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Caring for Children and Time–Budget Constraints: the Role of women’s professional activity;

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Abstract. Using the 1998 time use survey for France, my aim is to study the determinants of the time that mothers and fathers devote to active child care, emphasizing on the role of women's labor force commitment. Previous research has opted for a descriptive approach and has pointed out that higher educated women devote more time to their children as do their spouses. By simultaneously modeling wages, the women's decision to work on the labor market and each spouses time devoted to children, (i)we eliminate the endogeneity bias and can establish the direction of the causalities involved; (ii)we also assess the relationship between the time commitment of mothers and fathers to their children, testing the hypothesis of joint behavior. Work involvement is shown to be crucially important as the main parameter: introducing this simultaneity balances the influence of women's educational achievement on mothers and fathers' active caring. The mother's work involvement is what causes fathers' greater involvement with their children. Furthermore, controlled for all these socioeconomic determinants, fathers and mothers' childcare times are complementary; i.e., fathers spend more time on children when mothers do so

1. Introduction

Time spent by parents on their children represents a big investment, and one that appears to have increased throughout the modern industrialized world since the 1960s. Women's increased labour force participation and the time pressures of work notwithstanding, parents today appear to be devoting more time to childcare than they did 40 years ago in the USA (Bianchi, 2000), Canada and most industrialized countries (Sayer, Gauthier *et al.* 2004; Sayer, Bianchi, Robinson, 2004). Both mothers and fathers have increased their time investment in children. Fathers still spend less time on childcare than mothers, but the gender gap has narrowed. The objective of this paper, using the 1998 Time Use Survey for France, is to study the determinants of parental time spent on active childcare, emphasizing the role of women's occupational commitment, and taking into account the concurrency of the spouses' time allocations.

Previous research based on time use surveys has found that at a given point in time, both more highly-educated women and their spouses devote more time to their children (Leibowitz 1975, Gronau, 1973; Sayer, Bianchi *et al.* 2004; Chalasini, 2007). Another focus is the key role of mothers' work involvement (Gronau, 1977, 1986; Stattford and Russel, 1980; Hunt and Kiker, 1984; Lundholm and Hohlson, 1998; Anxo *et al.* 2002).

However, the causalities at work behind these influences are unclear. Among other well-documented factors, Gauthier *et al.* (2004) stress that paid work does not appear to impinge directly on the time investment that parents make in children: working parents spend slightly less time with their children than non-working parents, but the difference is much less than the difference in total work time between these two employment statuses.

But they also note that the results for working and non-working mothers suggest that a selectivity effect may be at work, producing a higher concentration among the non-employed of mothers with a greater propensity to spend time with children. This is especially true for women with greater wage-earning potential.

The French 1998 Time Use Survey based on time use diaries of both parents enables two outstanding questions to be addressed:

- In some couples where the mother had chosen to participate (or not) in the labour market, her choice was found to be endogenous to the time invested in the children. How does bringing a propensity for children versus a propensity for paid employment into the equation modify existing findings on child care factors?

- Is mothers and fathers' time invested in children substitutive or cumulative: Is the father's investment lower when the mother's is higher? Or are they positively correlated?

Previous research may be marred by endogenous bias, since formal qualifications, wages and women's decision to participate in the labour market mutually interact and influence the time each spouse spends on the children. By simultaneously modelling wages, women's decision to work on the labour market, and the time spent by each spouse on children, (i) the endogeneity bias is eliminated, enabling the real causal mechanisms involved to be established; (ii) the relationship between mothers and fathers' time commitment to their children can be assessed to test the joint behaviour hypothesis.

Furthermore, recent methodological developments reveal the conceptual difficulties in measuring that time, which goes well beyond the active care time where attending to the child is the main task, since it is possible to prepare meals while supervising the child's homework or talk to him/her while doing the housework (Sayer, Gauthier *et al.* 2004). Childcare time doubles when it includes these simultaneous activities, and triples if physical supervision time - being around in case of untoward occurrences - is included (Fedick *et al.*, 2005). This study is confined to active caring. The theoretical model takes its cue from Kooreman and Kapteyn (1987), Jenkins and O'leary (1995), Hills and Jenkins (1995), Hallberg and Klevmarken (2003).

The results point to a predominant influence of women's labour market participation. The influence of education *per se* is first controlled by women's potential wage. Two components are distinguished in the effect of education on active caring time, when estimating both education and potential wage effects without explicitly taking account of the concurrency of occupational commitment and time. The results show the conflicting influence of educational achievement *per se* and wage-earning potential. By increasing the preference for better educated children and the return on mother's time for that, higher educational achievement is shown to lead to more childcare time. Conversely, higher educational achievement results in a higher wage-earning potential, increasing the price of time and leading to less childcare time.

Work involvement is shown to be crucially important as the main parameter: introducing this concurrency eliminates the influence of women's educational achievement on mothers and fathers' active caring. The mother's work involvement is what causes fathers' greater involvement with their children. Furthermore, controlled for all these socioeconomic determinants, fathers and

mothers' childcare times are complementary; i.e., fathers spend more time on children when mothers do so .

The paper is structured as followed: the data, empirical framework and methodology are first presented (section 2), followed by the results (section 3). A stepwise procedure is followed, beginning with a descriptive approach, then introducing the influence of the spouses' wage-earning potential, concluding by modelling women's labour force participation and spouses' childcare time concurrently. This enables a comparison of the results of the different models. The conclusions then review the findings.

2. Data and methods

2.1 The data: The Time Use Survey

The INSEE 1998-99 Time Use Survey collected data from one-day dairies kept by each member of the household aged 15 and over.

To allow for in-week variations in activities, the sample comprises substantially the same number of dairies for each day of the week. Seasonal variations are also taken into account and identified, the survey having been conducted in 8 waves distributed over the year.

Table 1: Distribution of survey waves within the year

Wave 1: 16 February – 29 March 1998	Wave 2: 30 March – 10 May 1998
Wave 3: 11 May – 21 June 1998	Wave 4: 22 June – 2 August 1998
Wave 5: 17 August – 27 September 1998	Wave 6: 28 September – 8 November 1998
Wave 7: 9 November – 20 December 1998	Wave 8: 4 January – 14 February 1999.

Of the 1796 couples under age 60 with children aged 0-14, 132 were excluded due to the father's unemployment (the sample used contained no fathers in part -time employment) ¹. Others were disqualified if a control variable of interest was missing, if there were serious inconsistencies in the data, or if they did not pass the estimated wages robustness test because the estimated wage values were too distant from the actual values (more than 30 percentiles). This left a usable

¹ Unemployed persons and pensioners were excluded to avoid introducing extraneous concepts into the study. Households where the reference person or spouse was in education were also excluded from the sample for want of specific information on their incomes.

sample of 1183 couples with 1, 2 or 3 children² aged under 15, where the father was in full-time employment.

In 38% of cases, the woman was also working full-time. They had an average of 1.56 children and of these, 36% had children under 3 years of age. The other couples were equally divided between women working part-time (32% of the sample, with an average of 1.85 children, and 36% of these had children under 3 years of age) or non-economically active women (30% of the sample with an average of 1.92 children, 49% of whom had children under 3 years of age)³.

An enlarged sample of 2400 couples with and without children was used to estimate women's labour force participation and wages.

2.2. The empirical framework

2.2.1 The empirical strategy: the dependent variables

Previous analyses (Becker, 1991; Blau *et al.*, 1994; Hallberg and Klevmarcken, 2006) suggest ways in which wage rate and educational differentials might influence childcare time. The approach here is not to estimate a full structural model using specific assumptions about the functional forms of utility functions and interaction between spouses, but rather one that recognizes the joint dependence of time allocated to different activities and the interdependence of spouses' time use.

Furthermore, not all parents carry out caring activities in all cases. The presence of one or more child-directed activities is found in only 52% of fathers' and 83% of mothers' time uses, but it cannot be distinguished whether these are activities never carried out, or a random effect of their not being done on the survey day (e.g., the school run where the survey was done on a Sunday, or mother was attending a training course that day). In this latter case, the right model by which to describe parental time use is a generalized linear system (Robin, 1993), childcare time being the average of those who spent such time on that day and the others. This study hypothesizes the former scenario, where some fathers spend zero time on their children; accordingly, the spouses' childcare time is modelled as a bivariate Tobit. This choice was prompted by the fact that in the sample used, all non-working mothers of young children performed at least one caring task. Nevertheless, both models were estimated and the results stand up.

² There are too few very large families (4 or more children) to constitute a statistical base (fewer than 100 individuals per household size, accounting for 3% of the sample used)

³ The maximum available information was used; e.g., modeling the decision to work to estimate the women's full-time wages involved the use of 2781 questionnaires of women with and without children.

The estimating equations are analogues of equations that have become standard in the literature on labour supply:

$$h^f = f_0 + f_1 \ln w_f + f_2 \ln w_m + f_3 y + \mathbf{f}_4 \mathbf{c} + \mathbf{f}_5 \mathbf{z} + u \quad (1)$$

$$h^m = m_0 + m_1 \ln w_f + m_2 \ln w_m + m_3 y + \mathbf{m}_4 \mathbf{c} + \mathbf{m}_5 \mathbf{z} + u' \quad (2) \quad (S)$$

$$y^* = \gamma + \eta Z + u'' \quad (3)$$

$y = 1$ if $y^* > 0$ and 0 otherwise.

$$\begin{pmatrix} u \\ u' \\ u'' \end{pmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2 & \rho\sigma\sigma' & \rho''\sigma\sigma'' \\ \rho\sigma\sigma' & \sigma'^2 & \rho'\sigma'\sigma'' \\ \rho''\sigma\sigma'' & \rho'\sigma'\sigma'' & \sigma''^2 \end{pmatrix} \right]$$

Where h^f and h^m are the time spent on active child care; f_i and m_i are parameters to be estimated; w_f and w_m , are the spouses' wage rates; y^* is the advantage derived from women's labour force participation; \mathbf{c} is a vector of the number and age of the children and \mathbf{z} is a vector of sociodemographic variables, Z is a vector of gender-specific and common exogenous variables explaining the work decision, and u, u', u'' are the error terms that are normal interdependent ; $\text{Cor}(u, u') = \rho$, $\text{Cor}(u, u'') = \rho''$; $\text{Cor}(u', u'') = \rho'$..

We observe only the sign y_i of the variable y_i^* , and the positive part of h .

The estimation strategy, fairly widespread in the literature on labour economics, draws on that of Heckman (1978) implemented by Kooreman and Kapteyn (1987) (see below). It is based on the two steps process, using the inverse Mill's ratio..

2.2.2 The explanatory variables

The key impact of parents' educational achievement

Economic theory has shown that parents face a critical choice between having a larger family, and a smaller one but with more highly-educated children.

More highly-educated parents will tend to educate their children to a higher level, both to increase their return on investment in education, and to nurture the cultural level of their offspring. Cultural values are commonly held to be better transmitted by parents, and more highly-educated parents will spend more time with their children.

But while children need parental time, time is more costly to more highly-educated parents who can expect higher potential wages on the labour market. Which of these two causalities prevail is a problem this study aims to address by carefully modelling the two effects. To measure each of these causalities, both parents' educational achievement and potential wages were introduced into the model.

Exogenous wages;

Log w was measured as the logarithm of respondents' self-reported monthly earnings divided by 4.3 times their self-reported weekly hours (job status being determined by the main interview). This time measure is a response to a question and not extracted from the time diaries that yield the measures of h . Any error-induced bias in this wage measure from mistakenly reported hours is eliminated by the use of instrumental variables.

The problem with estimating (S) was the evident one that no market wage rate is recorded for non-workers (355 of the 1183 mothers). This was circumvented by estimating a probit over the entire sample of 2880 records including childless women, relating the probability of labour force participation to a number of variables that might affect it: age and its quadratic function, marital status, husband's wage, and the presence of young children. *Women's labour force participation* increases with rising educational levels and age; it decreases as the husband's wage increases, and according to the number and age of children. All these variables influence the labour supply but also affect childcare time. To describe the model, an exclusion condition had to be introduced that affects labour force participation without affecting time allocation or wages: for this, the local unemployment rate was introduced into the women's labour force participation equation. Women decide to work if their reservation wage is lower than the market wage. This labour market participation and the wage equation (table Annex 2) were then simultaneously estimated using Heckman's (1978) two steps strategy: the inverse Mills ratio, $f(-J)/[1 - F(-J)]$, where J is the predicted ordinate of the unit normal distribution for an observation, was then entered into a second-round equation describing the logarithm of wages in the sample of 828 working women.

The same strategy was used to estimate (S): an estimate was first made of (3) and the inverse Mill's ratio then entered as a covariate in the second round system of (1) and (2), estimated as a bivariate Tobit. Following Green 2003, we took into account the Mills ratios and wages in the calculation of the standard errors.

Other authors have introduced total family income directly as an explanatory variable of time-use. This was not done here, however, because it is an endogenous variable: total income is the outcome of a decision that depends on intended childcare time. The spouse's childcare time was not directly introduced in the regression equation for the same reason (Jenkins and O'leary (1995)); instead, both spouses' demands for active caring for children were modelled simultaneously.

The other variables used are the number and age groups of the children (c), parents' characteristics, size of locality of residence, man's age and age differential between the couple, their occupation and educational levels.

3. Results

After a brief consideration of childcare activity time and fathers and mothers' average childcare activity rates by sib composition and mother's employment (table 2), the influence of non-wage exogenous socio-demographic explanatory variables as found in the sociological literature will be analysed (model 1; table 3). I shall then examine in turn how these results are modified by inclusion of the estimated wages into the covariates (table 4 columns 3 and 6), concluding with a presentation of the causal model which takes account of the concurrency of mothers' decision to work and their time use by explicitly including the Mills ratio (table 4 columns 4 and 7).

The variations in childcare time calculated in this way will then be compared against the findings for parents' free time (Ekert-Jaffé, 2008) calculated by a model estimated from the same survey which, as here, takes account of the concurrency of women's time use and work involvement choices.

Table 2 shows that mothers in a couple family spend an average 113, and fathers 37, minutes a day throughout the year caring for their under-15-year-olds. The bulk of this is physical care - 65% of the total for mothers and 52% for fathers - followed by play at nearly 20mn per day for mothers and 6mn for fathers, then school runs and then educational activities (11mn for mothers and 3mn for fathers). But these activities are not systematically carried out by all parents. The presence of one or more childcare activities is found in only 52% of fathers' time use and 83% of mothers'. But the parental breakdown of average times spent shows that all these activities, even

the most infrequent, exact a minimum time spend. For example, average homework supervision time is low because it involves only children in a certain age group. But the parents concerned spend an average 50 minutes per day on it.

As several authors have previously argued (Bush, 1999; Bianchi, 2000; Anxo, 2002), most childcare time is spent by women, and this specialization in the domestic sphere rises with family size: more than 84% of women carry out at least one childcare task in the day, - except for full-time working mothers of an only child over 3 years of age, 60% of whom were caring for their children on the survey day. Their average childcare time is 70mn, but doubles where the child is under 3 years of age and increases by 30% per child. Obviously, childcare time varies with women's work activity, but much less so than suggested by employment time differentials: women who work part-time expend little more active childcare time than full-timers, while stay-at-home mothers, almost all of whom were caring for their children on the survey date, spend 50% more time on childcare (expending 105mn per day on an only child aged over 6).

For men, as family size increases, childcare time varies less than their rate of sharing childcare. For those who invest more time in their children, the time spent is less family size- than child's age-dependent. Equalling 53mn per day for children aged 7-12, it increases by 30 mn per day for an under-3-year-old (and by 10mn for children aged 3-6). For both spouses, it is indistinguishable from zero for children aged over 12.

These results are found in all the models estimates (table 3 and 4): household size increases mothers' childcare time by 36mn per child, but has no influence on fathers' childcare time, for whom the coefficient of +40mn (39.44) induced by the presence of an under-3-year-old expresses both an increase in childcare time and fathers' childcare activity.

This time is doubled for mothers, who spend 86 mn more per day caring for an under-3-year-old.

The other variables can be classified by whether they operate in the same way for both spouses, each being obviously more sensitive to its specific attributes, or by whether they operate in opposing ways as expressing substitutable qualities⁴ that induce spousal specialization and stem from the theory of marriage (Becker, 1973, Grossbard, 1993).

Generally, the couple's characteristics influence women to a higher degree, since they expend more of their time on active caring.

⁴ In economic terms, substitutable tasks are those whose productivity increases when one spouse specializes in them; conversely, the spouses are complementary if their productivity increases when both contribute to the same task.

Caring time depends on the locality of residence: rural men and women spend less time on their children. Is it that the countryside offers opportunities for child self-development or, on a like-for-like employment basis, do rural parents have a lower propensity to invest in their children? Whatever else (Ekert-Jaffé, 2008), their spare time is no more limited than the population as a whole.

Older couples (fathers' age) spend less time on childcare, when it is known that on a like-for-like employment basis, older people also have less spare time (Ekert-Jaffé, 2008). This analysis shows that they spend more time on paid work or household tasks and less on childcare, although it is not possible to say for certain whether this is an age or generation effect.

Women, but not men, who are younger than their spouse spend more time on childcare. Is this an indicator of more traditional behaviour patterns, a more extreme division of labour, or merely an effect of the woman's age?

This active caring time does not depend on the spouses' legal situation, but is obviously dependent on seasonality and weekly schedules. Women but not men invest more in their children in winter. Weekend time use also reflects the within-couple division of labour, as the father's childcare time increases (as the coefficient of +19 for the father shows) releasing the mother (-34 for the mother) for other tasks, since men generally (Ekert-Jaffé, 2008) take more rest than their spouse during weekends. Women do the housework, men childcare activities.

Childcare time also depends on occupational category: self-employed males - farmers and shopkeepers - with longer than average workdays have less spare time (- 100 mn per day) and leave childcare duties to their partner (coefficient equal to -33 for them and +24 for their partner). All the factors so far described are exogenous variables which have little or no model-specific variability, and are uncorrelated to the influence of the job market, whereas wages, educational achievement and women's employment interact on time uses.

In model 1 (Table 4, uncontrolled for LFP), men and women secondary school completers alike spend more time on childcare; men whose wives have no formal qualifications spend less, whereas woman who hold or have held executive positions encourage their husbands to invest time in the children.

In model 2 (Table4, controlled for potential wages), introducing the estimated potential wage reduces the impact of the woman's current or former executive position on her spouse's behaviour: the coefficient remains significant, but its magnitude is much lower; also, the woman's

lack of formal qualifications *per se* is no longer a contributory factor. The fathers' behaviour is particularly sensitive to the mothers' potential wage: the higher it is, the more time fathers spend with their children (coefficient of +25 mn for a wage multiple of 2.7). The influence of the spouse's educational achievement is predicated by its consequences on the job market.

Mothers' childcare time also increases and by the same magnitude as that of fathers when their spouse's wage increases. In accordance with the dictates of economic rationality, therefore, each invests their time commensurately to their spouse's wage.

Among the characteristics specific to mothers, a high potential wage significantly reduces⁵ their involvement in childcare duties - evidence of the cost of time, whereas the educational achievement that often goes with it increases⁶ their investment in childcare - evidence of the importance attached to education by the upper social groups. The reduction in childcare time that results from the prospect of a well-paid job is exactly counterbalanced by the father's involvement and the effort of more highly qualified mothers to set aside more time for their children.

Model 3 breaks down the estimated female wage into 2 components: the Mills ratio and the qualification level- and age-related market wage.

If the Mills ratio, which expresses women's propensity for paid employment, is included to allow for the endogeneity of female participation, the coefficient of mothers' educational achievement ceases to be significantly positive. Educational achievement and market wages can no longer be simultaneously identified, since the latter is a simple linear combination of the other explanatory variables, including educational achievement (table A2). To identify the model, I assumed the educational achievement effect to be included in that of the wage offered⁷ (Bilde and Hamermesch, 2006), which is also non-significant. The crucial importance of female participation choices in the volume and division of childcare duties within couples is demonstrated. Aside from the characteristics of the couple (ages, children, size of residential locality and fathers' self-employment status) and the survey days, the volume of fathers and mothers' childcare duties depends only on the Mills ratio and spouse's potential wage. The Mills ratio coefficient is -27mn in mothers' caring time and +10mn in that of fathers. A woman's economic benefit from working limits her time investment in children (- 27mn) but this reduction is offset by fathers' participation

⁵ (coefficient = -60mn)

⁶ (coefficient = +33mn)

⁷ The inclusion of both variables gave highly non-robust estimates, the coefficient signs varying with the sample.

in active caring for children (+10mn). Furthermore, as was seen earlier, the higher her spouse's wage, the more of her time she invests in her children (27mn more for a 60% increase in the wage). After all, children do not receive less caring because of their mother's professional commitment and women's labour force participation enhances sharing of child care between the spouses.

Furthermore, once all these elements of the division of labour are accounted for in all models, mothers and fathers' time investment in their children is positively correlated and the correlation is slightly higher when women's labour force participation is taken into account.

Discussion as a tentative conclusion;

In light of these results, three issues commonly identified by previous research can be discussed.

- (1) The emphasis placed on the impact of cultural aspects, and the key role of educational achievement in parents' personal investment in their children can be qualified.

With respect to mother's childcare time. From a descriptive standpoint, the effect of the mother's educational achievement is predominant. I show in this paper that this effect is the result of combined cultural and economic forces. Economic analysis, which successively introduces potential wages and simultaneous choice, yields different results: by introducing the potential wage, I find that a higher educational achievement has a strong positive influence on time spent by mothers, (resulting in a higher coefficient than in the descriptive approach), but is counterbalanced by the predominant role of economic reasoning that encourages more highly educated women to position themselves on the labour market. The high negative influence of potential wages sharply reduces the educational achievement effect. Simulations based on my equations show that degree-level qualifications per se increase active time with children by 33 mn (see table 4, column 6). However, degree-level qualifications represent an increase in potential wage of 60% relative to a sub-secondary school qualification (see table A2). The related higher price of time means that degree-level qualifications decrease this time by 60×0.6 , i.e., about 36mn. These two conflicting effects mean that the resulting effect of a degree-level qualification is not significantly different from zero. In the third step, simultaneously introducing the job search decision produces a variable called the inverse Mills ratio that represents the personal advantage

gained by women through their labour market participation. This advantage is evaluated by reference to every observable factor in the analysis. Table 4, column 7, shows that this personal interest, related to a potential loss of salary in the event of leaving the labour force, has a strong negative impact on mother's childcare time, resulting in a significant negative coefficient of -27. This summarizes both the wage effect and its educational achievement component, which become statistically insignificant. By contrast, the husband's wage is shown to have a positive effect on mother's caring time when the wife's decision to work is introduced.

- The same pattern recurs with the father's time spent in active child care. From a descriptive standpoint, husbands of women with no formal qualifications spend less time with their children. But this mother's educational achievement effect is sharply reduced when the mother's potential wage is taken into account. Women with no formal qualifications are more often non-economically active and married to men with no formal qualifications who more often leave the childcare duties to their wife.

- (2) The spouse's educational achievement *per se* has no effect on the father's childcare time (as previously demonstrated for the mother), but their spouse's work involvement does so significantly: the higher their spouse's potential wage, the more time fathers spend with their children. Fathers' caring time increases further where the mother is an executive. Women's labour force participation enhances sharing of child care between the spouses

(3) Mothers and father's time investment in their children is positively correlated and the correlation is higher when women's labour force participation is taken into account.

A significant economic gain from employment may reduce a mothers' active caring, but fathers' investment in childcare duties counterbalances the loss of earnings.

Parents spend the maximum time on their children that is compatible with their labour force obligations. Nevertheless, beyond the observables factors in child caring, some families invest more time in their children than others and this enhanced investment concern both spouses.

References

- ALGAVA Elisabeth, 2002, "Quel temps pour les activités parentales ? ", *Etudes et Résultats, DRESS*, 162, p. 1-12.
- ANXO Dominique, FLOOD L., KOCOGLU Y., 2002, "Offre de travail et répartition des activités domestiques et parentales au sein du couple : une comparaison entre la France et la Suède", *Economie et Statistique*, n° 352-353, p. 127-150.
- BARNET-VERZAT Christine, 1994, *Le Coût Temporel de l'Enfant*, thèse pour le doctorat en Sciences économiques, Université de Nantes.
- BECKER Gary S., 1965, "A Theory of the Allocation of Time", *The Economic Journal*, vol. 75, p. 493-517.
- BECKER Gary S., 1991, *A Treatise on the Family*, Harvard University Press, 288 p.
- BIANCHI Suzanne, 2000, "Maternal Employment and Time with Children: Dramatic Change or Surprising Continuity?", *Demography*, 37(4), p. 401-414.
- Biddle Jeff E. and Daniel S. Hamermesh, "Sleep and the Allocation of Time", *The Journal of Political Economy*, Vol. 98, No. 5, Part 1. (Oct., 1990), pp. 922-943.
- BITTMAN Michael and CRAIG L., 2008, 'The Incremental Time Costs of Children: An analysis of children's impact on adult time use in Australia', *Feminist Economics* 14 (2): 57-85.
- BLAU David and ROBINS P. 1989, "Fertility, Employment, and Child-Care Costs", *Demography*, vol. 26, n° 2, p. 287-299.
- BROSSOLET C., 1992, *Fondements de la division du travail dans les modèles économiques du ménage*, Arguments, 225 p.
- BROUSSE C., 1999, "La Répartition du Travail Domestique entre Conjoints, Permanences et Evolutions entre 1986 et 1999", in *France, portrait social*, Insee.
- Report*, Princeton ; Washington : Mathematica Policy Research, 62 p.
- CHALASANI Satvika, 2007, "The changing relationship between parents' education and their time with children", *International Journal of Time Use Research*, Vol.4, 1, p.93-117.
- DATCHER-LOURY L., 1988, "Effect of Mother's Home Time on Children's Schooling" *The Review of Economics and Statistics*, vol. 70, n° 3, p. 367-373.
- DUMONTIER F., PAN KE SHON J-L., 1999, "En 13 ans, Moins de Temps Contraint et plus de Loisirs", *Insee Première*, n° 675.
- Ekert-Jaffé Olivia, 2008, « Le coût du temps consacré aux enfants : contraintes de temps et activité féminine », mimeo Ined.
- FEDICK Cara B., GAUTHIER Anne H., PACHOLOCK Shelley, 2005, "Methodological issues in the estimation of parental time – Analysis of measures in a Canadian time-use survey", *International Journal of Time Use Research*, Vol.2, 1, p.67-87.
- FERMANIAN J-D, LAGARDE S., 1999, "Les Horaires de Travail dans le Couple", *Economie et Statistiques*, n° 321-322, p. 89-110.
- GAUTHIER A.H, Timothy M. SMEEDING AND Frank F. FURSTENBERG. Are Parents Investing Less Time in Children? Trends in Selected Industrialized Countries . *Population and Development Review*, Volume 30, Number 4 (December 2004), pp. 647-672.

- Green William H., 2003, *Econometric Analysis*, fifth Edition, Prendice Hall, Pearson Education International, P. 784-787.
- GRONAU R., 1973, "The Effect of Children on the Housewife's Value of Time", *Journal of Political Economy*, vol. 2, 2^{ième} partie, p. S168-S199.
- GRONAU R., 1977, "Leisure, Home Production and Work. The Theory of the Allocation of Time Revisited", *Journal of Political Economy*, vol. 85, n° 6, p. 1099-1123.
- GRONAU R., 1986, "Home Production- a Survey", in O. ASHENFELTER et R. LAYARD (éditeurs) *Handbook of Labor Economics*, volume I, Elsevier Science Publishers BV, p. 274-304.
- GROSSBARD-SCHECHTMAN Shoshana A. , 1993, *On the Economics of Marriage - A Theory of Marriage, Labor and Divorce*, Westview Press, Boulder, Co.
- HALLBERG Daniel., Anders KLEVMARKEN (2003), « Time for Children? A Study of Parents' Time Allocation », *Journal of Population Economics*, 16 (2), p. 205-226.
- HECKMAN James., 1978, "Dummy Endogenous Variables in a Simultaneous Equations System", *Econometrica*, 46,675-712.
- HERSCH J., 1991, "The Impact of non Market Work on Market Wages", *The American Economic Review (papers and proceedings)*, vol.81, n° 2, p. 157-160.
- HILL M. S., 1979, "The Wage Effects of Marital Status and Children", *The Journal of Human Resources*, vol. 14, n° 4, p. 579-594.
- HILL, C. Russell, and Frank P. STAFFORD., 1980, "Parental Care of Children: Time Diary Estimates of Quantity, Predictability, and Variety." *Journal of Human Resources* 15(2):219-239.
- HUNT J. C. and KIKER B. F., 1984, "Parental Time Devoted to Children in Two- and One-Wage-Earner Families", *Economics of Education Review*, vol. 3, n° 1, p. 75-83.
- JENKINS Stephen P. and O'LEARY Nigel C., 1995, "Modelling Domestic Work Time", *Journal of Population Economics*, p. 265-279.
- KOOREMAN Peter. And Arie KAPTEYN. 1987, "A Disaggregated Analysis of the Allocation of Time within the Household", *Journal of Political Economy*, vol. 95, 2, p. 223-249.
- KORENMAN S. and NEUMARK D., 1992, "Marriage, Motherhood, and Wages", *The Journal of Human Resources*, vol. 27, n 2, p. 233-255.
- KLEVMARKEN A., STAFFORD F., 1999, "Measuring Investment in Young Children with Time Diaries", in *Wealth, Work and Health. Innovations in Measurement in the Social Sciences*, eds. J.P. Smith and R.J. Willis, University of Michigan Press.
- LEIBOWITZ Arleen. 1975, "Education and the Allocation of Women's Time", in F. T. JUSTER (ed.), *Education, Income, and Human Behavior*. New York : McGraw-Hill, p. 171-197.
- LEMMENICIER B., & LEVY-GARBOUA, L. 1980, L'arbitrage autarcie-marché: une explication du travail féminin, *Consommation*, 1, CREDOC.
- LUNDBERG S. et POLLACK Robert A. 1996, "Bargaining and Distribution in Marriage." *Journal of Economic Perspectives* 10: 139-158 .
- LUNDBERG S., ROSE E., 1998, Parenthood and the Earnings of Married Men and Women", University of Washington Working Paper.
- LUNDHOLM M., OHLSSON H., 1998, "Who takes care of the Children? The Quantity-Quality Model revisited", Uppsala University, Working Paper n° 23.

- MINCER Jacob. 1963, 'Market Prices, Opportunity Cost and Income Effects', in *Measurement in Economics*, C. Christ and al. eds, (Stanford University Press, Stanford, CA).
- MINCER J. et POLACHEK S., 1974, "Family Investments in Human Capital : Earnings of Women", *Journal of Political Economy*, vol. 82, n° 2, 2ième partie, p. S76-S108.
- MINCER J. et POLACHEK S., 1978, "Women's Earnings Reexamined", *The Journal of Human Resources*, vol. 13, n° 1, p. 118-134.
- NAKAMURA A. and NAKAMURA M., 1992, "The Econometrics of Female Labor Supply and Children", *Econometric Reviews*, vol. 11, n° 1, p. 1-71.
- ROBIN, J.M. (1993), « Econometric Analysis of the Short-run fluctuations for Households'Purchase », *Review of Economics Studies*, 60, 923-934.
- ROY C., (1989), "La gestion du temps des hommes et des femmes, des actifs et des inactifs", *Économie et Statistique*, n°223, p. 5-14.
- SANDBERG J., HOFFERTH S., 2001, "Changes in Children's Time with Parents : United States, 1981-1997", *Demography*, 3, p. 423-436.
- SAYER, Liana C., GAUTHIER Anne H., and Frank F. FURSTENBERG. 2004. "Educational differences in parents' time with children: Cross-national variations," *Journal of Marriage and Family*, 66, December, p.1149–1166.
- SAYER, Liana C., BIANCHI Suzanne M., and ROBINSON. John P., 2004. "Are parents investing less in children? Trends in mothers' and fathers' time with children," *American Journal of Sociology* 10(1), p. 1–43.
- SOUSA-POZA A., SCHMID H., WIDMER R., 2001, "The allocation and value of time assigned to housework and child-care: An analysis for Switzerland", *Population Economics*, 4, p.599-618.

Table 2. Time devoted to active caring in minutes according to the labor force participation of the mothers and the number of children.

	Full-time dual earners		Part-time working mother		Inactive mother		Total		proportion having done some caring	
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Proportion of non zero time	0.56	0.80	0.51	0.83	0.47	0.88	0.52	0.84		
Mean Time in active caring	42	94	37	99	31	153	37	113	0.52	0.84
<u>According to Children of the couple</u>										
1 child aged 3-14	25	42	15	62	15	87	22	56	0.39	0.65
-aged 0-2	58	139	53	155	35	154	49	146	0.61	0.95
2 children aged 3-14	36	85	25	68	28	105	29	83	0.45	0.80
o/w one below age 3	53	154	53	152	48	211	51	171	0.67	0.96
3 children aged 3-14	45	88	81	94	21	128	33	110	0.51	0.87
Sample size	451		377		355		1183		1183	
% of Couples with 3 children in the sample	8		14		23					
% sample	38%		32%		30%		100%		100%	

**Table 3 . Parents’s Time devoted to childcare tasks in minutes : Bivariate Tobit regressions
Influence of socio demographic characteristics**

Variables	Father’s childcare activity standard		Mother’s childcare activity	
	Coefficients	Standard Error	Coefficients	Standard Error
Intercept	13.9	23	119.4	25
<u>Children’s Characteristics)</u>				
Number of childres	5.15	4.39	28.01	4.7
Children Aged 0-2	40.44	6.70	89.43	7.3
Children Aged 3-6	21.24	6.31	17.10	6.8
<u>Household’s Characteristics</u>				
Husband’s age	-1.2**	0.60	-3.22	0.6
Age difference	0.3	0.76	2.29	0.8
Lives in a rural area	-17.7	6.24	-15.48**	6.7
<u>Men’s Characteristics</u>				
Self employed	-32.6	11.2	24.07**	11.6
High School Completed	16.4	8.6		
<u>Women’s Characteristics</u>				
No diploma	-25.4**	9.5		
High School Completed			19.13**	8.3
Tertiary Education			5.28	7.7
Professional	37.8	9.6	-1.61	11.8
<u>Interviewed in winter</u>				
Interviewed during the week-end	7.4	5.6	20.67	6.1
Standard error of residuals	19.9	6.2	-34.75	6.9
Correlation coefficient rho	85.9	2.6	101.56	2.3
Number of observations	0.11	0.3	0.11	0.3
- Loglikelihood	1183		1183	
	10192		10192	

*Bold= significant at 1%level, **: significant at 5%, *: significant at 10%*

Table 4 . Impact of women’s professional commitment on the time devoted to child care in minutes according to estimated women’s wage, and exogenous versus endogenous Labor Force Participation

Variables	Father’s time in active child care			Mother’s time in active child care		
	Uncontrolled for LFP and wages	Controlled for potential, wage	Controlled for LFP	Uncontrolled for LFP and wages	Controlled for potential, wage	Controlled for LFP
Intercept	13.9	-85.5*	-113.1**	119.4	232.3	41.25
<u>Children’s Characteristics)</u>						
Number of childres	5.15	8.4*	9.3**	28.01	21.6	29.04
Children Aged 0-2	40.44	39.5	39.7	89.43	89.1	87.05
Children Aged 3-6	21.24	21.1	21.0	17.10	13.7**	13.64
<u>Household’s Characteristics</u>						
Husband’s age	-1.2**	-1.6**	-1.7	-3.22	-3.3	-4.16
Age difference	0.3	0.7	0.7	2.29	1.8**	2.77
Lives in a rural area	-17.7	-16.3	-16.1	-15.48**	-14.0**	-13.52**
<u>Men’s Characteristics</u>						
Self employed	-32.6	-34.2	-34.7	24.07**	26.8**	28.65**
High School Completed	16.4	14.4*	14.0			
<u>Women’s Characteristics)</u>						
No diploma	-25.4**	-13.3				
High School Completed				19.13**	32.9	
Tertiary Education Completed				5.28	33.3	
Professional	37.8	24.6**	23.2**	-1.61	4.3	2.19
<u>Estimated Wages</u>						
Husband’s wage(logarithm)		-0.3	0.094		29.9**	22.92*
Women’s wage(log.)		27.8	35.98		-60.6	5.96
Inverse Mill’s ratio			10.21			-27.21
<u>Interviewed in winter</u>						
Week end	7.4	7.0	6.7	20.67	20.6	21.02
Standard error of residuals	19.9	19.7	19.8	-34.75	-33.6	-34.07
Correlation coefficient rho	85.9	85.7	85.8	101.56	99.6	99.40
Number of observations	0.11	0.131	0.136	0.11	0.131	0.16
-Loglikelihood	1183	1183	1183	1183	1183	1183
	10192	10165	10163	10192	10165	10163

Bold= significant at 1%level, **: significant at 5%, *: significant at 10%

Table A1 : Estimation of women's labor force participation decision

Variables	Woman work in LF		Woman's salary	
	Coefficients	Standard Error	Coefficients	Standard Error
Intercept	4.7375	0.5542	8.75309	0.02987
Husband's wage	-0.3598	0.0594		
Age gap between the spouses	-0.0019	0.0065		
<u>Wife's education</u>				
No diploma	-0.6105	0.0798	-0.24714	0.04079
High School Completed	0.2625	0.0801	0.229252	0.03108
Tertiary Education	0.5919	0.0735	0.59665	0.0258
<u>Number of children aged :</u>			-0.07788	0.01286
0-2	-0.6228	0.0690		
3-5	-0.4595	0.0713		
>5	-0.1586	0.0309		
Centered women's age	-0.0045	0.0037	0.01128	0.00123
Centered women's age squared	-0.0025	0.0003	-0.00099	0.00016
Local unemployment rate	-0.0334	0.0084		
Rho	0.23295	0.0720	0.23295	0.0720