{U}/\partial S^i = \phi'(S^i) - \psi'(S^i) = 0$. The value of the child's services is chosen such that the parental marginal utility of attention is equalized with the child's marginal disutility of the provision for upstream services.[14] Hence, the level of attention is the same whatever the residence state, and we have $S^i = S^c = S^*$. Conversely, the optimal amounts of financial transfers depend on the child's location choice.

Proposition 2. The optimal residence choice is defined by the following condition:

$$q_{\hat{\theta}}^{*} = \begin{cases} 0 & \text{if} \quad \theta \leqslant \hat{\theta}, \\ 1 & \text{if} \quad \theta > \hat{\theta}, \end{cases}$$

where $\hat{\theta}$ is such that

$$(1 - \beta_p)\,\frac{F(\hat{\theta})}{f(\hat{\theta})} + \hat{\theta} = Y_k^c - Y_k^i + H_k.$$

Proof. Since $S^c = S^i = S^*$, we obtain the following derivative from (13):

$$\frac{\partial\overline{U}}{\partial q_\theta} = (1 - \beta_p)\,\frac{F(\theta)}{f(\theta)} + \theta - H_k + Y_k^i - Y_k^c.$$

Define $\hat{\theta}$ as that value for which $\partial\overline{U}/\partial q_\theta = 0$:

$$(1 - \beta_p)\,\frac{F(\hat{\theta})}{f(\hat{\theta})} + \hat{\theta} = Y_k^c - Y_k^i + H_k.$$

Then, Assumption 1 implies that, for $\theta > \hat{\theta}$, $(1 - \beta_p)F(\theta)/f(\theta) + \theta > (1 - \beta_p)F(\hat{\theta})/f(\hat{\theta}) + \hat{\theta}$, such that $\partial\overline{U}/\partial q_\theta > 0$. Thus, the optimal probability of leaving the parental home (denoted by $q_{\hat{\theta}}^{*}$) is equal to 1. The opposite holds true for $\theta < \hat{\theta}$, meaning that the probability of living away from the parental home is null when $\theta < \hat{\theta}$. □

Let us give an interpretation for the condition $(1 - \beta_p)(F(\hat{\theta})/f(\hat{\theta})) + \hat{\theta} = Y_k^c - Y_k^i + H_k$. We know that the parent receives the same level of services from the two types of child (co-resident or non co-resident). Hence, it is in the parent's interest to buy the services at a low cost, so that the problem is $\min[E_\theta(T_\theta)]$. However, the altruistic parent takes into account the informational rent left to the co-resident child, so that he maximizes $\max[E_\theta(\beta_p R_\theta)] = \beta_p \int_\Omega [1 - q(\theta)]F(\theta)/f(\theta)\,\mathrm{d}\theta$. Thus, the optimal level $\hat{\theta}$ is defined by $\partial[\beta_p E(R_\theta) - E(T_\theta)]/\partial q(\theta) = 0$. At the equilibrium, the marginal value of the rent is equalized with the marginal cost of the financial transfer.

We now study the various factors that affect the location choice of the child. Let L_θ be the function defined by $L_\theta = (1-\beta_p)F(\theta)/f(\theta) + \theta$ with $L'_\theta > 0$, so that the threshold value for the privacy cost $\hat{\theta}$ is given by $\hat{\theta} = L^{-1}(Y_k^c - Y_k^i + H_k)$. The implications of the model are as follows. The higher the child's level of income when staying at the parental home, the less likely the child is to move away from her parent.[15] Conversely, a higher level of income associated with greater job opportunities in the case of mobility diminishes the occurrence of co-residence ($\mathrm{d}\hat{\theta}/\mathrm{d}\,Y_k^i < 0$). With poor job market propositions, co-residence is more likely. The location choice also depends on the housing consumption, as shown by the positive sign of $\mathrm{d}\hat{\theta}/\mathrm{d}H_k$. The child prefers to live at the parental home when the housing cost for an independent home is too expensive. Finally, the more the parent exhibits altruistic concerns towards the child, the more likely the child is to accept the home-sharing arrangement. Indeed, an important value for the caring parameter β_p represents a situation where the parent is prepared to give up informational rent to the child.

It is now possible to draw a more complete description of the residence choice. From the self-selection process involved by the underlying contract of family transfers, we note that only the child who stays at the parental home may benefit from the informational rent subsequent to asymmetric information. The following corollary indicates the direction in which the distortion goes.

Corollary 1. The assumption of asymmetric information leads to an increased probability that the child chooses independent residence.

Proof. Under asymmetric information, the threshold value $\hat{\theta}$ for which the child is indifferent between living outside or in the parental home is such that $\hat{\theta} = H_k + Y_k^c - Y_k^i - (1-\beta_p)F(\hat{\theta})/f(\hat{\theta})$. Under symmetric information, the informational rent is equal to zero and the parent maximizes his expected utility $\overline{U}$:

$$\max_{S,\,q}\ \overline{U} = Y_p - H_p + q_\theta[\phi(S^i) - \psi(S^i)] + (1-q_\theta)[Y_k^c - Y_k^i + H_k - \theta + \phi(S^c) - \psi(S^c)].$$

Thus, we obtain

$$\frac{\partial \overline{U}}{\partial q_\theta} = -H_k + \theta + Y_k^i - Y_k^c \leqslant (\geqslant) 0 \quad \Leftrightarrow \quad \theta \leqslant (\geqslant)\theta^* = H_k + Y_k^c - Y_k^i.$$

By comparing θ^* and $\hat{\theta}$, we deduce that $\theta^* > \hat{\theta}$. The probability of independent residence is $\Pr(\theta \geqslant \theta^*) = 1 - F(\theta^*)$ under symmetric information and $\Pr(\theta \geqslant \hat{\theta}) = 1 - F(\hat{\theta})$ under asymmetric information. Since $\theta^* > \hat{\theta}$, we arrive at the result that $\Pr(\theta \geqslant \theta^*) < \Pr(\theta \geqslant \hat{\theta})$ □

Corollary 2. The information rent R_θ is given by

$$R_\theta = \hat{\theta} - \theta \qquad \forall \theta \leqslant \hat{\theta}.$$

Proof. From Proposition 1, the rent R_θ is $R_\theta = \int_\theta^{\bar{\theta}} (1 - q(x))\, \mathrm{d}x$. Hence we can write

$$R_\theta = \int_\theta^{\hat{\theta}} (1 - q(x))\, \mathrm{d}x + \int_{\hat{\theta}}^{\bar{\theta}} (1 - q(x))\, \mathrm{d}x.$$

But from Proposition 2, the probability of moving away from the parental home is such that $q(x) = 0$ when the condition $\theta \leqslant \hat{\theta}$ is satisfied and $q(x) = 1$ if $\theta > \hat{\theta}$, so that the rent becomes

$$R_\theta = \int_\theta^{\hat{\theta}} \mathrm{d}x.$$

This clearly gives the optimal solution defined by $R_\theta = \hat{\theta} - \theta$. □

In this model, the assumption of asymmetric information forces the parent to give up a costly rent to the child who decides to live with his parent. Hence, there is a strategic incentive for the offspring not to move away in order to take advantage of the parental generosity. Besides, the informational rent is higher when the child is characterized by a low privacy cost. To solve the various choices of intergenerational transfers, we finally calculate the optimal values for the financial gifts conditional on the residence state.

Proposition 3. The optimal values for the parental financial gifts are

$$T_\theta^{c^*} = \psi(S^*) + \hat{\theta} - H_k + Y_k^i - Y_k^c,$$
$$T_\theta^{i^*} = \psi(S^*).$$

Proof. Using (12), we calculate the following optimal value for the financial gift in the case of co-residence, since $q_\theta = 0$ and $R_\theta = \hat{\theta} - \theta$:

$$T_\theta^{c^*} = (\psi(S^*) + \theta - H_k + Y_k^i - Y_k^c) + (\hat{\theta} - \theta).$$

Hence the result is that $T_\theta^{c^*} = \psi(S^*) + \hat{\theta} - H_k + Y_k^i - Y_k^c$. But, as we consider a child who does not live at the parental home, her privacy cost satisfies the condition $\theta \geqslant \hat{\theta}$, so that she does not benefit from any informational rent ($q_\theta = 1, R_\theta = 0$) and $T_\theta^{i^*} = \psi(S^*)$. □

The main implication is that the financial transfer bestowed by the parent does not depend on the true value θ of the child's privacy cost. When the parent and the child live apart, the condition $T^{i^*} = \psi(S^*)$ means that the gift value is equalized with the compensation entailed by upstream services. Under co-residence, we can write $T_\theta^{c^*} + Y_k^c = \psi(S^*) + \theta + (\hat{\theta} - \theta) + (Y_k^i - H_k)$. Now, the child's full income is equalized with the sum of the attention cost, the privacy cost θ, the gain resulting from informational rent $(\hat{\theta} - \theta)$, and the reservation payoff.

Corollary 3. Co-residence decreases the amount of financial transfer received by a child.

Proof. From the definition of $\hat{\theta}$, we have $-H_k + Y_k^i - Y_k^c = -\hat{\theta} - (1-\beta_p)F(\hat{\theta})/f(\hat{\theta})$. The optimal amount $T_\theta^{c^*}$ is $T_\theta^{c^*} = \psi(S^*) + \hat{\theta} - H_k + Y_k^i - Y_k^c$ and hence we get $T_\theta^{c^*} = \psi(S^*) - (1-\beta_p)F(\hat{\theta})/f(\hat{\theta})$. Since $T_\theta^{i^*} = \psi(S^*)$, the equality $T_\theta^{c^*} = T_\theta^{i^*} - (1-\beta_p)F(\hat{\theta})/f(\hat{\theta})$ holds, which proves that $T_\theta^{c^*} < T_\theta^{i^*}$. □

Finally, we examine the various factors that affect the amount of financial transfers at the equilibrium. As found in exchange models without home-sharing, the gift value is expected to increase with a rise of upstream services whatever the state residence, since $\mathrm{d}T_\theta^h/\mathrm{d}S^* = \psi'(S^*) = \phi'(S^*) > 0$ $(h = i, c)$. Under co-residence, the gift is a decreasing function of the child's income.[16] Indeed, we have $\operatorname{sgn} \mathrm{d}T_\theta^{c^*}/\mathrm{d}Y_k^c = \operatorname{sgn}(\mathrm{d}\hat{\theta}/\mathrm{d}Y_k^c - 1)$. From the definition of $\hat{\theta}$, we calculate the derivative $\mathrm{d}\hat{\theta}/\mathrm{d}Y_k^c$, which is given by

$$\frac{\mathrm{d}\hat{\theta}}{\mathrm{d}Y_k^c} = \frac{1}{1 + (1-\beta_p)\dfrac{\mathrm{d}}{\mathrm{d}\theta}\left(\dfrac{F(\hat{\theta})}{f(\hat{\theta})}\right)}.$$

Provided that $\beta_p \in [0;\ 1]$, and given Assumption 1, it is easy to note that $\mathrm{d}\hat{\theta}/\mathrm{d}Y_k^c < 1$ and hence $\mathrm{d}T_\theta^{c^*}/\mathrm{d}Y_k^c \leqslant 0$. The optimal transfer is also an increasing function of the independent child's level of income Y_k^i. However, when the two generations live apart, the gift value is not affected by a change in the child's income and $\mathrm{d}T_\theta^{i^*}/\mathrm{d}Y_k^i = \mathrm{d}T_\theta^{i^*}/\mathrm{d}Y_k^c = 0$. The housing value H_k does not influence the parental transfer under independent residence $(\mathrm{d}T_\theta^{i^*}/\mathrm{d}H_k = 0)$, but it exerts a negative effect on the gift value when the parent and child live in the same home. The child is expected to receive a higher amount when she is characterized by an important reservation payoff. Finally, the degree of altruism β_p does not modify the gift value $T_\theta^{i^*}$, but it does exert a positive effect on $T_\theta^{c^*}$, since an altruistic parent is more likely to give informational rent to his child $((\partial T_\theta^{c^*}/\partial\hat{\theta})(\partial\hat{\theta}/\partial\beta_p) > 0)$.

IV. Conclusion

In this paper we have stressed the role of private information in family resource allocation. We propose a model of intergenerational transfers in the currencies of money, time and co-residence between a parent and a child in a setting of asymmetric information. Using the theory of incentives contracting, we show that a child who decides to co-reside receives informational rent from the parent: this occurs because the child has private information about her privacy cost entailed by the home-sharing. A full characterization of the familial choices of transfers is then provided. Following the implemented exchange contract, the informational rent is greater for the co-resident child who has a low privacy cost. Hence leaving the parental home may be seen as a self-selection device. The child effectively benefits from informational rent, provided that she does not move away from her parent, which requires that her privacy cost does not exceed a given threshold.

A question worth addressing is that of the relevancy of our model regarding empirical evidence. The framework that we have developed in this paper seems especially difficult to test. Indeed, in most data-sets, we do not find information concerning the three currencies of intergenerational solidarities, co-residence, gifts and services. Besides, questions related to both time and money transfers are usually put only to parents with non co-resident children; implicitly, it is assumed that parents make regular gifts and receive frequent services from co-resident children. The relevance of asymmetric information could be estimated by observing children's residence decisions and parental transfer responses targeted at exogenous events, such as income losses resulting from involuntary unemployment or disability, suggesting the use of a panel data-set. To the best of our knowledge, there do not exist appropriate data to test our model, and further evidence is needed to understand home-sharing arrangements.

Recently, some studies have argued that imperfect information accounts for many of the patterns of financial intergenerational transfers. Since the neutrality property of the altruism model does not hold (Altonji *et al.* 1997; Wolff 2000), some authors have focused on private information in the context of family transfers.[17] In that case, the need to convey incentives to the child causes the redistributive neutrality to break down. Fernandes (2000) finds that the magnitude of the asymmetric information correction factor is substantial when assessing the validity of the redistributive neutrality test. Villanueva (2001) shows that, in the household of a married child, the probability of receiving money responds more to the income of the primary earner than to the income of the secondary earner. Determining whether the assumption of asymmetric information may also be relevant for family residence decisions is an important question left for future research.

Rather than relying on altruism, our model assumes that co-residence is part of an intergenerational exchange within the family, a motive for which there exists empirical support. As noted by Attias-Donfut and Rozenkier (1996), the situation of cohabitation corresponds to one of mutuality, where private assistance must be seen in the context of relations established since childhood. When they become adult, children may stay at the parental home and receive additional financial aid and other support, which helps them to climb the social ladder; but in return they have later to care for aged parents who gain the ongoing presence and time-related assistance of their progeny. Children repay their debt through this intertemporal exchange. The co-residence choice may also convey another benefit: from the material viewpoint, co-resident children often get donations of the parental house (Dunn and Phillips 1998).[18]

A final comment concerns the role of intergenerational transfers in the ability of parents to influence the behaviour of their children. Hao *et al.* (2000) present a model of family reputation formation, where parents make a strategic use of their transfers in an attempt to prevent their children's undesirable actions.[19] In our own perspective of intergenerational exchange within the family, home-sharing and financial transfers from parents may, conversely, be seen as a positive rather than negative sanctioning to supervise the children's behaviour, by promoting a model of mutual assistance that takes the form of a cyclical exchange of gifts throughout the life course.

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NOTES

1. For example, Konrad *et al*. (2003) show that altruistic children have a strategic incentive to move away from their parents when they have siblings. By their own location choice, children are able to shift some of the burden of taking care of their elderly parents on to their siblings.
2. Other forms of exchange models are the strategic bequest transfers from Bernheim *et al*. (1985), where parents get a greater amount of the children's attention by threatening to disinherit them, and the intertemporal exchange in the presence of credit market imperfections, where gifts to children are a way of saving for old-age support (Cigno 1993).
3. Financial transfers are greater when the parents and the children live apart than when they are co-residing. There exists an intermediate range where the parents make no transfers during co-residence, but give money when the children live in an independent home (Ermisch and Di Salvo 1997; Wolff 1999).
4. Labour market conditions exert an influence on the type and level of transfers given by the parents (Chami 1998). For example, in the case of a precommitment, altruistic parents are more likely to use a state-contingent sharing rule than a fixed transfer rule.
5. In this familial exchange, these services correspond to care in old-age and companionship, and they are supposed to be without close market substitutes (Cox 1987, 1996).
6. The assumption according to which housing is a pure public good generates a trade-off between the cost saving from co-residence and the cost of privacy involved in co-residence. While housing is certainly not a pure public good, there may be some cost savings and this leads to qualitatively similar results.
7. The various predictions related to the financial and home-sharing transfers in this static altruistic setting are examined in greater detail by Ermisch and Di Salvo (1997) and Wolff (1999).
8. To account for the positive relationship between cost of services and the child's location, one can consider that a child living outside suffers from an additional cost D arising from the distance travelled when visiting parents. This does not change the main conclusions of our analysis, since it just implies that a non co-resident child has a net level of income $Y_k^i - D$.
9. The monotone hazard rate of F is a condition that is satisfied by the most standard distributions, i.e. uniform, normal, logistic, exponential or chi-squared (Laffont and Tirole 1993, p. 66).
10. We are indebted to the referees for their suggestions concerning the specification of the individual rationality constraint.
11. The variables that depend on the value of the privacy cost θ are given the subscript θ.
12. To prove this proposition, we can also follow the approach of Laffont and Tirole (1993). Nevertheless, the proof is now standard, so that we prefer to give a shorter one.
13. In this paper we restrict our attention to the case of complete contracts between parents and their children. On the one hand, from an historical perspective, numerous studies have shown that, in the context of family exchanges, parents were signing official contracts with their children for a provision of upstream services and attention in exchange of bequest. On the other hand, there is actually a controversial debate concerning incomplete contracts, with the need for a formal theory of bounded rationality (Tirole 1999). Thus, the possibility that family contracts are not necessarily complete is left for future research. This issue of incentives within the family is further discussed in an altruistic setting by Becker (1991), Lindbeck and Weibull (1988), and Bruce and Waldman (1990).
14. This result also holds in the model of intergenerational exchange transfers without home-sharing, proposed by Cox (1987) and Cox and Rank (1992), where the marginal cost of the child's time-related transfer equalizes the marginal utility of services for the parent.
15. The probability that the child chooses the co-residence state is given by $\Pr(\theta \leqslant \hat{\theta}) = F(\hat{\theta})$.
16. The same effect may be positive in the exchange model developed by Cox (1987) and Cox and Rank (1992). As we consider a rise in the child's income, the parent has to pay a higher price to receive the same level of attention from his child, but he also buys a lower amount of services. The relationship between the child's income and the financial transfer received is more likely to be positive.
17. Under altruism, the difference between the transfer derivatives with respect to parent's and child's incomes should equal unity. This prediction is rejected according to the data both in the United States and in France.

18. Dunn and Phillips (1998) show that the deed to a parent's residence and to other parental property is more likely to be passed to a co-resident child than to a non co-resident child.
19. Parents have the incentives to penalize teenage childbearing of their older daughters to avoid teenage childbearing decisions of their younger daughters when the daughters do not know the parental preferences with certainty. Hence parents treat their daughters differently according to their birth order so as to establish a reputation for preventing teenage childbearing, and they influence the children's behaviour through their choices of intergenerational transfers: the probability that a daughter with a teen birth will receive financial and co-residence support from parents decreases according to the number of daughters remaining at risk.

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