

# Asymmetries and Interdependencies in Time use between Italian Spouses

Anna Laura Mancini (University of Torino – Dipartimento “G.Prato” and Child-CCA)  
[annalaura.mancini@carloalberto.org](mailto:annalaura.mancini@carloalberto.org)

and

Silvia Pasqua (University of Torino – Dipartimento “G.Prato” and Child-CCA)  
[silvia.pasqua@unito.it](mailto:silvia.pasqua@unito.it)

## ABSTRACT

The importance parents give to time spent with their children for their future behavioural and cognitive development deeply affected the patterns of time allocation of both working and non-working parents in all developed countries in the last decades. We compare the two existing waves of the Italian Time Use dataset (1988 and 2002) to analyze how family time allocation changed over time in a country that experienced in that period a relevant increase in female employment rate and a continuous decline in total fertility rate. In particular, we investigate how parents' time with children depends on their employment status and on household characteristics. We use a simultaneous recursive approach that allows us to take into consideration the links among the different time uses of the same individual and the correlation between spouses' decisions. Our main findings are that wife's working decisions matter for both spouses' childcare decisions in 2002 but not in 1988 and that fathers are much more involved in children education and in child caring activities in 2002 than in 1988.

Keywords: time use, parents, children

JEL classification: D1, J13, J22

## **1. Introduction**

The increase in female labour force participation, the availability of new technologies for housework and the changed attitude towards time parents spend with their children for their future behavioural and cognitive development deeply affected the patterns of time allocation of both working and non-working parents in all developed countries (Sayer *et al.*, 2004; Bianchi, 2000; Craig, 2006).

Change in time allocation of Italian couples is particularly interesting since, as it is well known, over the last 30 years in Italy female employment rate increased noticeably

but remains one of the lowest among European countries, fertility declined remarkably and traditional family values persistently steered household decisions<sup>1</sup>.

We compare the two existing waves of the Italian Time Use dataset (1988 and 2002) to analyze how family time allocation changed over time in a period that shows an increase in female employment rate from 34,9% in 1988 to 42% in 2002<sup>2</sup> and a decline in total fertility rate from 1,36 in 1988 to 1,26 in 2002. In particular, we investigate how parents' time with children depends on their employment status and on the household structure.

Results for the U.S. showed that the increased mothers' labour force participation reduced the hours of childcare but also the number of children per household. Therefore even if mothers devote less time to childcare, since there are less children per household, no negative effects on children outcomes emerge (Sandberg and Hoffert, 2001). Moreover, for better children's academic achievements, what matters is not total time parents devote to them, but the type of activities parents and children do together (Zick *et al.*, 2001). Furthermore changes in social norms regarding parenting imply that parents place a higher value on the time they allocate to childcare and therefore the women's entry into the labour market did not produce a one-by-one decrease in the time they devote to children (Craig, 2006).

Most of the literature on time allocation of couples focuses on how spouses divide their time between work, domestic tasks and childcare without distinguish the time spent with children between basic care and quality time (Kalenkoski *et al.* 2005, 2006 and 2008; Connelly and Kimmel, 2007; Craig and Bittman, 2008; Mencarini *et al.*, 2004; Anxo *et al.*, 2007; Burda *et al.*, 2006; Bloemen and Stancanelli, 2008; Bloemen *et al.*, 2008). However, this distinction is relevant if we believe that the "quality" time parents spend with their children is important for the development of children's future abilities. If all these papers showed that working women devote less time to children than non-working mothers, which activities with children (quality or basic care) receive less time are still to be investigated deeply. Moreover, whether the fathers compensate or not for the reduction of maternal time devoted to childcare and which activities fathers do with their children can be relevant for the effects on children outcomes.

It is therefore interesting to investigate not only how parents' employment status affects the total time parents' spend with children, but also which type of childcare time

---

<sup>1</sup> According to a FRDB research, 35% of Italian households think that very young children are better off if they stay at home with relatives instead of staying in the crèches (Boeri, Del Boca, Pissarides, 2005)

<sup>2</sup> See OECD 2008

(basic or quality) is more reduced when both parents work. We can think, in fact, that parents are willing to find substitutes for the pure care time (help from grandparents, babysitter or childcare centers) while they try to allocate as much time as they can to “quality” activities with their children.

While most of the empirical literature on time allocation uses separate Tobit or OLS equations for the different time uses, in this paper we use a simultaneous approach to analyse parents’ time allocation between work, domestic tasks, basic childcare and “quality” time with children. Our approach allows us to take into consideration the links among the different time uses of the same individuals and the correlation between spouses’ decisions.

To the best of our knowledge only few studies analysed time allocation of Italian couples and none of them differentiate the time parents devote to their children between quality and basic care.

In our empirical investigation we find that while in 1988 the presence of children in the household did not affect fathers’ working decisions and affected only marginally their other time uses, in 2002 fathers were more involved in children caring and education. This is the response to the greater mothers’ involvement in the labour market. In 2002 mothers’ work is less responsive to family characteristics and even if, on average, they allocate more time to their children, they also rely more on other adults help (mainly on partners). However mothers tend to delegate mainly basic care activities and only marginally “quality” time. The results also indicate that spouses’ decisions are correlated and this correlation seems greater in the year 2002.

The paper is organised as follows: in Section 2 a review of the literature is presented, Section 3 illustrates the data, Section 4 shows our empirical estimation strategy, Section 5 presents the results. Conclusions follow.

## **2. Literature**

Pioneering models of time allocation (Becker, 1965; Gronau, 1976) and human capital theories explained that better educated women allocate more time to work and less time to housework. These theories have been further developed, extended and tested to include fertility decisions and the effects of children on parents’ time allocation and to take into account the role of each spouse bargaining power in the decision process.

Most of the empirical literature on couples’ time allocation focuses on the effects of children on the time mothers and fathers devoted to market work and housework. The

presence of children in the household reduces the hours of market work of the mothers (Kalenkoski *et al.*, 2005), especially in association with the birth of the first child (Craig and Bittman, 2008), and increases their average hours of domestic work (Craig and Bittman, 2008). Most of the extra unpaid domestic work due to the presence of the children is therefore done by the women. Mothers, in fact, devote more time to housework and to their children than fathers. Women's education tends to increase the hours of market work, but, *ceteris paribus*, better educated women devote also more time to childcare activities (Kalenkoski *et al.*, 2006). At the same time, fathers' time with children increases with the hours of work of the spouse and with her wage (Connelly and Kimmel, 2007; Bianchi, 2000). As a consequence, women's work does not seem to have a strong negative effect on the total time parents devote to their children. However, parents' childcare time decreases with the age of the children (Drago and Lee, 2008) and in particular fathers' time with children is highest when the youngest child is below 3 years (Yeung *et al.*, 2001).

Bonke *et al.* (2007) construct an index of specialization within the couple using time use data and they find that more egalitarian division of housework emerges when men are more educated and where social values are more egalitarian. However the presence of children always increases the specialisation within the household.

There are very few studies on time allocation of Italian couples. Mencarini *et al.* (2004) using data from five Italian cities, found that in dual-earner households men did not increase much their participation in housework after childbirth, but they increase their working time. More than 10% of fathers never help in childcare. However women's education increases the egalitarian division of housework.

Burda *et al.* (2006) consider time allocation in four countries including Italy. For Italy they use, as we do, the Multiscopo dataset for the years 1988 and 2002. In all countries considered but Italy total work (defined as the sum of market work and domestic work) is almost equal between men and women. In Italy, on the contrary, total work of women exceeds total work of men of 72 minutes in a representative day in 1988 and of 75 minutes in 2002. Moreover men enjoy more leisure than women in both waves. Also Bloemen *et al.* (2008) use Multiscopo dataset for the year 2002 and they impute wage data from a different survey. Their results show that husbands' housework time increases with the wage of their wife while wives' housework time decrease. As far as childcare is concerned, time of fathers increases with own wage and with the presence of small children in the household, but strong regional differences emerge.

Anxo *et al.* (2007) compare time allocation over the life-cycle in Italy, France, Sweden and the U.S. and find that in Italy and France the gender gap in worked hours increases after union formation. Moreover Italian women after childbirth increase their domestic time by 22 hours a week while the corresponding figure for men is only 6 hours a week.

The only study that looks at time allocation of Italian couples distinguishing the time parents spend with their children between quality and basic care is Ichino and Sanz de Galdeano (2004) that compares three countries: Italy, Germany and Sweden. The results show that when the mother works, basic care time is reduced by 49% in Italy (but only by 40% in Germany and 3% in Sweden), while the quality care time reduction is respectively 37% in Italy, 24% in Germany and not significant in Sweden. Interestingly, Italy is the only country where the time devoted to children by other adults increases when the mother works. Among working women, more educated ones devote more time to child care than less educated ones.

All the other studies that distinguish between basic care and quality time refer to other countries, mainly Anglo-Saxon ones. Nock and Kingston (1988) show that dual-earner households spend less time with children than single-earner households and that the differences is mainly in the shorter time working mothers devote to children. Fathers seem not to compensate for this shorter mothers' time, unless she works at night. However, they do not find a big decrease in quality time devoted to children when the mother is working. Even Zick *et al.* (2001) find that when the mother is employed, quality time that both parents devote to their children increases: employed mothers spend more time than non-working mothers in reading and helping children with homework and fathers increase the time devoted to children.

A general trend of increasing quality time and fathers involvement with children emerges when we compare data for the U.S. in the 1960s and in the 1990s (Bianchi, 2000; Sayer *et al.* 2004). Certainly this is due to the higher average level of education of parents. Craig (2006), in fact, using Australian data for the year 1997 finds that parents' education increases time spent with children, mainly in physical care, but only university degree increases quality time. Moreover, the effect of education is stronger for mothers: women with higher education increase both time for paid work and time with their children, by decreasing both housework and time for personal care.

A paper that considers a European country similar to Italy is Gutierrez-Domenech (2008), that uses the Spanish time use survey 2002-2003 to analyse how parents spend

their time with their children in basic and quality activities according to their working status. She finds that Spanish women perform almost all primary basic childcare activities while primary quality childcare is more similar across genders. Moreover, childcare time is the same between working and non-working fathers. Both father's and mother's education increases the time spent with children. Spanish data seem also to show that working mothers tend to prioritise quality childcare time over basic care time in their time allocation decision.

### **3. An overview of the data**

We investigate the time allocation of Italian families using data from the national time use surveys 1988-89 and 2002-03, "Indagine Multiscopo sulle Famiglie – Uso del Tempo", carried out by the Italian National Statistical Office (ISTAT). The 1998 dataset covers 13,729 households corresponding to 38,110 individuals while the 2002 wave covers 21,075 households corresponding to 55,773 individuals, including children and other adults living in the household.

An individual questionnaire containing socio-demographic information and a time diary were collected. All members older than three years<sup>3</sup> completed the time diary on a selected day. In each municipality covered by the survey, households were divided into three groups and each group was asked to fill in the daily diary at a different time: a weekday, Saturday or Sunday<sup>4</sup>. Our analysis is based on diaries completed during weekdays (Monday to Friday).

This dataset has the advantage of being representative of the Italian population and the advantage that all household members were required to fill in a time diary. On the other hand, its main disadvantage is that no information was collected on earnings or income.

The diary reports information on the time spent on a large number of tasks. Activities are coded by the respondent as main or secondary activities<sup>5</sup>. Moreover, the respondent specifies if the activity is carried out with another family member and if this member is a child less than ten years old.

Therefore the data allow us to construct three different definitions of childcare: *Primary childcare*, when the main activity is reported as childcare, *Secondary childcare*,

---

<sup>3</sup> The time diary of very young children was completed by parents.

<sup>4</sup> The oversampling of weekend diaries was a deliberate choice of the data collector (ISTAT).

<sup>5</sup> For example, someone maybe cooking and watching television or cooking and watching the children. It is the respondent that chooses how to code activities into main or secondary ones

when childcare is defined as secondary activity and *Passive childcare*, when parents report any activities with a family member younger than ten years old. Primary and Secondary childcare could be divided in two subgroups, according to the type of activities the parents made with their children. *Basic childcare* includes all activities related to the child essential needs (feeding, dressing, bathing and so on) while *quality childcare* refers to activities related to children educational, cultural and emotional development. Therefore quality childcare is supposed to be more effective in fostering child's development.

The distinction between primary, secondary and passive childcare and the one between basic and quality childcare are very important since we are concerned on the effect of parental (and especially maternal) employment on time allocation decisions. Therefore, we are interested in understanding if in families in which both parents are employed the time spent with children is reduced and which kind of time is reduced.

*Primary childcare* is the one that reflects better the active decision to commit time to the child, because it requires the highest degree of parental involvement among the three possibilities above described. Moreover, Secondary childcare and Passive childcare depend crucially on the way in which parents fill in the diary<sup>6</sup>. Therefore we decide to focus our analysis only on primary childcare and we divide the time spent with children in either basic care or quality care.

### **3.1. Sample selection and time categories**

For our empirical analysis we selected a sample of married<sup>7</sup> couples, in which both spouses are older than 18 and younger than 56 years at the time of the interview. We consider both childless couples and couples that have at least one child younger than 18. We excluded couples in which one (or both) spouse(s) is in full-time education, retired, disable, chronically ill or doing the military service. We also excluded couples for which the weekly diary was filled in on a "special" day, like, for example, a vacation day or a sickness day. We finally exclude all households in which one or more of the variables used in the analysis were missing. We were also forced to exclude singles due to the very small size, in term of observations, of the subgroup of single parents<sup>8</sup>.

Our final samples consist of 970 households in 1988 (90,9% with children) and 2,105 households in 2002 (87,3% with children).

---

<sup>6</sup> For example, in the 1988 survey almost no one reported childcare as a secondary activity while in the 2002 this is often the case

<sup>7</sup> Married stays both for married or cohabiting couples.

<sup>8</sup> 69 observations in 1988 and 288 in 2002.

Following the theoretical model of time allocation, we are interested in understanding how husbands and wives allocate their time into different activities and in particular we are interested in market work, domestic work, basic child care and quality care. The definitions of our four time categories are:

Market work: working time in paid job (main or secondary); coffee breaks and other breaks during the job; other activities related to employment, excluding job searching activities.

Domestic work: food management and preparation; housekeeping; laundry; ironing; shopping, commercial and administrative services.

Basic care: physical care; supervision; taking to school or to other child's activities.

Quality care: doing homework with the child; playing with the child; reading to the child; reading with the child; talking to the child; watching children's movies and shows.

Tables 1 and 2 show some summary statistics on time allocation in 1988 and 2002 according to the mother working status<sup>9</sup> and to the presence of children in the household. We divide couples in two main types: two earners households (46% in 1988 and 54,3% in 2002) and male breadwinner households (50,2% in 1988 and 42,2% in 2002). We also have the residual category of female breadwinner and no breadwinner (where both spouses are unemployed). Unfortunately this category is too small (3,8% in 1988 and 3,4%) to give reliable descriptive statistics, and therefore we do not report them. Table 1 reports the unconditional mean of work time, domestic time, basic care and quality care while in Table 2 we show the ratio of individuals with non-zero values in each time use and the means computed only for these individuals.

In both periods housework is for the largest part a female task, even if wives' domestic time reduced significantly in 2002. Husbands domestic time, instead, changed according to the presence of children within the household: childless male increased their domestic time between 1988 and 2002 while fathers did not change much it but they raised the time dedicated to the children. Also mothers increased considerably the time devoted to the children. When the mother doesn't work, the father tends to be less involved in basic childcare tasks and the time he spends with the children is more oriented towards quality time. When the wives work, fathers increase more the basic childcare time than the quality care time, and the total time fathers spend with their children increases too.

---

<sup>9</sup> An individual is classified as "working" when she declares to be employed.



If we consider, instead, the conditional means we see that men always work more in 2002 than in 1988 and also mothers work considerably more. Childless working women did not, instead, vary the hours of labor supply. We also notice that parents who allocate time to childcare activities (*i.e.* those with positive values, see Table2) always spend a significant amount of time in this activity: at least half an hour in basic care and more than one hour in quality care. Moreover, looking at individuals who report positive amounts of childcare time, we notice that not only both mothers and fathers do increase the time they spend with the children from 1988 to 2002, but also that the number of parents who spend time with their children grows. In 1988, among dual earners couples, 19,3% of fathers and 55,5% of mothers declare a positive amount of basic care, while in 2002 the percentages raise to 36,4% and 64,8% respectively. In 1988, among male breadwinner families, 13% of fathers and 24,8% of mothers spend quality time with their children, while in 2002 the percentages grow to 30,9% and 47,3% respectively.

The impact of schooling on different time uses is *a priori* not clear. Education should increase market work but the effect on other activities is uncertain and depends crucially on how parents value childcare time relative to other possible time uses. In Table 3 we report the unconditional average time spent on each activity by the two spouses as a function of each spouse's education level. In both years it seems that highly educated women (with a University degree) spend more time on paid work and less time on domestic work than poorly educated women (with compulsory education or less). In 1988 husband's education has a u-shaped effect on own time in domestic work, with the exception of middle educated husbands of middle educated wives, and the higher the wife's education the lower the husband's domestic work. Twelve years after things have changed: husband's education has a positive effect on husband's domestic work when the wife has compulsory education, a negative effect when she is middle educated and a mixed effect when she is college graduated. Men with a secondary school degree allocate the highest time to childcare tasks, both care and quality care, in both years. Childcare time increases with mothers' educational level, but highly educated women married to highly educated men decrease their childcare time supply. The higher the education level of their wife, the more time husbands allocate to childcare.

#### **4. Strategy for empirical estimation**

We are interested in estimating the effect of different individual and family characteristics on husband and wife time allocation decisions and the possible correlations among decisions.

We imagine a typical model of time allocation in which a household (composed by a husband and a wife) maximizes the utility function subject to a budget constraint and to the time constraints of the spouses. Household utility can be thought as the averaged sum of the utilities of the two spouses that depend on the consumption of market goods, on home produced goods, on leisure time enjoyed and on the quality of children. Market goods and leisure are pure private goods, while both home produced goods and children quality are “public goods” for the couple, that can be produced with spouses’ time and/or with goods bought on the market. The solution of the model gives the time allocation chosen by each parent, *i.e.* how each spouse divides his/her total time between work, domestic activities, basic childcare and quality care time. The decisions are taken simultaneously and they are all affected by individual and family characteristics and by social background. Given the nature of public goods for the couple of both domestically produced goods and children quality and given the unique household’s budget constraint, spouses’ decisions are interdependent. Depending on the functional form of the utility functions, the model can produce corner solutions, meaning that each individual may allocate zero time to one or more uses.

Our empirical strategy is not to estimate a full structural model, since we want to specify neither a functional form for the utility function nor the form of spouses’ interactions. We will nevertheless use a model that takes into account the joint dependence of time allocated to different activities by each spouse and the interdependence of spouses’ time decisions. Therefore, we estimate the following interdependent simultaneous equations:

$$\begin{cases} h_k^* = \alpha_0 + \alpha_1 X_m + \alpha_2 X_f + \alpha_3 F + \alpha_4 Y + \varepsilon_{hk} \\ d_k^* = \beta_0 + \beta_1 X_m + \beta_2 X_f + \beta_3 F + \varepsilon_{dk} \\ bc_k^* = \gamma_0 + \gamma_1 X_m + \gamma_2 X_f + \gamma_3 F + \varepsilon_{bck} \\ qc_k^* = \varphi_0 + \varphi_1 X_m + \varphi_2 X_f + \varphi_3 F + \varepsilon_{qck} \end{cases} \quad k = (m, f)$$

$$\begin{cases} h_k = \max(0, h_k^*) \\ d_k = \max(0, d_k^*) \\ bc_k = \max(0, bc_k^*) \\ qc_k = \max(0, qc_k^*) \end{cases}$$

where  $h_k$  is working time for individual  $k$ ,  $d_k$  is domestic time,  $bc_k$  is time for basic care and  $qc_k$  is time for quality care;  $X_m$  are husband characteristics,  $X_f$  are wife characteristics,  $F$  are family characteristics and  $Y$  are income controls. When the optimal choice is zero, it is because falls into the corner solution  $t=0$ .

As pointed out in Hallberg and Klevmarcken (2003), our equations are not Marshallian demand functions<sup>10</sup> because they do not depend on wages. They are behavioral equations derived from the first-order conditions of the optimization problem of the household.

A different model of household decisions on spouses' time allocation can be thought in which some of the time uses of one spouse depend directly on the own or other spouse's time uses. Given the characteristics of our sample (almost all men work, women are often considered as the secondary earner, and time for children seems to be taken mainly from women's work and leisure time<sup>11</sup>) we assume a sequence of time allocation decisions in which spouses first decide how much time they want to devote to market work and after they decide how to divide the residual time between domestic work, basic care, quality care and other activities. Working time is, in fact, the most difficult time use to be adjusted at the intensive margin. Flexibility in the number of working hours depends upon the type of contract, the type of job, the employer and therefore the decision is mainly between working and not working. Therefore it is likely that working time does not depend directly on the other possible time allocations but only indirectly through errors correlation. Moreover, woman's labour supply is considered more flexible and it is adapted to

<sup>10</sup> In the empirical analysis, we disregard the price of market substitutes for home production, since they are not known.

<sup>11</sup> See the next Section.

household domestic and childcare needs. Therefore, the main source of variation within the couple, in terms of working hours, is related to wives, since Italian husbands work almost always<sup>12</sup> and, if employed, they work full-time. It is therefore likely that spouses' domestic and childcare time depend directly on how much time the wife commits to work.

Moreover we assume that children need a minimum basic care time, while "quality" time is not strictly necessary. Therefore parents decide first how much time devote to basic childcare and after how much time to devote to quality care. Hence we model each spouse's quality care time use as dependent directly on his own basic care time.

We therefore consider a recursive model in which domestic time, basic care and quality care of both spouses depend on the wife's working time and in which husband's and wife's quality time depend on own basic time. The simultaneous equations become:

$$\begin{cases} h_k^* = \alpha_0 + \alpha_1 X_m + \alpha_2 X_f + \alpha_3 F + \alpha_4 Y + \varepsilon_{hk} \\ d_k^* = \beta_0 + \beta_1 X_m + \beta_2 X_f + \beta_3 F + \beta_4 h_f + \varepsilon_{dk} \\ bc_k^* = \gamma_0 + \gamma_1 X_m + \gamma_2 X_f + \gamma_3 F + \gamma_4 h_f + \varepsilon_{bck} \\ qc_k^* = \varphi_0 + \varphi_1 X_m + \varphi_2 X_f + \varphi_3 F + \varphi_4 h_f + \varphi_5 bc_k + \varepsilon_{qck} \end{cases} \quad k = (m, f)$$

$$\begin{cases} h_k = \max(0, h_k^*) \\ d_k = \max(0, d_k^*) \\ bc_k = \max(0, bc_k^*) \\ qc_k = \max(0, qc_k^*) \end{cases}$$

All the errors are assumed to be identically and independently jointly normally distributed with an unrestricted covariance matrix.

$$\begin{pmatrix} \varepsilon_{hm} \\ \varepsilon_{hf} \\ \dots \\ \varepsilon_{qcm} \\ \varepsilon_{qcf} \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ \dots \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_{hm}^2 & \sigma_{hm,hf} & \dots & \dots & \sigma_{hm,qcf} \\ \sigma_{hm,hf} & \sigma_{hf}^2 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \sigma_{hm,qcf} & \dots & \dots & \dots & \sigma_{qcf}^2 \end{pmatrix}$$

<sup>12</sup> 96,19% in 1988 and 96,58% in 2002

where  $\sigma_i^2$  is the variance of the  $\varepsilon_i$  and  $\sigma_{ij}$  is the covariance between  $\varepsilon_i$  and  $\varepsilon_j$ . Correlation in unobservables among the errors of the eight time-use equations may arise from unobserved household-specific correlations in preferences or productivity.

Instead of using a 3SLS as Hallberg and Klevmarcken (2003), we estimate our system as a Seemingly Unrelated Regressions system using simulated maximum likelihood. In fact, as pointed out by Greene (2003), in limited dependent variables models with simultaneous equations the endogeneity of one or more variables can be ignored in formulating the likelihood if the system is recursive (with a triangular coefficients matrix) and if the endogenous variables enter the subsequent stages as observed ( $h$  and not  $h^*$ ). Observations that are censored in three or more equations involve calculation of a cumulative jointly normal distribution up to eight dimensions, depending on the number of non-negative binding constraints. To solve this problem, we use the GHK algorithm developed by Børsh-Saupan and Hajivassiliou (1993), Hajivassiliou and McFadden (1990) and Keane (1994). This algorithm evaluates the probability each individual contributes to the likelihood exploiting the fact that a multivariate normal distribution function can be expressed as the product of sequentially conditioned univariate normal distribution functions.

We test the specification of our recursive model of time allocation against the non-recursive and more traditional one using a Wald test on the null of female work coefficients and basic care coefficients jointly equal to zero.

#### **4.1. Variables used**

In our empirical investigation we analyse how husbands and wives allocate their time into four different activities, that are our dependent variables: market work, domestic work, basic care and quality care.

As independent variables we consider both individual's characteristics, household characteristics and we control for the geographical area of residence.

To capture the effect of parental education, we use compulsory education (8 years of schooling) as the reference group. The other education levels that can be distinguished are lower 'secondary education' (2 years of secondary school); upper secondary education (5 years of secondary school); a short university degree (2 years); and a standard university degree (4 or more years). These last two categories are aggregated together in the estimation of the model as there are few observations with a short university degree. For the same reason, we aggregate together also lower and upper secondary schooling.

Next, we use dummy variables for the age of the youngest child in the household. We distinguish two categories: the youngest child is (i) younger than 3 years and (ii) from 3 to 5 years old. We distinguish between these two categories because the availability of childcare facilities for children below the age of 3 is very limited in Italy, especially in the Southern regions of the country (Del Boca *et al.*, 2007 and 2008), while public childcare covers on average 95% of the population of children from 3 to 5.

We also include the total number of children living in the household, since the higher the number of children the more the time parents have to spend with them. However, the amount of time required increases less than proportionally with respect to the number of children, due to economies of scale.

We control for the presence of healthy adults other than the parents in the household, (grandparents, adult children, other parents). Their role could be double fold: they can either help the family providing free childcare services but they can also be an income source. We also control for the presence of sick adults within the household<sup>13</sup>. In general, sick adults play a competing role with children for the wife (but also for the husband) time, since they need care for themselves, and their care might also require new expenses, increasing the household income need.

We include three regional dummies, to capture systematic differences across different parts of Italy. Living in the North is our reference group, compared to living in the Center and living in the South. Households that reside in different parts of Italy face different unemployment rates and labor market conditions, different childcare availability and different living costs, all elements that could strongly affect time allocation decisions.

Finally, in both dataset we have neither the wealth nor the income of the family and we hardly have variables that allow us to proxy the economic situation of the household. We nevertheless try to recover some economic controls from the information included in the two surveys. Therefore in both years we construct a dummy equal to 1 if the family owns the apartment or the house they live in. Home ownership is the first and main investment a family made whenever possible. Families that do not own the apartment/house are often families that can't afford it. In the 1988 sample, we also construct a dummy variable equal to 1 if the family lives in a public housing, as an indicator for families that are on the lower part of the income distribution. In 2002 we don't know if the family lives in a public housing but, instead, we control for the fact that the family own a

---

<sup>13</sup> In 1988 the sick status is based on a survey question that asks if the individual is chronically ill. In 2002, instead, is based on a self-reported variable on the individual health status, with possible answers that varies from very good to very bad.

holiday house as a sign for wealthy families. Moreover, we define another dummy to control for those families that declare to be poor or really poor on the basis of the survey question<sup>14</sup> “How you define the economic situation of your family?”.

Table 4 reports sample summary statistics for 1988 and 2002.

The ratio of childless couples increased slightly but it remained very low (9% in 1988 and 12% in 2002). Education increased drastically in 2002 with respect to 1988 for both men and women. In particular the number of men and women with at least secondary school raised significantly and also the percentage of women with a university degree. Women with children are more likely to stay at home than childless women in both samples. Moreover, wives are more likely to be housewives if they live in Southern regions. The number of children per household decreased slightly, from 1.75 to 1.55. Looking at our economic controls, the ratio of home owners rose from 66.9% to 71.3%. In 2002, 13.6% of households have also a holiday house, 5.6% feel to be poor or really poor, In 1988 26.5% of households live in public housings.

## 5. Results

We estimated the model for the two years separately and we use two different specifications corresponding to the two models described in section 4. The first model, called non-recursive scenario, is a SUR system of eight left-censored equations without endogenous variables. In the second model, called recursive scenario, we allow domestic time, basic care and quality care to depend directly from observed wife’s working hours and husband’s and wife’s quality time to depend directly on each own basic childcare.

Table 5 shows the estimation results of the non-recursive scenario for 1988. In general, wife’s time allocation is more responsive to family and individual characteristics than husband’s time decisions. Wife’s education has a positive impact on wife’s working hours and a negative impact on husband working time. It also has a positive effect on both parents basic care. Her education plays no significant role in husband quality time decisions while if she is highly educated she dedicates more quality time to the children. More educated women spend also less time in domestic works. Also wives of more educated husbands decrease significantly their domestic work time. Living in a Southern region decreases significantly mother working minutes, but also her quality time. On the contrary, living in the South increases the time devoted to wife’s domestic work and

---

<sup>14</sup> Since it is a self-reported variable, it depends crucially on individual beliefs and it is likely to be downward bias and centered around the mean (as it is). Nevertheless, we think that those individuals who report to be poor or really poor are likely to be families that suffer for some kind of real economic constraints.

reduces the husband's domestic time. Thus it is not true (at least in the South) that mothers who work less spend more quality time with their children: they spend more time in cleaning the house. This result holds also in the 2002 sample.

The presence in the household of a child younger than 3 has a negative effect only on the working time of the mother. Also the number of children in the household matters only for the mother's time decisions. In particular, it has a positive effect on the time dedicated to children (both basic and quality) and on the time spent in housework, while it has a negative effect on working time. Results show that parents allocate more time to both basic and quality care if they have children younger than 5 years old. This positive effect decreases with child's age. Living with other adults (not sick) decreases significantly the basic care time of both parents, as expected, and it decreases mother's quality time too. Finally, living in a public housing decreases both parents working time. This effect could be related either to a negative income effect (to maintain the right of living in a public housing, the family must not exceed a quite low income threshold) or to a negative social effect.

Table 7 reports the results of the recursive scenario for 1988. The above described results are all confirmed. This means that education and working time coefficients are actually capturing two distinct effects: the first related to personal and family characteristics, but also to the social background, the second related to time constrain. Living in the South increases the mother's time of basic care (the South coefficients becomes weakly significant and positive). Finally, mother basic care time has a negative effect on her quality time with children while father's basic care has no significant effect on his quality care.

Table 6 displays the coefficients for the non-recursive scenario in 2002. Most of the results are the same as for 1988. However, mother college education has now a positive effect on husband's working decisions (the effect was negative in 1988). The presence of a child younger than 3 in the household still has negative impact, but it becomes significant also for the father's working time. In 2002, when she is highly educated, he increases his domestic time. Also husband secondary school degree has now a positive effect on his time dedicated to domestic work. Living in the Center increases now father working time, decreases his domestic time and basic care, while it has a positive effect on mother domestic time. In 2002, mother secondary school has a positive effect also on both parents' quality time, (while in 1988 the coefficient was not significant), while husband college degree has a positive effect on maternal basic care. In 2002 the number of



children within the household matters for both parents time allocation and not only for women time decisions as in 1988. In particular, it has a positive effect on the time both dedicated to basic care and also on maternal quality care, a positive effect on maternal domestic time and a negative effect on paternal domestic time. It also has a negative effect on maternal work and a positive effect on paternal work. These last results support the fact that the male breadwinner family type is still a reference model for Italian couples , where he provides income and she provides care for the house and the children. Living with other healthy adults decreases significantly the basic care time but also the quality care time of both parents. Home ownership weakly increases mother working time. This effect is probably related to the need to pay back the loan associated to home purchases. Finally, perceived poverty decreases both parents working time. This variable could capture the same effect of the popular house variable in 1988 sample.

Table 8 shows the results for the recursive scenario in 2002. Wife university degree is no longer significant for husband domestic time, but mother working time becomes significant. The more she works, the more the father care about their children and the lower her basic care. It seems therefore that working mothers suffer from a time constraint but fathers compensate for the loss in maternal caring time. Mother working time also negatively affects the quality time she devotes to children and again the father compensates but the effect is not statistically significant. Mothers in the South spend less time in basic and quality care. As in 1988, the higher the own basic care time the lower the own quality time for both parents but in this case both coefficients are significant.

By comparing the recursive scenarios of the two years, we get some interesting results.

Fathers are more involved in children education and in child caring activities in 2002 than in 1988. In 2002, children become important for father working decisions while they were not in 1988. Living with other healthy adults help parents in managing both basic and quality care, in particular in 2002 where time constraints seem to be more stringent. Mothers work more in 2002 and they allocate less time to their children relying more on other adults help (father *in primis* and other family adults). In both years, more educated parents care more about their children, both basic and quality care.

Our test on the specification of the recursive model strongly rejects, on both years, the null of wife's working coefficients and basic care coefficients jointly equal to zero. We then conclude that our recursive specification is better than our non recursive one.

Table 9 and Table 10 report the correlation matrices for the two specifications in 1988 and 2002. The variances of the unobservables of the eight time use equations are always statistically significant. In 1988 non-recursive specification we find significant negative correlation across unobservables between wife's work and wife's basic and quality care and a positive correlation between wife's work and husband's basic and quality care. In the recursive scenario, where we control for the direct effect of wife's working time, the negative correlation with wife's care is even reinforced while the positive correlation with husband's care time lose its significance. In 2002, instead, the negative correlation in unobservables between mother's working time and mother's care becomes positive and still significant when we control for the direct effect of mother's work. Therefore if in 1988 it was true that working mothers spent less time with their children, in 2002 the opposite is true. It can be the case that in 1988 education increased the time for work but that in 2002 its positive effect on the value parents give to time with children is stronger.

Husband's working time is negatively related to husband's both type of care in 1988 and in 2002 recursive specification. We also find a negative and significant correlation between wife's domestic work and wife's child care (both basic and quality care) in both years recursive specifications. In both years wife's basic care is positively correlated with husband's basic care and both parents' quality care. Finally husband's basic care is positively correlated with wife's basic care and both parents' quality care. These results imply that parents who spend more time with their children tend to divide it between basic and quality care.

## **6. Conclusions**

This paper uses the two existing waves of the Italian Time Use dataset (1988 and 2002) to analyze family time allocation decisions and their changes over time in a period that showed an increase in female employment rate and a decline in total fertility rate.

We use a simultaneous recursive approach that allows us to take into consideration the links among the different time uses of the same individual and the correlation between spouses' decisions.

Our results show that women's time allocation is in general more responsive than men's time allocation to family and individual characteristics and this seems to indicate that women are still considered as secondary earners in the household. Their time allocation, in fact, depends strongly on the presence, the age and the number of children.

On the contrary, in 1988 the presence of children in the household did not affect fathers' time allocation decisions, and it becomes important for father working decisions only in 2002, when fathers were more involved in children caring and education. This is the response to the greater mothers' involvement in the labour market.

In fact, in 2002 mothers' work is less responsive to family characteristics and even if, on average, they allocate more time to their children, childcare time diminishes with their working time, but they rely more on other adults help (mainly on partners) for childcare. However mothers tend to delegate mainly basic care activities and only marginally "quality" time.

Women's education increases both the time mothers spend with children and the time fathers spend with children (only for basic care in 1988), men's high education has an effect on woman's quality care (only in 2002) but surprisingly men's education has no effect on fathers' care and quality time.

Despite the traditional household model of Italian couples, these results seem to be consistent with those found for other countries and confirm how parents value more and more time with children, since they increase the time devoted to "quality" activities. The implications of this for children development process and outcomes are therefore very important in terms of policy implication. The working hours of the mothers decrease certainly both basic and quality care time with the children, but this is compensated by the increase in the time fathers devote to their children. Unfortunately, at the moment, we have not datasets on children outcomes for Italy for analysing the consequences on children of these relevant changes.

## **Bibliography**

- Anxo D. Flood L., Mencarini L., Pailhé A., Solaz A. and Tanturri M.L. (2007), Time Allocation between Work and Family over the Life-Cycle : a Comparative Gender Analysis of Italy, France, Sweden and US, IZA DP No. 3193
- Becker G. S. (1965), A Theory of the Allocation of Time, *The Economic Journal*, Vol. 75, No. 299, pp. 493-517
- Bianchi S. (2000), Maternal Employment and Time with Children: Dramatic Change or Surprising Continuity?, *Demography*, vol. 37(4), p. 401-414
- Bloemen, H. and Stanca E. (2008), How do spouses allocate time: the impact of wages and income, IZA DP No. 3679, September
- Bloemen, H., Pasqua S. and Stanca E. (2008), An Empirical Analysis of the Time Allocation of Italian Couples: Are Italian Men Irresponsive?, IZA DP n. 3823, November

- Boeri T., Del Boca D. and Pissarides C. (eds.), (2005), *Women at Work. An Economic Perspective*, Oxford University Press
- Bonke J., Deding M., Lausten M. and Stratton L. (2007), Intra-household Specialization in Housework in the United States and Denmark, IZA DP No. 2777
- Börsh-Saupan, A. and Hajivassiliou, V. (1993), "Smooth unbiased multivariate probability simulator for maximum likelihood estimation of limited dependent variable models", *Journal of Econometrics*, 58(3), pp.347-368
- Burda M., Hamermesh D.S. and Weil P. (2006), The Distribution of Total Work in the EU and US, mimeo
- Connelly R. and Kimmel J. (2007), Spousal Influences on Parents' Non-Market Time Choices, IZA DP No. 2894
- Craig L. (2006), Parental Education, Time in Paid Work and Time with Children: an Australian Time-Diary Analysis, *The British Journal of Sociology*, vol. 57(4), p. 553-575
- Craig L. and Bittman M. (2008), The Incremental Time Costs of Children: an Analysis of Children's Impact on Adult Time Use in Australia, *Feminist Economics*, vol. 14(2), P. 59-88
- Drago R. and Lee Y. (2008), The Parenting of Infants: a Time Use Study, WP 08-02 Population Research Institute, PennState University
- Greene, W.H. (2003), *Econometric analysis*, Fifth edition, Prentice Hall
- Gronau R. (1976), Leisure, Home Production and Work. The theory of the allocation of time revisited, NBER Working paper No. 137, May
- Gutierrez-Domenech M. (2008), Parental Employment and Time with Children in Spain, La Caixa WP N. 1
- Hajivassiliou, V. and McFadden, D. (1990), "The method of simulated scores for the estimation of LDV-models with application to external debt crises", *Cowles Foundation Discussion Paper*, number 967, Yale University
- Hallberg D. and Klevmarcken A. (2003), Time for Children: a Study of Parent's Time Allocation, *Journal of Population Economics*, vol. 16, p. 205-226
- Ichino A. and Sanz de Galdeano A. (2004), Reconciling Motherhood and Work: Evidence from Time Use Data in Three Countries, W.P. n. 114 CSEF
- Kalenkoski C., Ribar D. and Stratton L. (2008), The Influence of Wages on Parents' Time Allocation of Time to Child Care and Market Work in the United Kingdom, *Journal of Population Economics*, vol. 22(2), pages 399-419, April
- Kalenkoski C.M., Ribar D.C. and Stratton L. (2005), Parental Child Care in Single Parent, Cohabiting, and Married Couple Families: Time Diary Evidence from the United Kingdom, *American Economic Review*, vol. 95, p. 194-98
- Kalenkoski C.M., Ribar D.C. and Stratton L.S (2006), Parental Child Care in Single Parent, Cohabiting, and Married Couple Families: Time Diary Evidence from the United States and the United Kingdom, WP No. 440 The Levy Economics Institute of Brad College
- Keane, M. (1994), "A computationally practical simulation estimator for panel data, *Econometrica*, 62(1), pp.95-116
- Mencarini L. and Tanturri M.L. (2004), Time Use, Family Role-Set and Childbearing among Italian Working Women, *Genus*, vol. LX, p. III
- Nock S.L. and Kingston P.W. (1988), Time with Children: the Impact of Couples' Work-Time Commitments, *Social Forces*, vol. 67(1), p. 59-85
- OECD (2008), *Employment Outlook*, Paris

- Sandberg J.F. and Hoffert S.L. (2001), Changes in Children's Time with Parents: United States, 1981-1997, *Demography*, vol.38(3), p. 423-436
- Sayer L.C., Bianchi S.M. and Robinson J.P. (2004), Are Parents Investing Less in Children? Trends in Mothers' and Fathers' Time with Children, *American Journal of Sociology*, vol. 110(1), p. 1-43
- Yeung W., Sandberg J., Davis-Kean P. and Hofferth S. (2001), Children's Time with Fathers in Intact Families, *Journal of Marriage and Family*, vol. 63, p. 136-54
- Zick C.D., Bryant W.K. and Österbacka E. (2001), Mothers' Employment, Parental Involvement, and the Implication for Intermediate Child Outcomes, *Social Science Research*, vol. 30, p. 25-49

**Table 1 Time Allocation<sup>15</sup> in 1988 and 2002 (unconditional mean)**

	<i>Dual earners households</i>		<i>Male breadwinner</i>	
	<i>Husband</i>	<i>Wife</i>	<i>Husband</i>	<i>Wife</i>
<b>1988</b>				
<b>Couples without children</b>				
Work	448.1	351.4	405.7	-
Household	31.1	233.7	38.0	429.9
Basic childcare	-	-	-	-
Quality childcare	-	-	-	-
<b>Couples with children</b>				
Work	456.7	305.0	462.9	-
Household	41.0	276.8	28.4	464.7
Basic childcare	8.6	37.0	3.7	51.2
Quality childcare	12.9	12.6	6.7	17.2
<b>2002</b>				
<b>Couples without children</b>				
Work	483.3	369.8	437.9	-
Household	43.0	165.7	39.8	363.2
Basic childcare	-	-	-	-
Quality childcare	-	-	-	-
<b>Couples with children</b>				
Work	465.4	305.6	459.2	-
Household	39.7	228.9	24.2	411.5
Basic childcare	18.6	60.2	10.3	80.6
Quality childcare	16.5	24.5	18.1	34,4

<sup>15</sup> All times are in daily minutes

**Table 2 Time Allocation in 1988 and 2002 (conditional mean)**

	<i>Dual earners households</i>				<i>Male breadwinner</i>			
	<i>Husband</i>		<i>Wife</i>		<i>Husband</i>		<i>Wife</i>	
	% >0	Mean if >0	% >0	Mean if >0	% >0	Mean if >0	% >0	Mean if >0
<b>1988</b>								
<b>Couples without children</b>								
Work	98.1%	456.7	81.1%	433.1	96.9%	418.7	-	-
Household	58.5%	53.2	98.1%	238.2	50.0%	75.9	100.0%	429.9
Basic childcare	-	-	-	-	-	-	-	-
Quality childcare	-	-	-	-	-	-	-	-
<b>Couples with children</b>								
Work	96.4%	473.6	80.9%	376.9	97.1%	476.5	-	-
Household	56.2%	72.9	99.7%	277.5	46.6%	61.0	100.0%	464.7
Basic childcare	19.3%	44.3	55.5%	66.6	10.5%	34.7	58.2%	87.8
Quality childcare	17.3%	74.7	21.4%	55.5	13.0%	51.7	24.8%	58.8
<b>2002</b>								
<b>Couples without children</b>								
Work	92.7%	521.3	84.9%	435.6	87.9%	498.3	-	-
Household	67.2%	63.9	97.4%	170.2	56.1%	71.1	100.0%	363.2
Basic childcare	-	-	-	-	-	-	-	-
Quality childcare	-	-	-	-	-	-	-	-
<b>Couples with children</b>								
Work	92.5%	502.9	79.6%	383.8	87.9%	505.9	-	-
Household	60.9%	65.2	99.3%	230.6	41.4%	58.5	99.7%	412.5
Basic childcare	36.4%	51.0	64.8%	93.0	21.5%	47.8	68.0%	118.4
Quality childcare	29.1%	56.8	40.1%	61.0	30.9%	56.8	47.3%	72.8

**Table 3 Time allocation in couples with children by educational levels in 1988 and 2002 (unconditional mean)**

Wife's education	Husband's education	HUSBAND				WIFE			
		Work	Domestic	Basic care	Quality care	Work	Domestic	Basic care	Quality care
<b>1988</b>									
Compulsory	Compulsory	470.6	37.7	3.2	5.8	115.2	417.4	31.6	10.7
	Secondary school	473.5	22.0	4.8	14.5	121.5	365.8	50.2	18.8
	University	368.7	46.2	1.3	19.4	143.9	360.0	21.1	0
Secondary school	Compulsory	439.5	32.7	8.3	18.7	203.1	322.5	69.8	21.0
	Secondary school	404.5	52.0	11.2	12.2	165.6	326.0	63.2	21.5
	University	393.1	38.1	11.4	19.0	199.5	307.6	66.5	21.9
University	Compulsory	233.7	31.2	21.2	0	152.5	320.7	26.2	26.2
	Secondary school	453.8	21.4	20.0	16.9	169.2	328.6	95.6	27.5
	University	424.8	44.3	18.4	13.5	215.8	274.9	35.9	18.3
<b>2002</b>									
Compulsory	Compulsory	418.1	34.8	10.4	12.2	123.9	350.8	57.4	23.2
	Secondary school	418.4	42.2	13.1	15.2	121.7	348.0	55.1	25.2
	University	287.1	52.9	8.6	5.7	114.3	394.3	30.0	10.0
Secondary school	Compulsory	430.5	40.1	17.0	20.7	194.8	283.6	67.1	30.9
	Secondary school	450.6	38.6	20.1	21.5	196.9	286.5	78.9	31.1
	University	486.6	30.0	25.1	14.2	205.8	294.5	78.3	35.7
University	Compulsory	478.2	32.3	28.8	39.4	174.7	252.9	124.7	61.8
	Secondary school	440.9	47.9	18.9	20.2	221.3	233.6	100.9	39.4
	University	465.5	33.4	15.8	20.0	252.2	220.1	82.4	33.0



**Table 4 Descriptive statistics 1988 and 2002**

	<b>1988</b>	<b>2002</b>
Wife's age	36.5	39.1
Husband's age	40.1	42.3
Wife's education		
<i>Compulsory or lower</i>	66.1%	50.12
<i>Secondary school</i>	28.1%	41.9%
<i>University or higher</i>	5.8%	7.9%
Husband's education		
<i>Compulsory or lower</i>	63.2%	52.3%
<i>Secondary school</i>	28.3%	39.3%
<i>University or higher</i>	8.4%	8.4%
Childless households	9.1%	12.7%
Number of children	1.74	1.55
Highest number of children in the household	8	7
Working wives		
<i>Working wives with children</i>	36.8%	41.9%
<i>Working wives without children</i>	50.0%	62.1%
Working wives		
<i>Nord</i>	49.3%	51.7%
<i>Centro</i>	49.4%	52.7%
<i>Sud</i>	23.8%	32.4%
Other healthy adults in the household	26.5%	34.1%
Sick adults in the household	8.1%	1.5%
Home owners	66.9%	71.3%
Public housing	26.5%	-
Poor Households	-	5.6%
Holiday house owners	-	13.6%
Observations	970	2105

**Table 5 Estimation results 1988, non recursive model**

VARIABLES		WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Work	Own age	-2.975	(2.381)	-1.197	(0.910)
	Wife's secondary school degree	151.1***	(34.77)	-49.64***	(13.42)
	Wife's university degree	169.3***	(64.28)	-47.55*	(25.57)
	Husband's secondary school degree	-2.732	(34.21)	-5.209	(13.17)
	Husband's university degree	51.62	(56.05)	-25.09	(22.23)
	Younger kids lower than 3 years old	-119.4***	(42.43)	-7.778	(16.12)
	Younger kids between 3 and 5 years old	-42.47	(41.79)	-5.551	(15.73)
	Number of children	-45.33***	(15.69)	7.864	(5.833)
	Other adults	50.11	(37.13)	-4.580	(13.98)
	Sick adults	-66.88	(51.46)	-1.061	(18.81)
	Public housing	-39.74*	(23.72)	-22.16**	(10.91)
	Home ownership	-2.268	(21.15)	9.514	(10.19)
	Center	-34.67	(38.94)	-18.92	(15.29)
	South	-210.1***	(31.09)	-54.17***	(11.55)
Constant	199.3**	(92.13)	531.7***	(37.50)	
Domestic	Own age	3.591***	(0.856)	1.203*	(0.667)
	Wife's secondary school degree	-49.68***	(12.78)	17.28*	(9.779)
	Wife's university degree	-74.02***	(24.35)	12.49	(18.35)
	Husband's secondary school degree	-30.32**	(12.46)	-3.888	(9.644)
	Husband's university degree	-51.78**	(21.05)	0.532	(15.84)
	Younger kids lower than 3 years old	11.02	(15.20)	20.79*	(11.86)
	Younger kids between 3 and 5 years old	2.953	(15.12)	1.284	(11.60)
	Number of children	27.02***	(5.478)	1.566	(4.244)
	Other adults	-21.26	(13.58)	-1.609	(10.34)
	Sick adults	7.746	(17.93)	-10.64	(13.85)
	Center	-0.309	(14.56)	-9.780	(11.18)
	South	56.00***	(11.01)	-14.94*	(8.477)
	Constant	202.1***	(32.84)	-53.25*	(27.67)
	Basic care	Own age	-3.175***	(0.557)	-0.809
Wife's secondary school degree		22.10***	(6.761)	34.14***	(10.05)
Wife's university degree		37.07***	(13.20)	58.65***	(17.74)
Husband's secondary school degree		8.169	(6.680)	6.074	(10.02)
Husband's university degree		-2.742	(11.47)	4.397	(15.69)
Younger kids lower than 3 years old		99.38***	(8.029)	37.10***	(12.23)
Younger kids between 3 and 5 years old		58.05***	(7.793)	21.87*	(11.98)
Number of children		12.57***	(3.379)	3.098	(5.475)
Other adults		-31.99***	(8.059)	-28.51**	(12.78)
Sick adults		-9.176	(9.762)	4.314	(14.29)
Center		-0.0302	(8.190)	-6.573	(12.34)
South		-1.070	(6.119)	-9.448	(9.349)
Constant		71.86***	(20.41)	-78.26**	(33.52)

**Table 5 Estimation results 1988, non recursive model (continue)**

	VARIABLES	WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Quality care	Own age	-4.260***	(1.015)	-3.188***	(1.129)
	Wife's secondary school degree	15.81	(11.93)	17.52	(13.59)
	Wife's university degree	45.65**	(22.48)	19.31	(25.50)
	Husband's secondary school degree	20.80*	(11.81)	7.116	(13.60)
	Husband's university degree	13.46	(19.87)	32.88	(21.67)
	Younger kids lower than 3 years old	4.748	(14.21)	70.83***	(17.17)
	Younger kids between 3 and 5 years old	13.24	(13.80)	66.67***	(16.54)
	Number of children	18.86***	(6.227)	1.914	(7.640)
	Other adults	-25.67*	(14.11)	-27.40	(18.06)
	Sick adults	-10.95	(18.11)	1.265	(19.79)
	Center	-4.474	(14.23)	4.838	(16.60)
	South	-27.87**	(11.03)	-20.60	(12.79)
	Constant	39.37	(36.19)	-24.76	(44.83)

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 6 Estimation results 2002, non recursive model**

VARIABLES		WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Work	Own age	-1.522	(1.541)	-6.383***	(0.899)
	Wife's secondary school degree	141.2***	(20.47)	14.21	(11.81)
	Wife's university degree	246.3***	(37.26)	57.84***	(21.95)
	Husband's secondary school degree	-2.360	(20.08)	11.19	(11.99)
	Husband's university degree	8.389	(36.56)	8.887	(22.44)
	Younger kids lower than 3 years old	-147.1***	(27.46)	-28.87*	(15.93)
	Younger kids between 3 and 5 years old	-20.68	(28.43)	-7.458	(16.73)
	Number of children	-37.47***	(10.69)	21.98***	(6.271)
	Other adults	11.20	(22.58)	-19.57	(13.09)
	Sick adults	-79.99	(73.50)	-82.18*	(42.08)
	Poor Households	-113.3***	(32.51)	-65.09***	(20.07)
	Home ownership	32.04**	(14.49)	9.243	(10.14)
	Holiday house ownership	-6.551	(18.25)	10.03	(13.31)
	Center	-7.626	(23.48)	38.37***	(14.04)
South	-146.5***	(19.86)	-24.08**	(11.43)	
Constant	111.2*	(61.48)	650.9***	(38.56)	
Domestic	Own age	2.583***	(0.548)	1.828***	(0.378)
	Wife's secondary school degree	-57.24***	(7.252)	6.350	(5.051)
	Wife's university degree	-113.3***	(13.63)	21.83**	(9.324)
	Husband's secondary school degree	4.305	(7.144)	8.644*	(4.961)
	Husband's university degree	-10.43	(13.34)	-13.24	(9.223)
	Younger kids lower than 3 years old	-10.08	(9.648)	4.177	(6.774)
	Younger kids between 3 and 5 years old	-9.945	(10.17)	2.680	(7.155)
	Number of children	27.50***	(3.781)	-7.222***	(2.664)
	Other adults	-8.978	(8.060)	-11.50**	(5.579)
	Sick adults	41.13	(25.25)	3.926	(18.01)
	Center	23.83***	(8.553)	-19.89***	(5.972)
	South	63.24***	(6.945)	-18.78***	(4.849)
	Constant	168.4***	(21.88)	-51.65***	(16.28)
	Basic care	Own age	-4.337***	(0.460)	-0.631
Wife's secondary school degree		14.25***	(5.079)	21.64***	(5.851)
Wife's university degree		21.52**	(9.441)	20.99**	(10.48)
Husband's secondary school degree		5.071	(5.008)	9.319	(5.760)
Husband's university degree		21.28**	(9.309)	14.82	(10.35)
Younger kids lower than 3 years old		112.9***	(6.486)	43.12***	(7.393)
Younger kids between 3 and 5 years old		55.84***	(6.519)	37.83***	(7.405)
Number of children		31.54***	(3.097)	13.07***	(3.596)
Other adults		-66.67***	(5.853)	-51.72***	(6.899)
Sick adults		2.026	(17.56)	-19.09	(24.15)
Center		-0.811	(6.053)	-14.78**	(7.084)
South		-3.465	(4.811)	-11.02**	(5.529)
Constant		134.0***	(18.32)	-55.59**	(21.73)

**Table 6 Estimation results 2002, non recursive model (continue)**

	VARIABLES	WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Quality care	Own age	-2.593***	(0.465)	-2.314***	(0.467)
	Wife's secondary school degree	11.22**	(5.165)	14.08***	(5.441)
	Wife's university degree	16.36*	(9.486)	11.53	(9.905)
	Husband's secondary school degree	2.195	(5.070)	2.707	(5.343)
	Husband's university degree	8.026	(9.410)	1.094	(9.872)
	Younger kids lower than 3 years old	41.94***	(6.491)	56.74***	(6.723)
	Younger kids between 3 and 5 years old	26.66***	(6.558)	42.77***	(6.751)
	Number of children	14.97***	(3.157)	3.155	(3.375)
	Other adults	-49.54***	(6.023)	-48.27***	(6.672)
	Sick adults	15.77	(17.76)	-25.04	(23.98)
	Center	5.443	(6.063)	-0.812	(6.516)
	South	-10.39**	(4.916)	-6.636	(5.172)
	Constant	55.76***	(18.49)	34.86*	(19.77)

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 7 Estimation results 1988, recursive model**

	VARIABLES	WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Work	Own age	-4.306*	(2.607)	-1.227	(0.909)
	Wife's secondary school degree	137.3***	(38.33)	-49.84***	(13.43)
	Wife's university degree	157.38**	(70.30)	-47.64*	(25.58)
	Husband's secondary school degree	-11.12	(37.83)	-5.104	(13.17)
	Husband's university degree	47.19	(61.44)	-24.67	(22.23)
	Younger kids lower than 3 years old	-220.20***	(48.52)	-7.823	(16.12)
	Younger kids between 3 and 5 years old	-75.89	(46.18)	-5.690	(15.73)
	Number of children	-50.84***	(17.68)	7.810	(5.834)
	Other adults	46.28	(40.80)	-4.589	(13.99)
	Sick adults	-59.57	(56.45)	-0.865	(18.81)
	Public housing	-65.18**	(31.20)	-20.68*	(10.71)
	Home ownership	19.96	(27.90)	11.65	(9.989)
	Center	-46.51	(42.45)	-19.21	(15.29)
	South	-239.1***	(34.65)	-54.27***	(11.55)
	Constant	271.3***	(100.7)	531.3***	(37.49)
Domestic	Own age	2.328***	(0.655)	1.242*	(0.674)
	Wife's secondary school degree	-9.487	(10.43)	15.56	(10.39)
	Wife's university degree	-43.87**	(18.49)	11.56	(18.50)
	Husband's secondary school degree	-30.54***	(9.328)	-3.791	(9.630)
	Husband's university degree	-37.34**	(12.24)	-0.214	(15.84)
	Younger kids lower than 3 years old	-31.74***	(12.24)	22.43*	(12.42)
	Younger kids between 3 and 5 years old	-10.01	(11.41)	1.699	(11.63)
	Number of children	11.33***	(4.406)	2.182	(4.439)
	Other adults	-5.988	(10.30)	-2.076	(10.41)
	Sick adults	-8.964	(13.52)	-9.811	(13.89)
	Center	-11.73	(11.97)	-9.201	(11.20)
	South	-14.12	(11.01)	-12.05	(10.28)
	Wife's working time	-0.673***	(0.070)	0.027	(0.056)
	Constant	404.4***	(32.27)	-60.88*	(32.36)
	Basic care	Own age	-2.716***	(0.577)	-0.762
Wife's secondary school degree		14.05*	(7.55)	28.10***	(10.73)
Wife's university degree		29.94**	(14.23)	55.07***	(17.75)
Husband's secondary school degree		6.202	(7.215)	4.289	(9.969)
Husband's university degree		-7.777	(12.35)	0.973	(15.60)
Younger kids lower than 3 years old		106.28***	(8.863)	42.40***	(12.55)
Younger kids between 3 and 5 years old		57.628***	(8.536)	22.06*	(11.90)
Number of children		14.597***	(3.609)	5.368	(5.548)
Other adults		-34.703***	(8.485)	-29.375**	(12.62)
Sick adults		-6.653	(8.485)	6.898	(14.19)
Center		2.535	(8.677)	-5.959	(12.25)
South		15.699**	(7.230)	1.935	(11.54)
Wife's working time		0.167***	(0.0318)	0.105	(0.065)
Constant		26.69	(22.76)	-101.49***	(37.80)

**Table 7 Estimation results 1988, recursive model (continue)**

	VARIABLES	WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Quality care	Own age	-6.757***	(1.704)	-3.396***	(1.164)
	Wife's secondary school degree	37.25**	(18.21)	28.92*	(15.29)
	Wife's university degree	86.37**	(34.44)	34.30	(27.35)
	Husband's secondary school degree	25.79	(16.46)	8.361	(14.08)
	Husband's university degree	5.344	(27.95)	35.86	(22.53)
	Younger kids lower than 3 years old	158.22***	(56.18)	69.91***	(19.73)
	Younger kids between 3 and 5 years old	90.05***	(32.64)	65.59***	(17.16)
	Number of children	33.16***	(10.65)	0.691	(8.199)
	Other adults	-56.99**	(23.45)	-26.44	(18.82)
	Sick adults	-18.61	(24.56)	1.539	(20.48)
	Center	0.157	(19.72)	3.818	(17.07)
	South	-8.092	(19.88)	-30.92*	(16.99)
	Wife's working time	0.149	(0.128)	-0.089	(0.085)
	Own basic care time	-1.599***	(0.517)	-0.511	(0.343)
	Constant	81.13	(54.96)	-0.799	(52.54)

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 8 Estimation results 2002, recursive model**

	VARIABLES	WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Work	Own age	-2.022	(1.666)	-6.323***	(0.898)
	Wife's secondary school degree	151.3***	(21.94)	11.45	(11.97)
	Wife's university degree	253.0***	(39.59)	9.327	(22.41)
	Husband's secondary school degree	-7.683	(21.42)	14.90	(11.80)
	Husband's university degree	7.617	(38.74)	58.53***	(21.92)
	Younger kids lower than 3 years old	-163.8***	(29.40)	-29.25*	(15.91)
	Younger kids between 3 and 5 years old	-26.29	(30.35)	-7.818	(16.71)
	Number of children	-40.05***	(11.47)	21.85***	(6.264)
	Other adults	16.25	(24.02)	-19.70	(13.08)
	Sick adults	-88.09	(79.09)	-82.22*	(41.99)
	Poor Households	-158.3***	(39.07)	-54.18***	(19.35)
	Home ownership	37.19**	(16.97)	5.036	(9.722)
	Holiday house ownership	-5.765	(20.98)	11.03	(12.75)
	Center	-8.321	(24.89)	38.54***	(14.02)
	South	-149.1***	(21.26)	-24.26**	(11.41)
	Constant	119.4*	(66.26)	650.6***	(38.50)
Domestic	Own age	2.436***	(0.504)	1.937***	(0.378)
	Wife's secondary school degree	-49.79***	(7.115)	-1.140	(5.565)
	Wife's university degree	-100.1***	(13.27)	8.450	(10.19)
	Husband's secondary school degree	4.010	(6.529)	9.016*	(4.945)
	Husband's university degree	-10.20	(12.19)	-13.29	(9.191)
	Younger kids lower than 3 years old	-19.64**	(9.421)	13.75*	(7.411)
	Younger kids between 3 and 5 years old	-13.14	(9.361)	5.678	(7.216)
	Number of children	25.56***	(3.529)	-5.112*	(2.733)
	Other adults	-8.025	(7.375)	-12.14**	(5.562)
	Sick adults	36.94	(23.12)	8.995	(17.97)
	Center	23.10***	(7.818)	-19.11***	(5.956)
	South	56.34***	(6.805)	-11.57**	(5.340)
	Wife's working time	-0.101***	(0.036)	0.102***	(0.033)
	Constant	195.3***	(22.07)	-78.07***	(18.29)
Basic care	Own age	-4.594***	(0.454)	-0.635	(0.490)
	Wife's secondary school degree	30.09***	(5.664)	15.88**	(6.394)
	Wife's university degree	48.86***	(10.34)	10.63	(11.28)
	Husband's secondary school degree	5.292	(4.992)	9.725*	(5.617)
	Husband's university degree	22.01**	(9.316)	15.36	(10.10)
	Younger kids lower than 3 years old	92.17***	(7.093)	49.65***	(7.968)
	Younger kids between 3 and 5 years old	48.93***	(6.591)	39.51***	(7.271)
	Number of children	27.64***	(3.142)	14.65***	(3.607)
	Other adults	-65.07***	(5.822)	-51.55***	(6.730)
	Sick adults	-9.256	(17.66)	-11.94	(23.15)
	Center	-1.961	(6.042)	-14.18**	(6.919)
	South	-17.18***	(5.299)	-5.821	(5.990)
	Wife's working time	-0.224***	(0.035)	0.0736*	(0.040)
	Constant	189.8***	(19.65)	-70.49***	(22.98)



**Table 8 Estimation results 2002, recursive model (continue)**

	VARIABLES	WIVES		HUSBANDS	
		Coeff.	(St. dev.)	Coeff.	(St. dev.)
Quality care	Own age	-7.625***	(1.186)	-2.244***	(0.483)
	Wife's secondary school degree	60.64***	(11.51)	13.96**	(6.304)
	Wife's university degree	96.90***	(20.43)	6.998	(11.31)
	Husband's secondary school degree	9.065	(8.826)	3.871	(5.572)
	Husband's university degree	37.33**	(16.97)	3.347	(10.30)
	Younger kids lower than 3 years old	149.4***	(23.05)	67.93***	(8.403)
	Younger kids between 3 and 5 years old	82.15***	(15.20)	49.67***	(7.491)
	Number of children	41.13***	(7.631)	4.764	(3.653)
	Other adults	-110.4***	(15.58)	-53.63***	(7.410)
	Sick adults	-10.32	(30.74)	-25.37	(24.72)
	Center	3.008	(10.52)	-2.264	(6.801)
	South	-43.49***	(9.885)	-4.431	(5.923)
	Wife's working time	-0.505***	(0.075)	0.0394	(0.041)
	Own basic care time	-1.420***	(0.222)	-0.373***	(0.124)
	Constant	341.9***	(52.47)	24.44	(22.10)

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 9 Covariance matrix for 1988**

Non recursive model								
	Wife's work	Husband's work	Wife's domestic	Husband's domestic	Wife's basic care	Husband's basic care	Wife's quality care	Husband's quality care
Wife's work	373.02***	0.070**	-0.757***	0.044	-0.268***	0.139**	-0.125**	0.125**
Husband's work		157.87***	0.093***	-0.463***	0.058	-0.243***	0.024	-0.144
Wife's domestic			150.77***	-0.089**	0.049	-0.115**	-0.032	-0.109*
Husband's domestic				106.24***	-0.008	0.241***	0.029***	0.035
Wife's basic care					70.19***	0.242***	0.243***	0.144***
Husband's basic care						78.52***	0.253***	0.273***
Wife's quality care							103.98***	0.432***
Husband's quality care								106.89***
Recursive model								
	Wife's work	Husband's work	Wife's domestic	Husband's domestic	Wife's basic care	Husband's basic care	Wife's quality care	Husband's quality care
Wife's work	400.61***	0.778**	0.248*	0.003	-0.707***	-0.159	-0.507***	0.302*
Husband's work		157.93***	0.188***	-0.466***	0.032	-0.255***	0.038	-0.158***
Wife's domestic			112.85***	-0.072*	-0.229***	-0.063	-0.275***	-0.009
Husband's domestic				106.06***	0.001	0.237***	0.025	0.058
Wife's basic care					79.58***	0.293***	0.800***	0.003
Husband's basic care						77.75***	0.357***	0.359**
Wife's quality care							162.73***	0.258**
Husband's quality care								113.53***

Note: Standard deviations on main diagonal, correlation coefficients off-diagonal.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 10 Covariance matrix for 2002**

Non recursive model								
	Wife's work	Husband's work	Wife's domestic	Husband's domestic	Wife's basic care	Husband's basic care	Wife's quality care	Husband's quality care
Wife's work	368.07***	0.122***	-0.734***	0.131***	-0.222***	0.219***	-0.160***	-0.013
Husband's work		232.93***	0.070***	-0.483***	0.100***	-0.244***	0.063**	-0.207***
Wife's domestic			142.89***	-0.110***	0.087***	-0.189***	0.042	-0.009
Husband's domestic				92.51***	-0.047*	0.235***	-0.025	0.138***
Wife's basic care					84.78***	0.176***	0.198***	0.148***
Husband's basic care						84.26***	0.097***	0.221***
Wife's quality care							79.81***	0.281***
Husband's quality care								76.33***
Recursive model								
	Wife's work	Husband's work	Wife's domestic	Husband's domestic	Wife's basic care	Husband's basic care	Wife's quality care	Husband's quality care
Wife's work	385.72***	0.120***	-0.660***	-0.111	0.341***	0.028	0.451***	-0.087
Husband's work		232.69***	0.093***	-0.509***	0.148***	-0.245***	0.157***	-0.253***
Wife's domestic			130.56***	0.028	-0.230***	-0.061	-0.330***	0.019
Husband's domestic				92.17***	-0.042	0.0212***	-0.045	0.0174***
Wife's basic care					85.81***	0.234***	0.085***	0.148***
Husband's basic care						81.71***	0.237***	0.419***
Wife's quality care							149.57***	0.230***
Husband's quality care								80.82***

Note: Standard deviations on main diagonal, correlation coefficients off-diagonal  
 \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%