Do downward private transfers enhance maternal labor supply? Evidence from around Europe [#]

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Abstract: With the use of a theoretical model of downward private transfers with endogenous labor supply and recursive econometric models based on 2317 mother-daughter pairs from the 2003 SHARE data on 10 European countries, we investigate the impact of private transfers on the career choices of transfer-receiving young mothers. For Europe as a whole, we find a strong positive impact of grandchild care on the labor force participation decision of the mother, but no clear impact of either grandchild care or monetary transfers on the mother's degree of labor market involvement. However, the link between family transfers and labor supply exhibits an interesting pattern across institutional settings. Finally, while both recipients and donors with better endowments are more likely to participate in a monetary transaction, time transfers are such that mothers with lower level of human capital tend to assist the professional development of their better endowed daughters.

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1/Introduction

During the past several decades, decreasing fertility rates and rising life expectancy turned the attention of economists towards several major implications of population ageing around the world. On the one hand, researchers forecasted the impact of a shrinking labor force on economic growth and the fiscal sustainability of the pay-as-you-go pension system. They proposed an increase in retirement age and phasing out of the public pension premium over time as solution to the economic challenges (see Börsch-Supan, 2001, Beetsma et alii, 2003). In an alternative, but related analytical framework, economists explored the impact of the rising demand for informal elderly care on the labor supply of the care provider. This impact was typically found to be significant and negative (Boaz and Muller, 1992, Ettner, 1995, 1996).

Despite an overwhelming evidence of prime age inactivity in the shrinking labor force of Europe (Eurostat, 2005), and in spite of the stylized dual negative impact of female labor market participation on fertility and of institutional inflexibility on the balancing of motherhood and career (Iglesias and Ribout, 1985; Gustafsson and Jacobsson, 1985; Gustaffson et alii, 1996), little rigorous attempt has been made to explore the impact of the complex gamut of downward intergenerational transfers on the career and/or fertility choices of the younger generation in aging economies. The large body of research addressing the (simultaneous) choice of childcare and work among (potential) mothers typically concentrated on the labor market implications of government induced monetary incentives, treating the availability of informal care as exogenously given (Gronau, 1973, Heckman, 1974, Blau and Robins, 1988). At the same time, the literature studying the impact of downward intergenerational transfers on the labor supply of young individuals has focused almost exclusively on consequences of downward monetary gifts such as work disincentives or human capital investment (Ehrenberg and Sherman, 1987; Keane and Wolpin, 1997; 2001; Dustmann and Mickelwright, 2001, Wolff, 2006).

To the best of our knowledge, the only microeconomic studies that addressed the impact of intergenerational solidarity on the choice between motherhood and work explored the link between intergenerational co-residence and the labor supply of young women (Ogawa and Ermisch, 1996; Sasaki, 2002). These studies found a positive impact of intergenerational co-residence on the labor supply of young female participants in the

intergenerational exchange and interpreted this result as indicative of a high correlation of co-residence and downward time transfers and hence positive impact of the latter on the work effort of the recipient. While acknowledging the possibility that other factors such as the monetary needs of larger intergenerational families might have triggered the positive correlation, these studies waved them away as unlikely based on both related questionnaire responses and age and matrimonial status of the recipients and donors, making downward transfers more likely than upward transfers.

Such arguments leave out of focus the potentially important implications of downward transfers of time and money in non-co-residing intergenerational households. On the one hand, there is strong evidence to suggest that while intergenerational co-residence in countries such as those of Western Europe and the United States is decreasingly frequent, time services, especially in the form of grandchild care are non-decreasing and indeed on the rise (Tobio, 2001; Leira et alii, 2005). Even more importantly, failure to consider the possibility of substituting monetary for time transfers to children may have important implications from the point of view of economic performance. For instance, it is plausible to assume that wealthier and/or more productive parents might choose to provide monetary instead of time support to their adult children, and this choice would coincide with continued labor force involvement on the part of the donor.

At the same time, the impact of the substitution of monetary for time assistance on the labor supply of the recipient is *a priory* unclear. Such assistance can discourage the labor market involvement of the recipient due purely to its stylized income effect. But it can equally increase the incentive of the recipient to undertake paid employment by way of releasing the paid child care constraint, especially among low -skilled and low-income recipients for whom the latter may have proved prohibitively high. In other words, failure to explicitly model different types of transfers across both co-residing and non-co-residing intergenerational households and leaving out of focus the possibility of substitution of monetary for time transfers may bias the results from previous studies.

This paper attempts to fill the gap in the literature with a simple theoretical model, linking informal child care and/or monetary transfers provided by a benevolent parent and the labor supply of a transfer-receiving child, and an empirical test of the hypotheses derived from the model with the use of a rich data set on 10 different European countries. The solution of the theoretical model leaves us with three reduced form equations of grandchild

care, monetary gift provision and labor supply by the transfer-receiving child, where grandchild care and monetary gifts are endogenous in the labor supply equation of the child. We estimate this simultaneous recursive model with the use of maximum likelihood.

For Europe as a whole, we find a strong positive impact of grandchild care on the labor force participation decision of the mother, and no impact of either grandchild care or monetary transfers on the mother's degree of labor market involvement. However, the link between intergenerational transfers and labor supply exhibits an interesting pattern across family oriented institutions. Furthermore, while both recipients and donors with better endowments are more likely to participate in a monetary transaction, time transfers follow an intergenerational solidarity pattern, whereby mothers with lower level of human capital tend to assist the professional development of their better endowed daughters.

The contribution of this paper to the previous literature is twofold. First, we touch upon a rather unpopular dimension to the debate on inter-generational transfers and labor supply in ageing economies by testing the hypothesis of efficient reallocation of resources across generations. Our null hypothesis is that members of each generation self-select into an optimal equilibrium of household assistance and labor supply based on a set of human capital characteristics. Secondly, we benefit from the availability of comparable data for 10 different countries to explore the impact of family related institutions on the choices made by individuals and households.

The remainder of the paper is organized as follows. In Section 2, we present a simple model of intergenerational transfers where an altruistic parent provides time-related resources to the child and the child's labor supply is endogenous. The solutions for the transfer and labor functions define a recursive, simultaneous equations model whose estimation strategy is presented in Section 3. The relationship between grand- child care, monetary transfers and labor supply is tested using the SHARE data set described in some detail in section 4. The different results obtained through maximum likelihood estimation are discussed in Section 5. Finally, section 6 concludes.

2/ A model of private transfers of time and money with endogenous labor supply

We start our analysis with an intergenerational model of private transfers where parents help their children by providing grandchild care and financial gifts. To better understand the link between the receipt of parental help and the child's decision to

undertake paid employment, we assume that the child's labor supply is endogenous. We begin with a description of the basic framework, after which we solve the sequential transfer game.

We assume that downward transfers are driven by altruism as opposed to strategic exchange behavior (Laferrère and Wolff, 2005). This strong assumption is based on the fact that an exchange-motivated grandchild care supply in the classical sense, whereby the donor provides a service in exchange for money (Cox, 1987), is unlikely. Such a service would induce a very low repayment on the part of the child; if not, the child would have opted for formal (instead of informal) child care services.

One could, of course, suggest a dynamic conceptual framework whereby the provision of current period downward transfers of time and money on the part of the parent is stimulated by the more complex exchange motive for repayment in terms of future supply of informal care or money to the elderly parent. However, the empirical literature has failed to find convincing evidence in support of exchange motivated coexistence of upward and downward transfers of services and money (see the discussion in Laferrère and Wolff, 2005). To the extent to which our focus is on the present period impact of transfers on the labor supply of the recipient, and given that our data is only available for a single point in time, we believe a life cycle exchange conceptual framework to be unnecessary complicating. This is especially relevant to the subsequent empirical analysis of West European economies marked by strong old age social security support and hence relatively low incidence of private upward transfers.

Our model consists of two actors: an adult child who decides how many work hours to supply, and a parent who helps his adult child with grandchild care and cash gift. The parent and the child are denoted by subscripts p and k, respectively. We assume that both the parent and the child are represented by only one individual. In other words, we assume income pooling at the household level for both the parent and the child, and we neglect complex bargaining issues between spouses.

We consider the following two-stage game. In the first stage, the altruistic parent provides transfers, either grandchild care or money. In the second stage, conditional on the parental transfer decision, the child chooses the number of work hours. This recursive structure allows us to solve the model through backward induction. We begin by analyzing

the child's labor supply decision provided that the parent makes transfers, after which we characterize the optimal pattern of parental transfers.

The child is characterized by a utility function $v(c_k, l_k)$, which depends on the level of private consumption c_k and on the amount of leisure l_k. The level of satisfaction is increasing in both arguments, so that we have $v_1 > 0$ and $v_2 > 0$. We also assume that v is continuous, twice differentiable and quasi-concave ($v_{11} < 0$, $v_{22} < 0$).

There are two resource constraints for the child. First, the total amount of time (normalized to one) is devoted to hours of work h_k and leisure l_k, but the child may also benefit from grandchild care s: these care services extend the child's full amount of time, as (s)he may spend additional time to other activities when being helped. Secondly, the child may receive a gift T, so that his total income is $wh_k + y_k + T$, where w is the wage rate and y_k is an exogenous non-labor income. In sum, the two constraints are $h_k + l_k = 1 + s$ and $c_k = wh_k + y_k + T$.

After making the appropriate substitutions, the child's problem amounts to :

$$\max_{h_k} v(wh_k + y_k + T, 1 + s - h_k) \tag{1}$$

The corresponding first-order condition $\partial v / \partial h_k = 0$ implies :

$$wv_1 - v_2 = 0 \tag{2}$$

In other words, the marginal gain of paid employment wv_1 is equal to the marginal disutility of work v_2 in equilibrium. From (2), the optimal labor supply function of the child can be expressed as:

$$h_k = h_k(w, y_k, s, T) \tag{3}$$

It is then straightforward to investigate the effects of the different exogenous variables on the optimal amount of labor supply. Specifically, we find that :

$$\frac{dh_k}{ds} = -\frac{wv_{12} - v_{22}}{w^2 v_{11} - wv_{12} - wv_{21} + v_{22}} > 0 \tag{4}$$

$$\frac{dh_k}{dT} = -\frac{wv_{11} - v_{21}}{w^2 v_{11} - wv_{12} - wv_{21} + v_{22}} < 0 \tag{5}$$

As the denominator is negative for a maximum and the utility function is concave, it follows that the effect of s on h_k is necessarily positive, at least under the reasonable assumption

that $v_{12} > 0$ (a complementarity between c_k and l_k in the utility function): with more parental services, the child is able to spend more time on paid employment. At the same time, the cash gift has an opposite effect on the child's labor supply. Receiving more money reduces the child's incentives to have a paid job, due simply to an income effect.

Note that, as mentioned at the outset of the paper, transfer money spent on formal child care can release the monetary constraint and hence provide a stimulus to a recipient, especially one in the lower part of the skill distribution for whom formal childcare costs have proved to be prohibitive, to opt for paid employment. However, the inability of providers of monetary as opposed to in-kind transfers to have full control over the choices made by the recipient make the theoretical modelling of this possibility difficult (Pollak, 1988)[1]. Hence, while our null hypothesis is that monetary transfers have a negative impact on the labor supply of the recipient, we leave this hypothesis open to an empirical rejection.

We can now turn to the parental problem. Let $u(c_p, s)$ be the parental utility function, which is increasing in private consumption c_p and grandchild care s, i.e. $u_1 > 0$ and $u_2 > 0$. The latter assumption is based on the psychologically and anthropologically reasonable assumption that the parent enjoys spending time with the grandchildren. While we assume such intrinsic utility for the provision of grandchild care services, there is no joy-of-giving motive in our model (Andreoni, 1990). This would be the case with the cash gift as a direct argument of the parental utility function. Once again, the reason for this is our focus on the link between childcare and labor supply and the related direct and easier to account for impact of in-kind as opposed to monetary transfers on the behaviour of the recipient (Pollak, 1988). Monetary transfers therefore enter our model as nothing more than a substitute for time transfers in releasing the constraints faced by the recipient.

We assume that $u(.)$ is continuous, twice differentiable, and quasi-concave, so that $u_{11} < 0$ and $u_{22} < 0$. Since the parent behaves as an altruist, (s)he seeks to maximize the augmented utility function $u(c_p, s) + \beta_p v(c_k, l_k)$, where β_p is the caring parameter. It indicates the strength of the altruistic feelings from the parent towards the child, and this parameter belongs to the closed interval [0;1].

[1] And indeed for the subsequent empirical analysis we have no information on the specific use a monetary transfer received has been put into.

The parent is endowed with a fixed income y_p, but making transfers is costly. While this is evident for the cash gift which directly reduces the available income, we also assume that caring for the grandchildren is costly. For instance, even aside from accounting for the opportunity cost of foregone employment, visiting the grandchild (who does not necessarily live in the same dwelling) entails some distance related costs. Let p be the price per unit of services, which is an increasing function of the geographic distance between the child and the parent. Then, the budget constraint for the parent is :

$$c_p = y_p - T - ps \tag{6}$$

Recalling that h_k is a function of s and T, the maximization program for the parent becomes:

$$\begin{aligned} &\max_{s,T} u(y_p - T - ps, s) + \beta_p v(wh_k + y_k + T, 1 + s - h_k) \\ &s.t. \quad h_k = h_k(s,T) \end{aligned} \tag{7}$$

Hence, the first-order conditions which give the optimal transfer values are (respectively for s and T):

$$-pu_1 + u_2 + \beta_p(wh_{k1}v_1 - h_{k1}v_2 + v_2) = 0 \tag{8}$$

$$-u_1 + \beta_p v_2 + \beta_p(wh_{k2}v_1 - h_{k2}v_2) = 0 \tag{9}$$

with $h_{k1} = \partial h_k / \partial s$ and $h_{k2} = \partial h_k / \partial T$. At first sight, these conditions seem difficult to interpret. Fortunately, they can be simplified using (2), i.e. $wv_1 - v_2 = 0$. This gives:

$$-pu_1 + u_2 + \beta_p v_2 = 0 \tag{10}$$

$$-u_1 + \beta_p v_1 = 0 \tag{11}$$

The interpretation of (10) and (11) is now straightforward. According to (10), the cost for the parent to care for the grandchildren (owing to the price of those services) is equal to the sum of the selfish benefit u_2 and the altruistic gain $\beta_p v_2$ given by the increase in the child's level of well-being. According to (11), the marginal utility lost of transferring money to the child (owing to a lower income) is equal to the child's marginal utility of receiving money[2]. Combining (10) and (11) leads to :

[2] Interestingly, this standard first-order condition which links the parent's and child's marginal utility of consumption also holds in the basic altruistic model (Laferrère and Wolff, 2005).

$$u_2 / p + \beta_p v_2 / p = \beta_p v_1 \quad (12)$$

meaning that, for the child, the marginal benefit of receiving money is equal to the marginal benefit of receiving grandchild care. When this equality does not hold, a better outcome can be reached by reallocating parental resources between grandchild care and cash gifts. Finally, using (10) and (11), we deduce that the optimal transfer functions for the parent are given by:

$$s = s(w, p, \beta_p, y_p, y_k) \quad (13)$$

$$T = T(w, p, \beta_p, y_p, y_k) \quad (14)$$

which indicates how the respective incomes of the parent and the child influence the provision of services. In this model where an altruistic parent commits to transfer values which the child takes as given, we find that both type of transfers are endogenous in the child's labor force participation equation. From an empirical perspective, it means that the grandchild care, cash gift and labor supply equations have to be jointly estimated as these three equations define a recursive, simultaneous equations model. We now turn to the methodology used in estimating the parameters of the corresponding structural equations.

3/ Econometric methodology

In our empirical part, we do not attempt to estimate the structural model associated with our theoretical framework, as the choice of a specific utility function would certainly drive the empirical results. We rely instead on a simultaneous-equations model with latent variables (Heckman, 1978, Maddala, 1983). This allows us to account for the endogeneity of both the financial and time transfers in the child's labor supply equation. The econometric model includes three equations.

The first two equations are related to the different parental transfers. Following equation (13) and (14), we can express both the financial gift and grandchild care transfer as a function of several different exogenous characteristics. Let s^* and T^* be two latent variables indicating the propensity of the parent to provide respectively grandchild care and cash gift, s^* and T^* being either positive or negative). The two transfer equations are given by :

$$s^* = X_s \beta_s + \varepsilon_s \quad (15)$$

$$T^* = X_T \beta_T + \varepsilon_T \tag{16}$$

where X_s and X_T are two sets of variables explaining respectively the grandchild care and financial gift outcomes, β_s and β_T is the vector of associated parameters, and ε_s and ε_T are two random term errors which are normally distributed. Importantly, these two error terms may be correlated.

By definition, the two latent variables s^* and T^* are not observed from the data, but we have some information on the observed counterpart of the transfer variables. Unfortunately, owing to limitations with the data, we restrict our attention to the discrete decisions of giving for the parent, which are denoted by s and T, respectively. Let $s = 1$ when the parent provides grandchild care and $T = 1$ when the parent gives money to the child. Then, we have :

$$s = \begin{cases} 1 & if \quad s^* > 0 \\ 0 & if \quad s^* \leq 0 \end{cases} \tag{17}$$

$$T = \begin{cases} 1 & if \quad T^* > 0 \\ 0 & if \quad T^* \leq 0 \end{cases} \tag{18}$$

To be consistent with the theoretical framework, the third equation indicates that the child's latent labor supply h^* depends on a set of exogenous covariates and on the observed parental transfer s and T. The labor equation can be formalized as :

$$h^* = X_h \beta_h + \gamma_s s + \gamma_T T + \varepsilon_h \tag{19}$$

where X_h is a set of variables that explain the work decision, β_h is the corresponding vector of parameters, and ε_h is a normally distributed error term. The estimates of special interest for our analysis are both γ_s and γ_T, which pick up the effect of informal grandchild care and cash gift on labor supply of the child. Again, the latent variable h^* is not observed. As there is no information on the number of worked hours in the survey, we focus in what follows on the discrete decision of working for the child. Let $h = 1$ when the child works, and $h = 0$ otherwise, such that

$$h = \begin{cases} 1 & if \quad h^* > 0 \\ 0 & if \quad h^* \leq 0 \end{cases} \tag{20}$$

Clearly, equations (15)-(20) define a simultaneous model of equations which comprises one Probit equation for the labor decision and two Probit equation for the different transfer decisions. The endogeneity bias stems from the potential correlation between the random residual ε_H and the error terms ε_s and ε_T. While several studies have controlled for the potential endogenity bias using a two-stage estimate for discrete models (Ettner, 2002, Sasaki, 2002), we rely on a full maximum method estimation which avoids any efficiency loss.

The above framework can easily be estimated by maximizing the corresponding log likelihood. We denote by ρ_{sT}, ρ_{sh}, and ρ_{Th} the respective coefficients of correlation between ε_s and ε_T, ε_s and ε_h and ε_T and ε_h. We assume that the residuals $(\varepsilon_s, \varepsilon_T, \varepsilon_h)$ follow a trivariate normal distribution such that $(\varepsilon_s, \varepsilon_T, \varepsilon_h) \sim N(0,0,0,1,1,1, \rho_{sT}, \rho_{sh}, \rho_{Th})$. Given the definition of s, T and h, it is straightforward to model explicitly the individual contribution to the log likelihood. There are eight groups for the different observations as each dependent variable is equal either to 0 or 1, and the probability of being in each group may be expressed as a function of the trivariate normal distribution function[3].

Given our data-based ability to distinguish between full time and part time labor supply, we explore as an additional case the impact of parental transfers on the child's choice between full time work, part time work and no work. In that case, the dependent variable h takes the following values: $h = 0$ if the child does not work, $h = 1$ if the child works part time, and $h = 2$ if the child works full time. The model now comprises two Probit equations for the grandchild care and cash gift transfers, and one ordered Probit equation for the labor participation. Things are slightly more difficult for the computation of the likelihood, due to to the threshold level to estimate. Again, we rely on a ML method to estimate the corresponding model.

An additional concern is the direction of the bias related to the endogeneity of the transfer variables in the labor participation equation. This bias is difficult to determine a priori. Let us consider for instance the case of grandchild care. On the one hand, it is reasonable to expect a positive correlation between the random terms ε_H and ε_s as higher propensity for grandchild care on the part of the parent increases the child's time available

[3] When performing the estimation, we rely on a numerical integration process which allows to speed up the computation process. Specifically, we integrate the trivariate normal distribution with six integration points.

for paid work. At the same time, the receipt of informal care may also require a higher taste for family involvement and leisure, implying a negative correlation between the residuals. Thus, knowing how the correction of the endogeneity problem affects the magnitude of the coefficients γ_s and γ_T in the labor equation remains an empirical question.

4/ Data

To estimate the relationship between downward transfers and labor participation, we make use of data from the first release of the SHARE data base. This data base contains detailed information on the financial, human capital, family and health status of elderly citizens of more than 50 years of age for 10 different European countries[4]. Clearly, the transfer providing parent is the primary respondent to the SHARE questionnaire.

However, aside from detailed information on that primary respondent, the data base also contains some information on up to four randomly selected respondent's children. This latter information includes not only human capital characteristics, but also number of children, age of the youngest and eldest child, and labor force participation. Although information on the actual number of hours of work supplied by the child is missing, we are able to distinguish between different levels of labor force involvement, such as full time work, part time work and no work, which provides sufficient grounds for analyzing the impact of transfers on the degree of labor market involvement of the recipient.

Our data set has several interesting intergenerational transfer related features. To begin with, when the data set was compiled only one member of each elderly household gave response to questions related to the provision of grandchild care and monetary transfers and the respective response was repeated in the column related to the spouse of that respondent. In other words, the data compiling methodology is consistent with the assumption of pooling of resources within the elderly households. Secondly, while we do have information on the characteristics of both biological and non-biological children of the elderly respondents, information on the characteristics of sons and daughters- in -law is absent.

[4] For further information and download of the data, see the following url http:\\www.share-project.org. The countries included in the First, 2003, release of SHARE are Austria, Germany, Netherlands, Sweden, Spain, Italy, Denmark, France, Greece and Switzerland.

The economics literature gives us little guideline on how to overcome this shortcoming of the data. While there are several studies on both upward and downward financial transfers (see Arrondel and Masson, 2005; Laferrère and Wolff, 2005) as well as upward services in the form of informal care for disabled elderly parents (Ettner, 1995; Pezzin and Schone, 2002), economic studies on the grandchild care are virtually absent. However, the bulk of the sociological literature indicates that not only grandmothers, as opposed to grandfathers, are the primary suppliers of grandchild care but also grandchild care supply is more likely to affect the career prospects of the grandchild's mother rather than the father (Tobio, 2001)[5]. Moreover, sociological evidence indicates that it is the maternal grandmother who tends to be the primary supplier of grandchild care in Europe (Tobio, 2001; Herlyn, 2001; Dench and Ogg, 2001, 2002)[6].

Hence, we overcome the limitations of our data, by justifiably restricting our sample to elderly mothers and their adult daughters who have at least one child. We further restrict our sample to the relevant cases of daughters in working age and grandchildren young enough to need care. Given the evidence of highest amount of grandchild care supply being provided to children younger than 10 years of age, we treat this age as our upper bound (Heckman, 1974; Tobio, 2001). Our final sample contains 2317 observations.

4.1. Descriptive statistics

In our theoretical section we derived three reduced form equations of time, monetary transfers and labor supply. In keeping with the stylized literature on private transfers and labor supply, the time and monetary transfers are a function of the income levels of the donor and recipient, the wage rate of the recipient, the caring parameter and the opportunity cost of the donor, while labor supply is function of the wage rate, non- labor income and endogenous time and monetary transfers. Our monetary transfer variable takes the value of

[5] In Spain, for instance, 27 % of the female participants in a representative survey point out their own mother as a primary provider of help in their struggle to balance work and family life, ahead of even their husband or partner (25%), proximity to work (11%) or other family members (10%).

[6] In Spain, in services such as taking the grandchild to school, it is the maternal grandmother that faces the highest probability of providing support (19% of the cases), followed by the maternal grandfather (11% of the cases), the paternal grandmother (9% of the cases) and the paternal grandfather (5% of the cases). In Germany, about 10% of the paternal grandmothers report suboptimal relations with their grandchildren due to conflicts with daughter in law or competition from the daughter-in-law's parents. In Great Britain, the preference for the maternal lineage is found to be reinforced by increasing number of divorces.

one if, during the reference period, the respondent has provided a monetary transfer of 250 or more euros to any of her children. We can also distinguish between infrequent grandchild care (grandchild care provided on less than a weekly basis), frequent grandchild care (care provided on a daily or weekly basis) and no grandchild care during the same reference period. Since experimentation with the data indicated that only frequent grandchild care has significant influence on the labor supply of the recipient, in our analytical part we use a grandchild care variable taking the value of one if the donor provides grandchild care on a daily or weekly basis. As indicated earlier, we define two different dependent variables for our labor supply equation: (i) a variable taking the value of one if the transfer recipient provides any labor supply, and (ii) a variable taking the value of zero if the recipient does not participate in the labor market, a value of one if she participates on a part time basis, and a value of two if she works full time.

The main exogenous variables, implied by our theoretical model, are the income levels on both the donor and the recipient and the wage rate faced by the donor. The data set makes available continuous variables of the total current and asset household income of the donor and we use this variable as a proxy for the child's income. Unfortunately, we do not have information on the income of the recipient, but we assume it to be highly correlated with human capital and household level characteristics such as age, education, marital status, number of children and age of the youngest child. We therefore include these variables directly into the transfer and labor supply equations. Our further education variable is comparable across the different countries and takes a value of one if the recipient of transfers has tertiary education. Experimentation showed a linear impact of the donor's age on labor supply and we therefore do not account for nonlinearities in our subsequent empirical estimation.

One of the major shortcomings of the data is the lack of information on wages. However, as indicated by Ettner (1996), empirical construction of wage rates for non-workers involves issues of identification. We therefore follow the broader empirical literature in including factors influencing the wage (such as age or education) directly in our structural equation as a proxy for the potential wage rate. In addition to these main independent variables, we include in our transfer equations controls for the geographical distance between donors and recipients, health, marital status and number of children of the donor, as well as a dummy variable taking the value of one if the donor herself receives a transfers. We

distinguish between residence in the same building or across the street, geographical distance larger than this but smaller than 25 km, distance between 25 and 100 km and distance larger than 100 km. Our health variable takes the value of one if the respondent reports less than two chronic diseases. Aside from capturing the opportunity cost of the transfer, these variables serve as excluding conditions in our simultaneous system of equations.

Table 1 highlights the descriptive statistics for four different combinations of intergenerational transfers: (i) monetary transfer and no grandchild care, (ii) grandchild care and no monetary transfer, (iii) monetary transfer and grandchild care and (iv)neither monetary transfer nor grandchild care. While the age of the recipient of transfers does not vary significantly across the categories, we do observe that better educated recipients are more likely to receive a monetary rather than a time transfer, with the mean of further education exceeding 0.75-0.80 in the case of monetary receipt whether simultaneously with a time transfer or without a time transfer, the mean of further education ranges around 0.60 among mothers not receiving monetary transfers. In other words, parents with better endowments are in a better position to provide a monetary instead of time support to their educated children. This hypothesis is confirmed by the higher mean of further education among providers of monetary transfers than among providers of time transfers, as well as the higher mean of current income among providers of monetary as opposed to providers of time transfers.

Expectedly, our statistics also indicate that the acts of not donating and not receiving any transfers is an increasing function in the number of children of the donor and recipient and the age of the grandchild and a decreasing function of the good health condition of the provider of transfers. In addition, the provision of time related assistance decreases steeply with the increase in geographical distance between the donor and the recipient. Finally, we observe some transmissibility of transfer behavior in that donors who themselves receive transfers are more likely to provide transfers.

Table 2 highlights the characteristics of the recipients of transfers by employment status, namely full time employment, part time employment and no employment. Expectedly, better educated and more experienced mothers are more likely to hold full time employment, while low level of education has a strong influence on non-employment. At the same time, the degree of employment (full-time versus part time) is a negative function of the number of young children and a positive function of the age of the child. Married

mothers are slightly more likely to not work than to work, indicating at least a weak impact of double earnings on labor force participation among women with children. Finally, the provision of frequent grandchild care for our sample as a whole appears to stimulate the labor force participation of the recipient, while monetary transfers tend to discourage full time labor force participation. This observation is consistent with the predictions of our theoretical model.

Overall, our preliminary descriptive analysis is consistent with our theoretical model and conceptual priors. We do observe for the sample as a whole that time transfers encourage the labor force participation of the recipient, while monetary transfers discourage it. The rest of our descriptive analysis is also in conformity with expectations. Higher degree of human capital of the mother is associated with both a higher level of labor market participation and higher probability of receipt of monetary as opposed to time transfers. At the same time, donors with better human capital characteristics are more likely to donate monetary as opposed to time transfers. Finally, higher level of family involvement, captured by larger number of children and lower age of the youngest child discourages not only labor force participation, but also the receipt and donation of transfers. We will use these priors as a starting point for our rigorous empirical estimations, where we take a step away from simple correlations by correcting for the obvious endogeneity of intergenerational transfers in the labor force participation equation of the recipient.

4.2. Cross-country differences in transfers and labor supply

Before proceeding with the rigorous test of our hypotheses it is worthwhile devoting some attention to the possible cross-country differences in transfers and labor supply. The availability of 2317 observations for a total of 10 countries makes individual country analyses econometrically difficult, while introducing 9 country variables reduces the degrees of freedom and makes interpretation of the numerous country characteristics that these dummies may stand for difficult to interpret. We therefore opt for the allocation of countries in different groups based on comparable institutional characteristics. Our first choice was to use indexes of labor market characteristics, such as labor market flexibility and labor market related social security legislation (Botero et alii, 2003), as well as indexes capturing the difference in family related policies such as cash benefits to parents, duration of maternity and childcare leave and other support to working parents (Gauthier, 2002).

However, high level of correlation across the diverse indexes made their use in our empirical analysis unfeasible. Hence, we gave preference to the alternative strategy of classification of countries in stylized social security regimes, defined primarily on the basis of family policy differences (Gautier, 2002)[7].

We proceeded as follows. The countries in our sample were allocated into four different categories on the basis of family policies including both cash and time oriented government assistance to working and non-working parents. Our *social democratic* category, including Sweden and Denmark, is characterized by both high level of cash support and time related government assistance in terms of childcare leaves, relatively inexpensive childcare facilities and flexible employment patterns. In the category conservative regime, we include Austria, France, Germany and Netherlands. This system is similar to the social democratic system in terms of cash support to parents and relatively long childcare leaves, but suffers from limited childcare facilities. While both the social security and the conservative and the social democratic system are marked by generous family policies, the latter being more generous than the former, the *liberal* (including Switzerland in our sample) and the *southern European* regime (including Spain, Italy and Greece) stand at the other end of the generosity spectrum. These regimes are characterized by low levels of both cash and time related

[7] This typology stems from the stylized classification of countries according to social security regimes (Esping-Andersen, 1990; 1994), which has faced a lot of criticisms (e.g. Castles and Mitchell, 1993; Liebfried, 1992; Sainsbury, 1994; Gordon, 1990; Orloff, 1993), but has nevertheless remained one of the most influential reference point in institutional studies exploring welfare state dynamics. With the use of one of its latest modifications, we benefit from (i) including a South-European regime, marked by specific family based characteristics as a separate category and (ii) using family related policies, the primary focal point of our analysis as a basis for country classification. This overlooks the possibility that old age security characteristics might influence the behavior of the elderly providers of transfers. However, the insignificant differences across old age security regimes across the countries in our sample (institutionalized retirement age in all but one of the countries being 65, etc.) makes the omission immaterial in our context. Indeed, experimentation with both alternative old age security indexes and welfare state classification including the original Esping-Andersen welfare state typology did not change the message of our research and we adopted the Gauthier (2002) version as the optimal choice in capturing the relevant cross-country institutional context in our analysis. For further details see the references included in this footnote.

childcare facilities, the main difference in the former compared to the latter being the higher level of support for families in need combined with economic philosophy giving higher credence to market forces.

Figure 1 highlights the distribution of grandchild care across the different regimes. We define three different categories of grandchild care: (i) regular care on a daily or weekly basis, (ii) irregular care of less than weekly basis and (iii) no grandchild care at all. Expectedly, we observe significantly higher level of regular grandchild care provision among the two regimes - liberal and south European - characterized by scarce childcare facilities. However, we do observe a higher level of irregular grandchild care provision among the more generous social-democratic and conservative regimes, perhaps on account of altruistic feelings on the part of the grandparents.

Figure 2 highlights the distribution of the alternative monetary transfers across institutional settings. While the difference in the provision of these transfers is both of a smaller scale and more similar across the institutional settings, we do observe a higher incidence of such transfers in the most generous social democratic regime than in the least generous south European regime. As these two regimes stand at two extremes in terms of time transfers, this observation does provide some evidence that institutional characteristics might influence the substitution of different types of transfers by the parents.

As the main focus of this paper is the impact of transfers on labor supply, as a next step in our preliminary data analysis we graph the distribution of employment and the impact of transfers on employment choices across institutional settings. Figure 3 highlights the distribution of labor force participation across full time, part time and no work activities of the daughter. The observed differences across institutions are once again interesting. While the most generous in terms of family policies social democratic regime is characterized by the highest level of labor market involvement of women with children, the most market oriented liberal regime accounts for the least level of full time employment. At the same time, we observe a clear dichotomy of high level of non-working and high level of full time employment among south European economies, possibly on account of low level of choices related to flexible participation in the labor market (Gerhard et alii, 2005). In other words, we do observe significant differences in both transfers and labor supply across institutional settings and therefore find it essential to control for these differences in our subsequent analysis.

5/ Econometric analysis

Table 3 and 4 highlight our maximum likelihood estimates of the simultaneous recursive model. We start with an estimation of a simultaneou system of three Probit equations for labor force participation, regular grandchild care and monetary transfers, and then proceed to accounting for the possibility of different degrees of labor market involvement by estimating a simultaneous system of equations including an ordered Probit model of labor force participation (including full- time, part-time employment and non-employment), a Probit model for regular grandchild care and a Probit model of monetary transfers. Column 1 in each table reports the results from labor supply equation, after accounting for the endogenous provision of grandchild care and monetary transfers. In Column 2, we report the results from our grandchild care equation. Finally, in Column 3, we report the estimates from our monetary transfer equations.

The coefficient of the endogenously treated grandchild care variable in the labor participation estimates reported in Table 3 is 0.436, significant at the 5% level, while the coefficient of our endogenous monetary transfer variable is also positive and of a similar dimension, but not significant. In other words, our results indicate that for the sample as a whole grandchild care has a positive impact on the labor force participation of young mothers, while monetary transfers have no impact on the mother's labor force participation.

Our results further indicate that social democratic institutions involve a higher level of labor force participation and liberal institutions involve a lower level of labor force participation than the omitted southern European category, an observation consistent with the pattern highlighted in Figure 3. The rest of labor participation estimates are consistent with our priors. Specifically, we observe that higher level of human capital, captured by further education and age/experience have positive impact on labor force participation, while higher level of household involvement, captured by the number of children and lower age of the youngest child, have a negative influence on the labor force participation of the mother.

Interestingly, the results reported in column 2 of Table 3 indicate that higher education of the donor has a negative influence on the provision of grandchild care, while a higher education of the recipient has a positive influence on the provision of grandchild care. In other words, we observe an intergenerational solidarity pattern whereby mothers with

lower human capital promote the professional development of their better educated daughters, an observation consistent with the sociological literature (Gerhard et alii, 2005). The grandchild care estimates are also consistent with our priors in that larger number of grandchildren and children has negative impact on the provision of grandchild care. In addition, we find further confirmation of the transfer transmission hypothesis whereby grandparents receiving transfers are more likely to provide help themselves. Finally, we find a negative impact of social democratic and conservative institutions on the provision of grandchild care, an observation which is once again consistent with the pattern observed in our graphs.

There is no obvious impact of family related institutions on the provision of monetary transfers. Specifically, none of the coefficients of our institutional variables reported in Column 3 of Table 3 is significant, indicating that unlike time transfers monetary transfers are perhaps driven to a higher extent by the needs of the recipient and the financial ability of the donor. This latter hypothesis is confirmed by the observation of a strong and positive impact of both current earnings and financial assets of the donor on the provision of monetary transfers. Better educated children are once again more likely to receive transfers than less educated children, while transfers are a decreasing function of the number of children of the donor.

We now proceed to assessing the results from our ordered Probit model of labor supply, after accounting for the endogeneity of time and monetary transfers. The estimates highlighted in Column 1 of Table 4 indicate that neither time nor monetary transfers have any impact on the degree of labor market involvement of the mother. In other words, while the receipt of time assistance influences the mother's decision of whether to participate or not in the labor market other factors, e.g. flexibility of choices have larger influence on the choice of how much labor to supply. This hypothesis is supported by the change in coefficient of the conservative regime variable vis-à-vis the omitted southern European variable. In particular, while there is no statistically significant difference between the conservative regime and the omitted southern European category in the labor participation (Probit) equation, the coefficient of the conservative regime in the ordered Probit equation is significant and negative. This observation, consistent with the pattern highlighted in Figure 3, indicates a higher preference for part time as opposed to full time employment among mothers in the conservative regime category.

The rest of the estimates reported in Table 5 are consistent with those based on the system of three Probit equations. Once again, we observe a lower level of grandchild care provision in the case of the conservative and social democratic regimes compared to the omitted southern European category, and once again the impact of institutions on monetary transfers is insignificant. Mothers with lower endowments provide time assistance to daughters with lower endowments, while better off parents are more likely to provide a monetary assistance to their adult daughters. Increasing geographical distance has negative impact on the provision of grandchild care. Better human capital characteristics and lower level of family involvement (reflected in things like family size and youngest child's age) have positive impact on not only the decision to participate in the labor market, but also on the degree of labor market involvement and the probability of receiving any type of assistance from elderly parents.

Overall, our empirical results are consistent with our theoretical predictions and reflect an efficient intergenerational and labor market participation environment. Specifically, we observe that higher level of human capital is the driving force behind the receipt of assistance; i.e. parents support their better off as opposed to weaker children and it is the stronger children that benefit from higher level of labor market involvement. Indeed, not only are endowments the driving force behind monetary transfers, but also mothers with lower endowments enter an intergenerational solidarity pattern by providing time assistance to their better off daughters. Finally, we do find that family related institutions do have an impact on both intergenerational transfers and labor supply in that we observe a higher level of grandchild care supply in the least generous in terms of institutionalized assistance regimes. At the same time, family related institutions are found to be far from being the most important determinant of the choices between options such as motherhood, informal assistance and career, especially in so far as the choice between full time and part time work is concerned.

6/ Concluding comments

During the past several decades, much of the political economic debate related to the problems of ageing societies concentrated on the fiscal and informal care burden of the elderly population and on the productivity decreasing impact of the latter. Meanwhile, fertility and child related economic research focused almost exclusively on the impact of

family related policies on the choices between motherhood and career, either ignoring or treating as exogenous informal care provision. Based on both stylized facts and sociological evidence, we postulated that this approach to the fertility and ageing related problems of developed economies is overly restrictive and proposed a theoretical model and empirical estimates of the reduced form equations emanating from the model to fill the potentially important gaps in the literature.

Specifically, we proposed a simple theoretical model, linking informal child care and/or monetary transfers provided by a benevolent parent and the labor supply of a transfer-receiving child, and an empirical test of the hypotheses derived from the model with the use of a rich data set on 10 different European countries. The solution of the theoretical model left us with three reduced form equations of grandchild care, monetary gift provision and labor supply by the transfer-receiving child, where grandchild care and monetary gifts are endogenous in the labor supply equation of the child. We estimated this simultaneous recursive model with the use of maximum likelihood.

Overall, our empirical results are consistent with our theoretical predictions and reflect an efficient intergenerational and labor market participation environment. Specifically, we observe that higher level of human capital is the driving force behind the receipt of assistance; i.e. parents support their better off as opposed to weaker children and it is the stronger children that benefit from higher level of labor market involvement. Indeed, not only are endowments the driving force behind monetary transfers, but also mothers with lower endowments enter an intergenerational solidarity pattern by providing time assistance to their better off daughters. Finally, we do find that family related institutions do have an impact on both intergenerational transfers and labor supply in that we observe a higher level of grandchild care supply in the least generous in terms of institutionalized assistance regimes. However, they are far from being a major determinant of choices such as the degree of labor market involvement of young mothers.

In other words, our study not only opens a new dimension to the debate related to intergenerational transfers in ageing economies by taking a step away from the productivity deteriorating impact of informal elderly care, but also suggests that factors other than family institutions may be an important determinant of young women's choices between motherhood and career.

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Table 1. Descriptive statistics by type of transfer

		Transfer/ No care	Care/No transfer	Transfer & Care	Neither Transfer
Characteristics of the child					
Age		35.18(5.39)	34.90 (4.74)	33.76 (5.61)	36.29 (5.55)
Married		0.69 (0.46)	0.80 (0.40)	0.66 (0.48)	0.77 (0.42)
Further education		0.86 (0.35)	0.64 (0.48)	0.75 (0.44)	0.67 (0.47)
Number of grandchildren		2.01 (0.99)	1.80 (0.77)	1.76 (0.91)	2.02 (0.94)
Age of grandchildren		3.98 (2.97)	4.21 (2.87)	4.12 (2.91)	4.93 (3.23)
Characteristics of the parent					
Age		61.26 (6.44)	61.75 (6.47)	59.98 (6.60)	63.43 (7.71)
Married		0.65 (0.48)	0.69 (0.46)	0.66 (0.48)	0.62 (0.48)
Number of children		2.57 (1.22)	2.65 (1.22)	2.34 (1.07)	3.16 (1.42)
Health		0.40 (0.49)	0.44 (0.50)	0.34 (0.47)	0.46 (0.50)
Further education		0.69 (0.46)	0.40 (0.49)	0.53 (0.50)	0.50 (0.50)
Income (log)		10.52 (0.93)	9.96 (1.18)	10.46 (0.88)	10.05 (1.09)
Assets (log)		11.82 (1.45)	11.57 (1.81)	11.87 (1.54)	11.30 (1.79)
Received transfer		0.11 (0.32)	0.05 (0.23)	0.10 (0.30)	0.05 (0.73)
Distance	0-5 kms				
	5-25 kms	0.47 (0.50)	0.28 (0.45)	0.31 (0.47)	0.42 (0.49)
	25-100 kms	0.19 (0.40)	0.01 (0.11)	0.01 (0.09)	0.15 (0.30)
	> 100 kms	0.11 (0.32)	0.00 (0.04)	0.00 (0.00)	0.09 (0.29)
Number of observations		176	645	131	1365

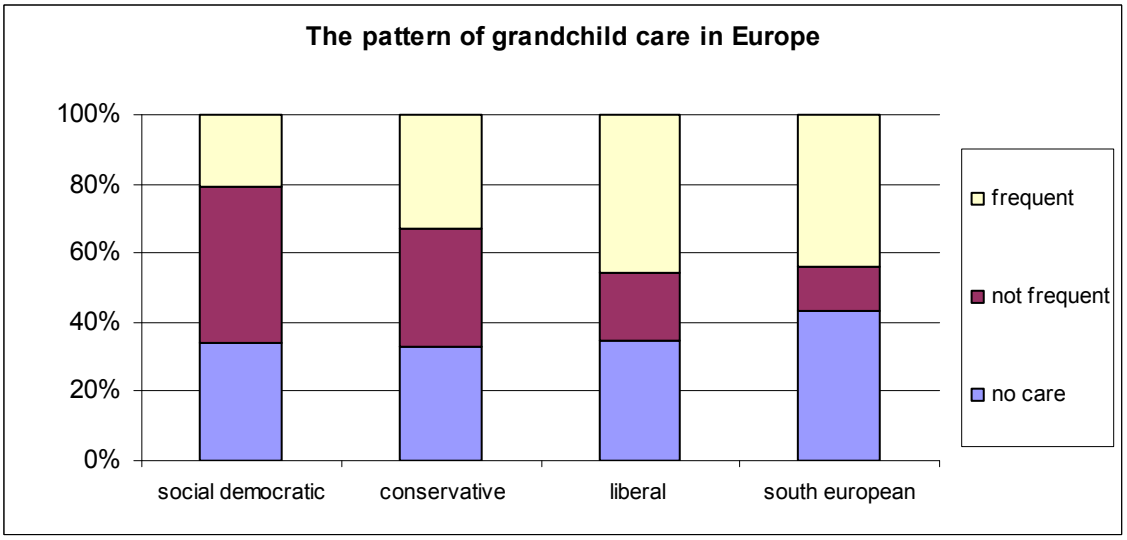
Source: Share release 1, 2003.
The figures in brackets are standard deviations.

Table 2: Descriptive statistics by employment status

	No work	Part time	Full time
Characteristics of the child			
Age	34.80 (5.67)	36.21 (5.28)	35.99 (4.97)
Married	0.79 (0.41)	0.76 (0.43)	0.75 (0.44)
Further education	0.56 (0.50)	0.69 (6.46)	0.85 (0.36)
Number of grandchildren	2.02 (0.96)	1.87 (0.84)	1.98 (0.90)
Age of grandchildren	4.09 (3.07)	4.84 (3.10)	4.97 (3.12)
Monetary transfer	0.13 (0.33)	0.15 (0.36)	0.10 (0.31)
Grandchild care	0.28 (0.45)	0.36 (0.48)	0.36 (0.48)
Number of observations	787	970	560

Source : Share release 1, 2003.
The figures in brackets are standard deviations

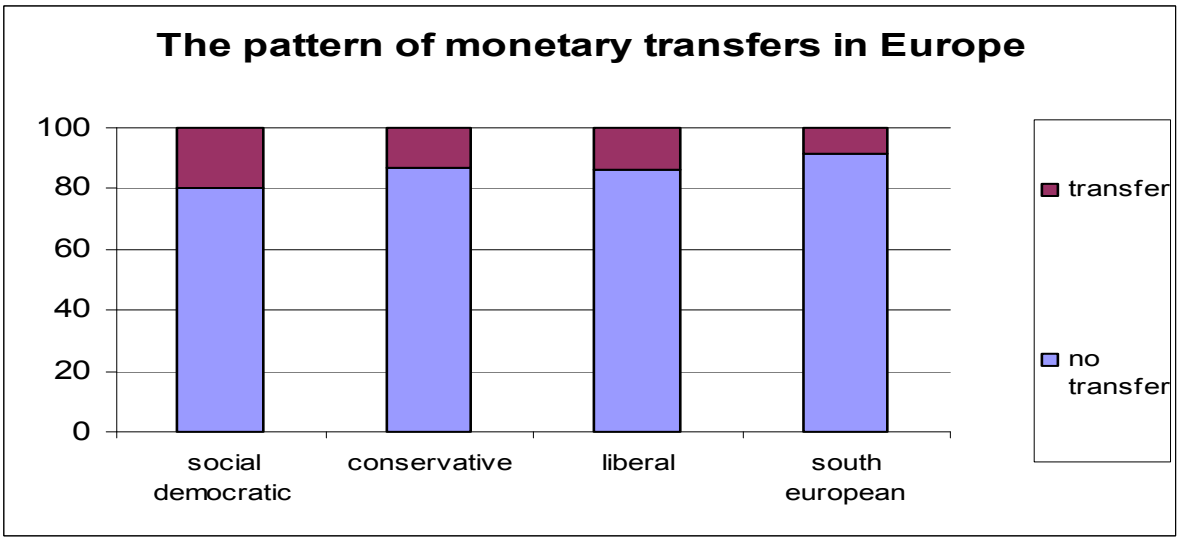
Figure 1. The pattern of grandchildren care in Europe



Source : Share release 1, 2003.

Note: Regular care is defined as care provided on daily or weekly basis. The graph is based on the sample of daughters in working age 18-65 who have at least one child of less than 10 years of age, and their elderly mothers.

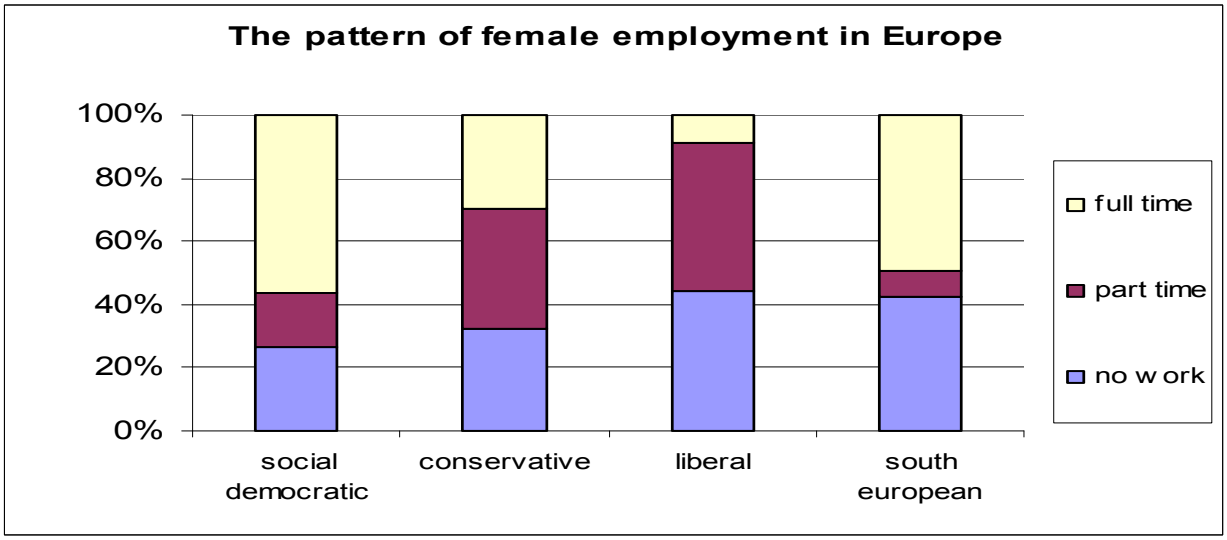
Figure 2. The pattern of monetary transfers in Europe



Source : Share release 1, 2003.

Note: The graph is based on the sample of daughters in working age who have at least one child of less than 10 years of age, and their elderly mothers.

Figure 3. The pattern of labor market participation in Europe



Source: Share release 1, 2003.

Note: The graph is based on the sample of daughters in working age 18-65 who have at least one child of less than 10 years of age, and their elderly mothers.

Table 3. Maximum likelihood estimates of labor force participation, with endogenous grandchild care and monetary transfers

Variables	Labor supply		Grandchild care		Monetary transfer	
	Coef.	Sign.	Coef.	Sign.	Coef.	Sign.
Constant	-1.506 ***	(0.335)	2.845 ***	(0.517)	-2.541 ***	(0.731)
Characteristics of the child						
Age	0.042 ***	(0.009)	-0.016	(0.013)	-0.018	(0.015)
Married	0.002	(0.101)	-0.153	(0.114)	-0.300 **	(0.123)
Number of grandchildren	-0.219 ***	(0.047)	-0.098 *	(0.053)	0.101	(0.062)
Age of grandchildren	0.066 ***	(0.015)	-0.053 ***	(0.017)	-0.019	(0.020)
Further education	0.650 ***	(0.117)	0.573 ***	(0.128)	0.306 *	(0.168)
Grandchild care (endogenous)						
Monetary transfer (endogenous)						
Characteristics of the parent						
Age			-0.018 **	(0.009)	-0.019 *	(0.011)
Married			0.075	(0.098)	-0.144	(0.113)
Number of children			-0.266 ***	(0.033)	-0.258 ***	(0.041)
Health			-0.058	(0.093)	-0.003	(0.111)
Further education			-0.475 ***	(0.116)	0.093	(0.126)
Income (log)			-0.029	(0.030)	0.248 ***	(0.057)
Assets (log)			0.025 *	(0.015)	0.040 **	(0.020)
Received transfer			0.227 **	(0.099)	0.619 ***	(0.106)
Distance 0-5 kms			Ref			
5-25 kms			-0.986 ***	(0.094)		
25-100 kms			-2.765 ***	(0.231)		
> 100 kms			-3.669 ***	(0.544)		
Institutions						
Social democratic	0.348 **	(0.161)	-0.811 ***	(0.169)	0.028	(0.185)
Conservative	0.077	(0.124)	-0.242 *	(0.144)	-0.145	(0.167)
Liberal	-0.443 *	(0.244)	0.417	(0.307)	-0.248	(0.333)
Coefficient of correlation						
Labor supply	1	-	-0.019	(0.185)	-0.472	(0.332)
Grandchild care			1	-	0.310 ***	(0.103)
Monetary transfer					1	-
Number of observations	2317					
Log likelihood	-3346.32					

Source: Share release 1, 2003.

Recursive simultaneous model with one Probit equation for labor participation, one Probit equation for grandchild care and one Probit equation for cash transfer, estimated by maximum likelihood. Asymptotic standard errors are in parentheses, and significance levels are respectively 1% (***), 5% (**) and 10% (*).

Table 4. Maximum likelihood estimates of labor force involvement, with endogenous grandchild care and monetary transfers

Variables	Labor supply		Grandchild care		Monetary transfer	
	Coef.	Sign.	Coef.	Sign.	Coef.	Sign.
Constant					-2.390 ***	(0.732)
Threshold level 1	0.796 ***	(0.302)	2.854 ***	(0.517)		
Threshold level 2	1.722 ***	(0.304)				
Characteristics of the child						
Age	0.038 ***	(0.008)	-0.016	(0.013)	-0.018	(0.015)
Married	0.014	(0.089)	-0.154	(0.114)	-0.318 ***	(0.123)
Number of grandchildren	-0.226 ***	(0.043)	-0.097 *	(0.053)	0.097	(0.062)
Age of grandchildren	0.043 ***	(0.013)	-0.052 ***	(0.017)	-0.019	(0.020)
Further education	0.549 ***	(0.095)	0.568 ***	(0.128)	0.311 *	(0.169)
Grandchild care (endogenous)	0.239	(0.176)				
Monetary transfer (endogenous)	0.093	(0.403)				
Characteristics of the parent						
Age			-0.018 **	(0.009)	-0.019 *	(0.011)
Married			0.078	(0.098)	-0.143	(0.114)
Number of children			-0.266 ***	(0.033)	-0.259 ***	(0.041)
Health			-0.056	(0.093)	-0.012	(0.113)
Further education			-0.461 ***	(0.117)	0.110	(0.128)
Income (log)			-0.030	(0.030)	0.235 ***	(0.057)
Assets (log)			0.025 *	(0.015)	0.039 **	(0.020)
Received transfer			0.225 **	(0.099)	0.616 ***	(0.107)
Distance 0-5 kms						
5-25 kms			-0.990 ***	(0.094)		
25-100 kms			-2.771 ***	(0.233)		
> 100 kms			-3.651 ***	(0.534)		
Institutions						
Social democratic	0.227 *	(0.133)	-0.813 ***	(0.169)	0.053	(0.187)
Conservative	-0.459 ***	(0.104)	-0.248 *	(0.144)	-0.131	(0.169)
Liberal	-0.986 ***	(0.242)	0.410	(0.305)	-0.237	(0.333)
Coefficient of correlation						
Labor supply	1	-	0.094	(0.163)	0.020	(0.317)
Grandchild care			1	-	0.312 ***	(0.103)
Monetary transfer					1	-
Number of observations	2317					
Log likelihood	-4351.18					

Source: Share release 1, 2003.

Recursive simultaneous model with one Ordered Probit equation for the labor force participation (no job, part time, full time), one Probit equation for grandchild care and one Probit equation for cash transfer, estimated by maximum likelihood. Asymptotic standard errors are in parentheses, and significance levels are respectively 1% (***), 5% (**) and 10% (*).