GREQAM

Groupement de Recherche en Economie
Quantitative d'Aix-Marseille - UMR-CNRS 6579
Ecole des Hautes Etudes en Sciences Sociales
Universités d'Aix-Marseille II et III

Document de Travail

n°02A23

Hélène Couprie

Time allocation within the Family: Welfare implications of life in a couple.

Abstract : *This paper analyzes the household decision-making process leading to the allocation of time and consumption in the family. We estimate, on the British Household Panel Survey, a collective model of demand for leisure generalized to the production of a household public good. For the first time in such a framework the sharing rule conditional on public expenditures is identified by woman's change of family status: from single-living to couple or from couple to single-living. Welfare implications are elaborated. Woman's share of household's private expenditures appears to be on average 45\%.*

Key-words : *Household production, Public domestic good, Collective model, Sharing rule.*

Résumé : *Ce papier étudie le processus de décision intra-familial conduisant à une allocation du temps et de la consommation entre les différents membres du ménage. J'estime, sur le British Household Panel Survey, un modèle collectif de demande de loisir généralisé à la production d'un bien domestique public. Pour la première fois dans ce type de modèle, la règle de partage conditionnelle aux dépenses publiques est identifiée en utilisant le changement de statut familial des femmes: formation d'un couple ou séparation. Des implications en terme de bien-être sont élaborées. La part de la femme dans les dépenses privées du ménage avoisine en moyenne les 45%.*

Mots-clés: *Production domestique, Bien public, Model collectif, Règle de partage.*

Classification J.E.L. : *J22, D13, D63, C33*

Time allocation within the Family: Welfare implications of life in a couple*

Hélène Couprie

1. Introduction

Female labor supply behavior is known to be more flexible than male's one and highly correlated to their family status. In the United Kingdom, as in all the European countries, we observe that women in couple or with children tend to work fewer hours on the labor market, and they also experience lower participation rates.

Our first concern is to explain the impact of family status on female labor supply. In the literature, it is often argued that women are the main time contributor to domestic production, because of their comparative advantage (Becker, 1981). The specialization of roles in the family makes women substitute market work against non market household activities. Women in couple thus supply fewer hours of market work and experience higher inactivity rates. Furthermore, the presence of a partner in itself has an impact on the difference of behavior between women in couple and single-living women. Theoretically, the household utility function is different for women single-living and for couples, the change in household preferences, due to the change of state is thus obvious.

Our second concern is to be able to compare the behavior of economic agents that are fundamentally different: an individual and a household composed of two individuals. Most of the time, economic outcomes are measured at the household level, the specific situation

*This research benefited from a Marie Curie program. The BHPS was made available through the Data Archive, Essex University. Aknowledgments: I would like to thank John Ermisch, Mette Erjnaes, Martin Browning, Bo Honoré, Nicolas Gravel for stimulating research comments. All remaining errors are mine.

of each member of the household (in terms of preferences or consumption) being ignored. In the better case, households are compared using traditional equivalence scales, the relative weight of each member in the household's aggregate utility function is considered as equal and intra-household inequality issues ignored. One stake of this paper is to recover females' specific welfare in the household, in order to implement welfare comparisons between women of different family status. Household production activities, mainly carried out by women, clearly bring an additional welfare to all family members. But household production is also made at some cost, as it implies to forego a certain amount of leisure and a part or the totality of an income from market work. More than recovering the specific individual situation of women inside the family, we can analyze how women who specialize in household production activities are compensated in terms of welfare by the intra-household income/time allocation process.

Such an allocation process is analyzed in a collective framework. This means that we view the family as a political place, characterized by conflicts of interest, but also cooperation and share. As emphasized by Chiappori (1988), Bourguignon and Chiappori (1992), Browning and Chiappori (1998), the family decision making process cannot be represented by a unique utility function. Each family member is an economic agent, endowed with preferences. We assume that the family decision is the outcome of a cooperative bargaining process between its members. This implies that the household outcome is Pareto-efficient. The collective framework has the advantage of encompassing both the unitary model and other bargaining approaches such as Nash-bargaining models (Horney and McElroy (1981), Manser and Brown (1980)). As we do not have to specify a threat point, the collective model is more flexible in its empirical implementation. It is also more realistic as it does not imply the symmetry of family members substitution effects or the income pooling property.

In this framework, individuals can substitute market work against non market work activities, which we view as domestic production. A public domestic good is produced with time inputs of family members. We implement an estimate of a collective model of demand for leisure conditional on this public good consumption. In recent contributions, Apps and Rees (1997) and Chiappori (1997) discuss the incorporation of an assignable private domestic good in a collective model of labor supply, and Aronsson and Al. (2001) provide an implementation on Swedish data. In our approach, the domestic good is modelled as a public good. We believe that this is a better way to interpret housework activities, which

consumption can hardly be assigned between household's members and even more hardly sold on the market.

An income sharing rule, which represents the underlying intra-family negotiation process, is recovered from the collective model. On this basis, intra-household inequality implications can be elaborated. Unfortunately, data usually do not contain both time use and consumption informations, the household demand system is imperfectly observed and the sharing rule can only be recovered from the model in relative terms : we can estimate its derivatives with respect to prices, income and distribution factors, but not the constant of the sharing rule. This considerably limits possible interpretations of the collective model in terms of inequality. One of the innovations of this paper is to identify the sharing rule by using the change of family status from single-living to couple or from living-in-couple to single. Intra-household welfare analysis is based on the share of leisure time as an assignable and observable good.

The outline of the paper is the following : section 2 develops the theoretical model, then we describe the econometric specification in section 3, section 4 describes the results and section 5 concludes.

2. A theoretical model of allocation of time in the family

A family is composed of two decision-makers, namely spouses, with or without dependent children. There is no other decision-maker in the family, children have no bargaining power. Each individual is characterized by his/her own preference ordering over consumption and leisure. Two types of good can be consumed : an aggregate consumption good C and a public domestic good D. In the following, we denote by the superscript s the female's partner variables. Individual total time T can be allocated to the production of the domestic good t, sold on the labor market H, or directly consumed as leisure L. The hourly wage is denoted by w whereas y is non-labor income.

The allocation of time within the family is modeled with a collective model of labor supply, extended to household production. The household good is taken as public and the collective model of leisure demand is formalized given a predetermined choice of household production.

A recent paper from Chiappori and Al. (2002) deals with the introduction of a public

good in a collective model of labor supply, in an unconditional way. The authors show that if preferences are separable regarding the public good then the sharing rule conditional on public expenditures can be recovered up to a constant. This framework as two limitations. First, it is required to make a separability assumption on preferences. Second, the existence of the conditional sharing rule does not guarantee the efficiency of public expenditures. In empirical applications, the efficiency of household production has to be assumed.

In this paper, an unobserved public domestic good is produced with time spent at housework. An unconditional approach would require to parametrize a domestic production function and to make efficiency assumptions about the allocation of time inputs. Moreover, the constant of the sharing rule would not be identified on the basis of single-living women preferences because we clearly face an identification problem for single-living women. If we set the price of the domestic good to the opportunity cost of time, then it is not possible to disentangle the choice of leisure and domestic good consumption in single-living women utility function. Of course, the conditional approach is limited by its own definition: it gives conditional results. Welfare comparison will be elaborated conditionally on the domestic good consumption. The conditional approach gives us a good interpretation of woman's share of household's private expenditures. However, we must keep in mind that the efficiency of the conditional model does not imply the efficiency of the full unconditional model and vice versa.

2.1. Domestic production

A domestic good is produced with time inputs from the woman (t) and her partner (t^s). In Apps and Rees (1997) and Chiappori (1997), the domestic good consumption is private and assignable, household members can exchange a part of the domestic good at a particular price decided between household's members. This is typically the case of housework activities such as cooking or washing someone's garments, these private outcomes can also be bought on the market, in this case, the price in the household is also the market one. We believe that this approach is not a realistic way to model the domestic good. Family life involves a high degree of sharing and most of the household production can be seen as public. This is particularly the case of cleaning or child bearing activities. In the framework proposed here, the consumption of the domestic good by one member does not affect its consumption by the other members.

Our main concern for the continuation of this work is to be able to compare, in the same framework, single-living women and women in-couple. Both can produce a domestic good, according to the following technology:

$$\begin{aligned} D &= h_1(t) \qquad \text{for single} \\ D &= h_2(t, t^s) \quad \text{for couple} \end{aligned} \tag{2.1}$$

where h_1 and h_2 are increasing functions of t and t^s.

Aronsson and Al. (2001) model the household production assuming a CES technology, and implement some estimates assuming an efficient allocation of inputs. The results show a complementarity of time inputs to household production[1]. It is thus difficult to support the idea that a domestic good can be produced by a single-living individual with the same technology than a couple. There must exist some mechanisms implying that the domestic production function is different for different types of household: $h_1(t) \neq h_2(t, 0)$. In this latter case, it is not possible to estimate a quantity of domestic good for single individuals without any parametric assumption on the domestic good production function. But, we do not have any idea about the eventual economies of scales. For all these reasons, we keep an unrestricted version of the domestic good production technology. The allocation can be efficient or not, and we do not restrict the shape of the production function.

We assume that the domestic good production is determined in a first step, the quantity of domestic good is not observed but we observe time inputs to household production t,t^s and public expenditures: wt for single women and $wt + w^s t^s$ for couples.

2.2. A conditional collective model of leisure demand for couples

The domestic production decision is predetermined, whereas pure leisure and consumption are efficiently assigned between spouses, given public expenditures. Private expenditures $\widetilde{FI}$ are represented by the sum of earnings potentials and non labor incomes of each spouse (full income) minus expenditures involved in the production of the domestic good. The resources of the household in the second step are the following:

$$\widetilde{FI^h} = FI^h - wt - w^s t^s \text{ with } FI^h = wT + w^s T + y + y^s \tag{2.2}$$

[1] Author's estimates on the BHPS also show a weak substitution elasticity of 0.05.

The cooperative allocation of consumption C, C^s and leisure L, L^s, given the conditional budget of the household is solution of the following program (P):

$$\begin{aligned} & Max_{C,C^s,L,L^s}\ \mu(.)\,u(C,L;D) + (1-\mu(.))\,u^s(C^s,L^s;D) \\ & \text{st.} \begin{cases} C + C^s + wL + w^sL^s \leq \widetilde{FI^h} \\ \widetilde{T} = L + H \\ \widetilde{T^s} = L^s + H^s \end{cases} \\ & \text{with } \widetilde{FI^h} = FI^h - wt - w^st^s \text{ , } \widetilde{T} = T - t \text{ and } \widetilde{T^s} = T - t^s \end{aligned} \tag{P}$$

Assuming cardinal preferences and usual regularity assumptions on the shape of the utility functions, $\mu(.)$ situates the outcome on a precise point of the efficient frontier. In general, μ can be a function of prices, incomes, individual heterogeneity or even distribution factors. If μ does not depend on prices or income, then the model collapses to the unitary one.

As in the second welfare theorem, we can decentralize the solution of the program. There exists a distribution of income: $\widetilde{FI^h} = \phi + \phi^s$ such that the solution of (P) is also the solution of each member's maximization program, given the allocation of income. Thus, program (P) is equivalent to the two programs defined by (P'). The negotiation takes place as if individuals were to maximize their own utility subject to a share of $\widetilde{FI^h}$, this share being negotiated between spouses in a preliminary step:

$$\begin{aligned} & Max_{C^i,L^i}\ u^i(C^i,L^i;D) \\ & \text{st. } C^i + w^iL^i = \phi^i \\ & \text{st. } \widetilde{T^i} \geq L^i \qquad i = s \text{ if woman's partner} \end{aligned} \tag{P'}$$

$\widetilde{T^i} = T - t^i$ is the remaining disposable time, household private expenditures $\widetilde{FI^h}$ are shared between spouses, such that $\phi + \phi^s = \widetilde{FI^h}$. ϕ represents female total expenditures in consumption good and pure leisure, whereas ϕ^s represents male total expenditures in consumption good and pure leisure. The income sharing rule is a reduced form of the negotiation process and depends on the same arguments as μ: prices, incomes, individual heterogeneity in preferences and distribution factors. This sharing rule is conditional on the first step decision of domestic good consumption. Given ϕ, the demand functions for consumption and leisure have the usual properties of Marshallian demands. Normalizing the price of the market good to one, and expressing wages and incomes in real terms, demand systems are :

$$\text{woman} \begin{cases} C = C(w,\phi;D) \\ L = L(w,\phi;D) \end{cases} \text{, man} \begin{cases} C^s = C^s(w^s,\phi^s;D) \\ L^s = L^s(w^s,\phi^s;D) \end{cases} \tag{2.3}$$

The observation of leisure demand is sufficient to recover the derivatives of the conditional sharing rule, depending on wages w, w^s, incomes y, y^s, distribution factors s and other preference parameters (See Chiappori, 1992 and Chiappori, Fortin, Lacroix, 2001, for details on the derivation of the sharing rule, with and without distribution factors).

$$\phi = \phi(w_f, w_m, y, y^s, s; \text{preference parameters} : z, D) \tag{2.4}$$

In principle, the sharing rule (2.4) can be used as a tool to analyze intra-household inequality issues. One of the main drawback of this sharing rule is that it can only be recovered up to a constant (See Chiappori, 1992 for a proof). The absolute distribution of income in the family remains unknown. In this paper, we propose to use single-living women behavior to identify the constant of the sharing rule. Then, the implementation of some welfare comparisons becomes possible.

2.3. Identification of the sharing rule

The knowledge of the distribution of income in the family would give the collective model a higher explanatory power to analyze intra-household inequality issues. We propose to use single-living women to identify the absolute intra-family distribution of income. The basic idea is the following: single-living women do not have to bargain with a partner, they can spend 100% of their own full income. If we observed a woman single-living and a woman living in a couple having the same preferences, then the change in leisure demand between family status would allow us to approximate the share of income. Figure 1 illustrates this purpose. It represents the Engel curve of demand for leisure of the same woman observed in two different states, the demand functions are the following:

$$\begin{aligned} L_{\text{single}} &= L(w, FI; D) \\ L_{\text{couple}} &= L(w, \phi; D) \end{aligned} \tag{2.5}$$

The marginal effect of income on leisure demand β is identified by observing the behavior of the woman when she lives single. In the linear case, we have the following relation between leisure consumption and incomes:

$$L_{\text{couple}} - L_{\text{single}} = \beta(\phi - FI) \tag{2.6}$$

Thus the sharing rule ϕ is identified by the relation:

$$\phi = \frac{(L_{\text{couple}} - L_{\text{single}})}{\beta} + FI \tag{2.7}$$

The empirical implementation implies to parametrize preference parameters and the sharing rule. Moreover, women are not observed at the same time single-living and living-in-a-couple. For each individual, we allow for change in preferences between the two states coming from a change in the explanatory variables such as the hourly wage rate. Of course, a selection bias can occur if single-living women have different unobserved characteristics than women in-couple. We control for the selection bias by using a panel data fixed effect estimator. The sharing rule in itself will be identified only on the sub-sample of individuals who experience a switch from single-to-couple or from couple-to-single.

3. An empirical implementation on the BHPS

3.1. Data

The British Household Panel Survey contains a full set of informations about households and their members from 1992 to 2000. Not only labor supply behavior is reported (usual weekly hours of paid work, labor earnings, non labor earnings), but also time-use informations such as the time spent on housework activities during the week. Even if such a question is subjective, we hope it gives a realistic approximation of the real share of time allocated to produce the domestic good. We are aware that the information is probably less reliable than in an objective time-use survey. This being so, we do not have to venture into a merge of two different data sources.

Table 1 describes the sub-sampling selection rule. First, we isolate women single living or living in a couple, withdrawing all particular families such as collocation or people living with one of their parents. This step is necessary for the data to fit into the collective framework specified. Then, to make sure that the demand for leisure analysis does not capture other effects such as human capital investments or rationing on the labor market, we exclude students and involuntary unemployed people. This will constitute what we call the full sample of 18022 observations, used to implement the fixed effect panel data estimate. Some descriptive statistics of the full-sample are reported in table 2. We can notice that 80% of the couples are married and 50% have children, around 40% of the single-living women are

lone-mothers. Time spent at housework by men is particularly low compared to women's: 5.7 hours a week for men against 16.6 for women. Finally, we extract from the full sample a restricted sample of 2201 observations corresponding to 420 individuals who experienced at least one change in their family status. This restricted sample is used when the selection bias due to household formation is not controlled, which is the case when we predict indirect utility levels.

For the empirical analysis, the hourly wage is calculated by dividing the usual net monthly wage by the usual hours of work per month (including overtime). Non-working individuals are kept in the sample, corresponding missing hourly wages are imputed on the basis of demographics, educational achievement, regional and year dummies.

3.2. Specification

3.2.1. Preferences and demand for leisure

Demands for consumption and leisure correspond to a Linear Expenditure System (LES). Women, either living in couple or not face the following cost function :

$$c(w,u) = \gamma + w\alpha + uw^{\beta} \tag{3.1}$$

The corresponding indirect utility function is :

$$\begin{aligned} V(w,\widetilde{FI}) &= w^{-\beta}\left(\widetilde{FI} - \gamma - w\alpha\right) \text{ for single-living women} \\ V(w,\widetilde{FI}) &= w^{-\beta}\left(\phi - \gamma - w\alpha\right) \text{ for women in couple} \end{aligned} \tag{3.2}$$

And demand for leisure :

$$\begin{aligned} L &= \alpha + \beta\left(\tfrac{\widetilde{FI}-\gamma}{w} - \alpha\right) \text{ for single-living women} \\ L &= \alpha + \beta\left(\tfrac{\phi-\gamma}{w} - \alpha\right) \text{ for women in couple} \end{aligned} \tag{3.3}$$

$\widetilde{FI}$ and ϕ are private expenditures on pure leisure and the consumption good respectively for women single-living and in-couple, whereas ϕ is the share of income obtained by a woman in a couple, conditional on household's public expenditures. The subsistence level of leisure is denoted by α, whereas γ stands for the subsistence level of consumption. The demand for the consumption good is not modelled explicitly: income that is not spent on leisure will be consumed as an aggregate consumption good.

3.2.2. Dependency with domestic good consumption

Private goods consumption is modelled conditional on a predetermined consumption of public good. We propose three different estimations of the model.

Model 1 We implement an estimate of the demand for leisure function assuming that preferences are separable with respect to the public good:

$$U(C, L, D) = F\left[u(C, L), D\right] \tag{3.4}$$

In this case, the domestic good consumption that takes place in a first step has an impact on the second step demand for leisure only via an income effect, by reducing the budget for private expenditures. For single women, total private expenditures $\widetilde{FI}$ will correspond to the individual's full income minus domestic good expenditures. The domestic good consumption is perfectly observed in our data and corresponds to the opportunity cost of time spent at housework. The share of income allocated to women in couple own private consumption ϕ will be conditional on the total household public expenditures. As emphasized by Chiappori and Al. (2002) in the collective framework, one sharing rule of the household private expenditures can correspond to several household public expenditures and vice-versa, the sharing rule is conditional on household public expenditures:

$$\phi(PUBEXP) \text{ with } PUBEXP = wt + w^s t^s \tag{3.5}$$

Model 2 A major problem of this specification is that in practice, households' consumption choices of the domestic good and leisure are simultaneous. The sequential assumption can generate some endogeneity that we will have to control for. Private expenditures will closely depend on the domestic good production choice which is simultaneously chosen with the demand for leisure. The endogeneity of private expenditures will be controlled with instrumental variables that should reflect the total income, the price of the domestic good and the chosen consumption of domestic good. Model 2 controls for this endogeneity. The instruments are the individual full income, the individual full income squared and the presence of a dish-washer in the household.

Model 3 We relax the assumption of separability of the utility function with respect to the domestic good. The sub-utility from consumption and leisure will depend on the quantity

of domestic good consumed $u(C, L; D)$. Leisure and domestic good consumption can be substitutable, complementary or independent goods.

The parameters of the linear expenditure system will depend on the quantity of domestic good. Following Browning and Meghir (1991)'s way of conditioning preferences, we write:

$$c(w, u; D) = \gamma + w\alpha(D) + uw^{\beta} \tag{3.6}$$

The quantity of domestic good D is not observed in the data. To avoid any restriction about the domestic good production function, we specify the dependency in an unrestricted way (equation 2.1). Taking into account the fact that the production technology can differ between singles and couples, we allow $\alpha_1 \neq \alpha_2$:

$$\begin{aligned} c(w, u; D) &= \gamma + w\alpha_1(t) + uw^{\beta} \text{ for single-living women} \\ c(w, u; D) &= \gamma + w\alpha_2(t, t^s) + uw^{\beta} \text{ for women in couple} \end{aligned} \tag{3.7}$$

Moreover, as the sharing rule depends on preferences for the domestic good, we have to consider that the sharing rule depends both on public expenditures and on the quantity of domestic good:

$$\phi(PUBEXP, D) = \phi(PUBEXP, t, t^s) \tag{3.8}$$

As in model 1, the decision of time allocation to housework and leisure consumption is simultaneous and a lot of variables of this specification are suspected to be endogenous, in particular $\widetilde{FI}, PUBEXP, t$ and t^s.

3.3. Panel data identification of preferences and of the sharing rule

Let us denote by $\delta_{it} = 1$ if a woman from household i is in couple at time t, $\delta_{it} = 0$ if not. In the LES specification of preferences (3.3), we assume that the subsistence level of leisure α can vary with individual heterogeneity, whereas the subsistence level of consumption γ remains constant. Leisure demand for women, in a couple or not, can be written:

$$L_{it} = \alpha_{it}(1 - \beta) - \gamma\beta w_{it}^{-1} + \beta\frac{(1 - \delta_{it})\widetilde{FI}_{it}}{w_{it}} + \beta\phi_{it}\frac{\delta_{it}}{w_{it}} \tag{3.9}$$

Each individual requires a fixed minimum level of leisure a_i, plus a term dependent on k observed explanative time-varying variables X_{it}. Explanative variables are marital status, presence of a child, number of children and age of youngest child. The fixed effect captures

unobserved heterogeneity in preferences between women. It also controls for any systematic selection bias between women in couple and single-living women. Preferences for leisure can differ between a woman who is always in couple and a woman who is always single-living. Whatever the correlation between family status and preferences for leisure, this correlation should not matter for the consistency of the estimator as soon as it remains fixed for each individual within the time period analyzed. This assumption appears reasonable with respect to the gain in precision we can benefit by using the full sample (18000 observations). Preferences can depend on the quantity of the domestic good consumed in the household in an unrestricted way. The unknown domestic production functions h_1 and h_2 depend on the time spent at housework and they are linearly approximated. In model 1 and 2, the separability of preferences with respect to the domestic good imposes that $c_1 = c_2 = 0$.

$$\alpha_{it} = a_i + bX_{it} + c_1\delta_{it}h_1(t_{it}) + c_2(1-\delta_{it})h_2(t_{it}, t^s_{it}) \tag{3.10}$$

The sharing rule ϕ_{it} corresponds to woman's expenditures on leisure and consumption good. Only the expenditures on leisure are observed. Private expenditures are recovered via the following parametrization of the share of income:

$$\phi_{it} = r_0 + r_1 w_{it} + r_2 w^s_{it} + r_3 y_{it} + r_4 y^s_{it} + r_5 X_{it} + r_6 PUBEXP + r_7 h_2(t_{it}, t^s_{it}) \tag{3.11}$$

ϕ_{it} depends on prices, incomes and preference parameters. It is also conditional on household public expenditures, taken as endogenous in model 2. If the quantity of domestic good changes the taste for leisure (model 3), then it should also play a role on the negotiation process and on the income sharing rule. The last term reflects this dependency. In the separability case (model 1 and 2), $r_7 = 0$.

Substituting the sharing rule (3.11) and preference parameters (3.10) in the leisure demand equation (3.9) gives the following panel data equation:

$$\begin{aligned} L_{it} = a_i(1-\beta) + b(1-\beta)X_{it} + c_1h_1(t_{it}) + c_2h_2(t_{it}, t^s_{it}) - \gamma\beta w^{-1}_{it} + \frac{\beta(1-\delta_{it})\widetilde{FI}_{it}}{w_{it}} + r_0\frac{\beta\delta_{it}}{w_{it}} \\ + r_1\beta\delta_{it} + r_2\frac{\beta w^s_{it}\delta_{it}}{w_{it}} + r_3\frac{\beta y_{it}\delta_{it}}{w_{it}} + r_4\frac{\beta y^s_{it}\delta_{it}}{w_{it}} + r_5\frac{\beta X_{it}\delta_{it}}{w_{it}} + r_6\frac{\beta PUBEXP_{it}\delta_{it}}{w_{it}} + r_7\frac{\beta h_2(t_{it}, t^s_{it})\delta_{it}}{w_{it}} + \mu_t + \varepsilon_{it} \end{aligned} \tag{3.12}$$

μ_t is a time component, fixed between individuals. It is introduced to capture any macroeconomics effects on the leisure time that is not linked to preferences or to intra-household negotiation. A significative coefficient can be due to a change in the average working time, to the composition of the labor force, or even to changes in involuntary unemployment rate.

The white noise ε_{it} should control for measurement errors and any remaining time-varying unobserved heterogeneity on the sharing rule and on the preferences. We estimate equation (3.12) by a fixed effect estimator on the full sample. This choice is mainly driven by two elements:

- first, it is highly probable that the fixed effect μ_i is correlated with the explanatory variables. Contrary to the random effect estimator, the fixed effect estimator may capture unobserved heterogeneity related to preferences, even if these unobserved characteristics are correlated with explanative variables. In particular, it can be the case that the household formation is correlated with unobserved characteristics[2].

- second, the within aspect of the data is fundamental to identify the sharing rule. It is clear, in equation (3.12) that, given a consistent estimate of β, the r parameters are identified with the time-change of family status δ of the individual i. δ varies between 0 and 1 for 420 individuals switchers in the data. A first-difference estimator would directly take into account a change from one period to another, whereas the fixed effect estimator compares the present situation with the average family situation of the individual. An adjustment of the leisure time is susceptible to occur just before and just after the change of family status, and not only at the precise point of the change. With the fixed effect estimator, we avoid to capture only the mechanism happening around the switching point, choosing to represent the average effect of the switching process on leisure time.

A requirement of the model is that the shocks in leisure should be uncorrelated with all past or future values of the explanative variables. This would not be the case if, for example, the decision to divorce is linked to an income shock related to a change in working time, or if the search process on the marriage market requires leisure time. In any case, the correlation between δ and ε requires to endogeneise household formation or dissolution, this goes far beyond the objective of this paper. We will assume the uncorrelation between δ and ε.

To control for endogeneity of singles' private expenditures $\widetilde{FI}$ and of couples' public expenditures $PUBEXP$ in model 2, we implement a within 2SLS estimator, see Baltagi (2001) for more details. Instruments must vary with time and be correlated with $\widetilde{FI}$ and $PUBEXP$, we use exogenous variables of the model, individual full income, individual full income squared and utilization of a dish washer in the household. This last equipment induces a significant decrease in time spent at housework and thus in public expenditures. Of

[2]The random effect estimator is rejected at usual level by Hausman's test.

course, to some extend, the choice of buying a dish washer is a voluntary way to increase the productivity of the household's production technology, this could be related to the preferences for leisure, but there is no reason for this instrument to be strongly correlated with a shock in leisure time.

Finally model 3 is estimated without taking into account the potential endogeneity of public expenditures and domestic good consumption because this involved a lot of variables in the model and we could not guarantee reasonable exclusion restrictions for each of them. In particular, it is rather difficult to find correct instruments to predict the time each partner spends at housework and the share of time in the family. Opinion variables, number of rooms in the household and household composition instruments were not good enough to carry out a correct convergence of the model.

4. Results

4.1. Demand for leisure

Table 3 shows random effect estimates of the panel data equation (3.12). Results from model 1, 2 and 3 are presented, with standard errors and each parameter's significance level. The overall R squared is around 15%, whereas the value, sign and significance of coefficients seems globally robust to different specifications. Model 1 and 2 assume separability of preferences with respect to the public good, and Hausman test rejects the within estimator against the 2SLS within estimator ($\chi^2(22) = 529.79$). Given a correct specification of the model, private expenditures for singles and public expenditures for couples are endogenous variables. Controlling for endogeneity, income elasticity of the demand for leisure appears lower and similar to the unrestricted specification of model 3: the coefficient associated to $(1-\delta)\widetilde{FI}/W$ decreases from 0.3 to 0.2. When conditioning preferences for leisure with respect to domestic good consumption, it appears that the impact of the presence of a child is weaker both for single-living women and for women in couple.

Table 4 presents the estimated coefficients of the preference parameters (equations 3.6 and 3.10). Standard errors are calculated with the delta method. In the 3 specifications, the subsistence level of consumption looks reasonable: between 83 and 120$£_{1991}$ a week.

The average of the fixed level of leisure required by individuals is around 130 hours per week. Family status does not seem to have a significant impact of the subsistence level

of leisure. On the contrary, the number and age of children have a strong impact in the three models: the more children, the higher is the preference for leisure, this effect is even stronger if the youngest child is small. This result comes from the fact that a part of the time allocated to children is not reported by individuals as time spent at housework, a part of the time spent with children is thus seen as leisure by women.

The unrestricted specification of model 3 gives similar results on preferences. Time spent at housework by a woman single-living, or time spent at housework by a woman in couple or her partner significantly decreases the subsistence level of leisure required. As the domestic good production technology is increasing with time spent at housework, it appears that the impact of the domestic good on preferences for leisure is negative, both for single-living women and for women in couple. As we do not have any measure of the quantity of the domestic good produced, we are not directly interested in the eventual welfare implications of the domestic good consumption in the household. However, we can take into account the fact that the domestic good and leisure appear substitutable to each other: the more domestic good is consumed, the lower the basic leisure requirement.

4.2. Sharing rule

Table 5 shows the estimated parameters of the sharing rule specified in equation (3.11). Here again, there are very few differences between model 1, 2 and 3. The female's wage increases considerably her private expenditures, whereas her partner's wage increases them very slightly. This is due to a general increase in the household's full income, but probably not in the bargaining power. The effect of non labor income is different depending on who gets the non-labor income: a higher non-labor income for females increases their bargaining power in the family in model 2. The year of birth variable is aimed to capture a cohort effect. The significance is weak. In model 1 and 2, the coefficient appears to be slightly negative. Younger generations tend to allocate a lower share of household's private income towards women's expenditures. Surprisingly, the argument that younger generations would be more equal towards females than older generations is not verified in this data. The greater equality that is suspected in younger couples could come from the general increase of female hourly wages compared to males', but is apparently not directly linked to a change in the mentalities in itself. The preceding result is compensated by the trend coefficient which indicates that female's share of income tends to increase with time spent with her partner.

The impact of marital status and children is ambiguous. According to model 1 and 2, women have a higher share if they have a child, especially if the child is young and if the couple is not married. On the opposite, for model 3, married women with a child obtain a significantly higher share of household expenditures compared to women cohabiting. The impact of motherhood is ambiguous according to models 1, 2 and 3. In all cases, mothers experience a loss in their sharing rule when the younger child becomes older and when they give birth to an additional child. Another interesting feature concerns marriage. Women without child who get married tend to experience a diminishing share of household's private expenditures.

Public expenditures have a negative impact on the woman's share of income. This is directly due to the reduction in private household income to be shared between the woman and her partner. When taking into account the impact of the domestic good consumption on preferences (model 3), it appears that most of the coefficients remain the same. The impact of children becomes less significant, a part of the time devoted to children is included in the production of the household public good. Time spent at housework have a positive effect on the sharing rule. The effect of time input to the domestic good as a concave shape as shown in figure 2. As soon as the time spent to housework does not exceed the equivalent of a full time job, the effect on the sharing rule is positive. If the domestic good production increases with time inputs, it appears that the quantity of domestic good consumed plays a positive role on the sharing rule. This could be due to woman's comparative advantage in household production. As the opportunity cost of woman's time is lower, or as their productivity at housework is higher, the household gains if woman's time is the main input to household production. In this case, a part of this efficiency gain is redistributed towards women. If the investment in the public good production is too high (the equivalent of a full time job), then women can spend less in term of consumption and leisure.

Table 6 presents the average predicted female share of income conditional on the household's consumption of domestic good . It appears for the 3 specifications that the conditional share of income varies between 40% and 50% on average with a standard error around 10%. These calculations are realized only on the sub-sample of switchers to avoid the selection bias problem. Figure 3 illustrates the distribution of the sharing rule in the population. For the three models, it looks symmetric and between 0 and 1.

In order to analyze the implications of intra-household wage inequality on the intra-

household distribution of power, we draw in Figure 3 the average sharing rule for different ratios of wages between woman and her partner's hourly wage. Some striking features appear. First, the three specifications give very similar patterns for the evolution of the average sharing rule. Then, we observe that intra-household equality would (on average) take place if women's hourly wages were not different from their partner's. This illustrates the great importance of hourly wages on the sharing rule. The stake of the gender wage gap seems to go far beyond usual socio-economics aspects, it has also a crucial impact on the distribution of power inside the family.

4.3. Welfare implications of life in a couple

Table 7 provides the average marginal effects of different variables on welfare. The welfare is measured by the sub-utility of leisure and consumption. It is conditional on the consumption of the public good. It appears that an increase of the hourly wage increases the level of indirect utility functions both for women in couple or single-living. An increase in the partner's wage increases slightly the welfare level of women in couple, because the full income to share becomes higher. Time spent at housework approximates the production of a domestic good. In the two first models, it appears that an increase of time spent at housework by the woman or her partner decreases the indirect utility from consumption and leisure. This is due to the budget constraint: the more time one spends on the domestic good, the less one can spend on leisure and consumption. If we allow preferences to change conditional on the quantity of domestic good (model 3), it appears that time spent at housework increases the welfare of women in couple. The negative budget constraint effect is encompassed by the substitution effect between domestic good and other goods for single-living women. This positive impact on welfare comes from an increase in woman's bargaining power linked to a comparative advantage in housework. Moreover the efficiency gain linked to the use of woman's time as the main input to household production is partly redistributed to the woman as a part of household's general welfare. This last result goes in the direction of the fact that women who invest their time in household production are indeed compensated in term of welfare by the household income allocation process. This is an average and does not apply to all the women, some of them, as illustrated in Figure 3, are characterized by a particularly low bargaining power. Moreover, according to Figure 2, if women completely specialize in housework, spending more than a full-time job in this activity, they are more likely to experience

a loss of welfare. Of course, these results only reflect the welfare gain in terms of leisure or market good consumption, they are weakened by the fact that the consumption of the aggregate market good is not observed but inferred from the Linear Expenditure System. The endogeneity of domestic production variables in model 3 is not taken into account. However, the specification looks robust as the coefficients do not vary between the specifications in model 1, 2 and 3.

5. Conclusion

A collective demand for leisure is modeled for a sample of British women in couple or not, observed on a maximum period of 9 years, from 1992 to 2000. A public domestic good can be produced with time spent at housework by family members. Fixed effect panel data estimates are implemented on the BHPS with 3 different specifications. 420 individuals who change of family status from single-living to couple or from living-in-couple to single are used to identify the income sharing rule and to predict the ratio of income allocated to the woman in the family. Three different specifications based on different assumptions are implemented. In model 1, preferences are assumed separable with respect to the domestic good, in model 2, we control for the endogeneity of public expenditures. Finally, model 3 relaxes the separability assumption. The coefficients appear very similar between the specifications and the main interpretations are basically the same. Conditional on the public good consumption, woman's average share of income is estimated to be between 40 and 50%, and is probably around 45%. The predicted distribution of the sharing rule among the population is represented in Figure 3. Then, welfare comparisons are implemented with predictions of the conditional sub-utility of leisure and consumption. The main results are the following:

- A part of the time devoted to children is experienced by women as leisure time, another part of this time is considered as housework. Thus, the presence of a child does not have a straight welfare implication here. However, given that a woman has a child, the number of children clearly reduce woman's share of income.

- The marital status has a clear negative impact on woman's welfare if they do not have a child. This situation can improve with time as the share increases with time spent with the same partner.

- As illustrated in Figure 4, the sharing rule is highly driven by the intra-household share of hourly wages, it would be on average equal if the hourly wages were equal, this emphasize the stake of reducing the gender wage gap to reduce intra-household inequality.

- The young generation does not seem to experience a change of mentality towards greater equality between men and women in the family. The cohort effect is weak and even slightly negative. The change in the distribution of power between generations can come from other factors such as the evolution of females' wages relative to males'.

- Finally, we evidenced in model 3 that the production of the domestic good, which is largely due to woman's time contribution, has a positive welfare impact as soon as the woman does not spend more than a full time job at housework. Women can thus find a greater welfare compensation in family relationships.

References

[1] Apps, P.F. and R. Rees (1997), "Collective Labor Supply and Household Production", *Journal of Political Economy, 105, 178-190.*

[2] Aronsson, T., Daunfeldt S.-O. and M. Wikström (2001), "Estimating Intra-Household Allocation in a collective Model With Household Production", *Journal of Population Economics*, 14, 569-584.

[3] Baltagi, B.H (2001), "Econometric analysis of panel data", John Wiley & Sons.

[4] Becker, G. (1981) *A Treatise of the Family*, Cambridgen Mass. : Harvard University Press.

[5] Blundell, R., T. Magnac and C. Meghir (2001), "Collective Labour Supply : Heterogeneity and Non-participation", IFS Working Paper 01/19.

[6] Bourguignon, F. and P.-A. Chiappori (1992) "Collective Models of Household behavior: an introduction", *European Economic Review*, 36, 355-364.

[7] Browning, M. and P.-A. Chiappori (1998), "Efficient Intra-Household Allocations : a General Characterization and Empirical Tests", *Econometrica*, 66, 1241-1278.

[8] Browning, M. and C. Meghir (1991), "The Effects of Male and Female Labor Supply on Commodity Demands", *Econometrica*, 4, 925-951.

[9] Chiappori, P.-A. (1988), "Rational Household Labor Supply", *Econometrica*, 56, 63-89.

[10] Chiappori, P.-A. (1992), "Collective Labor Supply and Welfare", *Journal of Political Economy*, 100, 437-467.

[11] Chiappori, P.-A. (1997), "Introducing Household Production in Collective Models of Labor Supply", *Journal of Political Economy*, 105, 191-209.

[12] Chiappori, P.-A., R. Blundell and C. Meghir (2002), "Collective Labour Supply with Children". IFS Working Paper 02/08.

[13] Chiappori, P.-A., B. Fortin and G. Lacroix (2001), "Marriage Market, Divorce Legislation and Household Labor Supply". Typescript, CREFA Université Laval.

[14] Horney M.J and M.B. McElroy (1981), "Nash-Bargained Household Decisions : Towards a Generalization of the Theory of Demand", *International Economic Review*, 22, 333-349.

[15] Manser, M. and M. Brown (1980), "Marriage and Household Decision Making : a bargaining Analysis", *International Economic Review*, 21, 31-44.

Appendix

Figure 1: Identification of the sharing rule

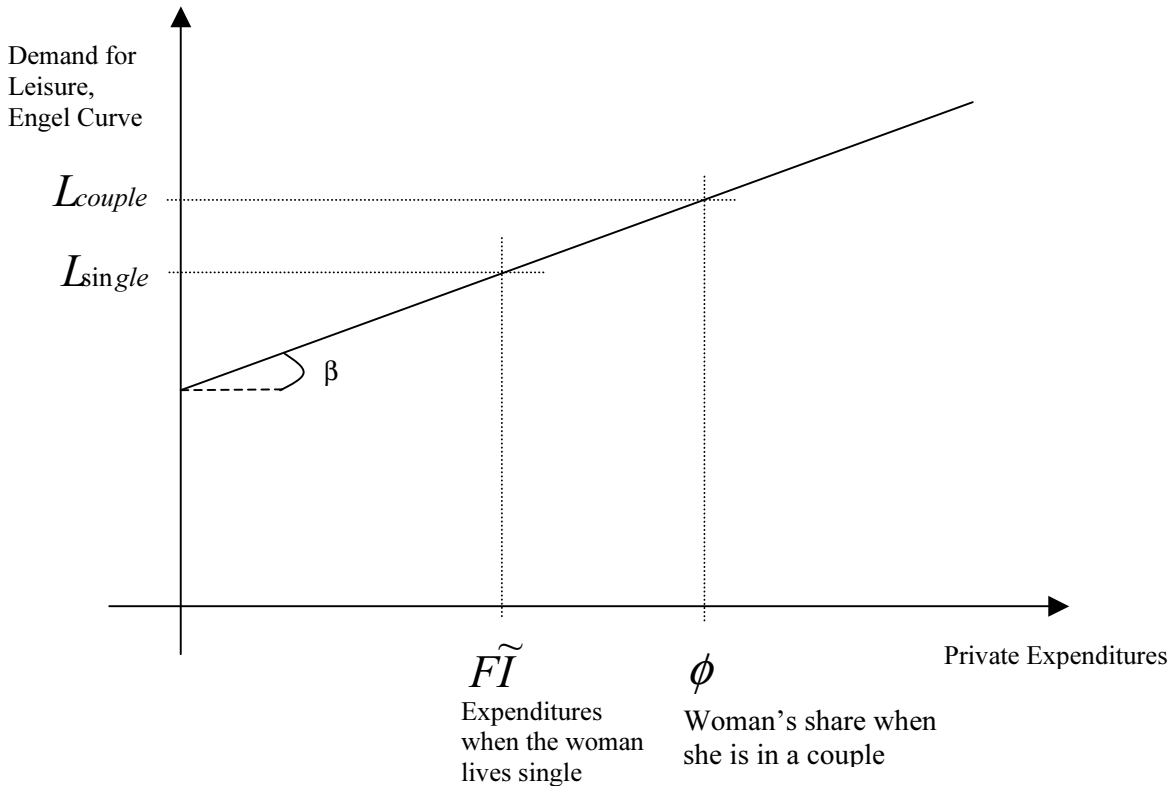


Table 1: Selection of the Sub-sample

Sub-sample \ Number of Observations	Single Women	In couple	Total
Women from 20 to 65 year old from 1992 to 2000	15257	25243	40500
- No other person (except children) in the household	5957	19110	25067
- Non Student, Not Involuntary Unemployed	5645	17791	23436
- Full Sample: No missing values (Housework, hours of work, wage and income)	5103	12919	18022
- Restricted Sample: The individual change from couple to single or from single to couple	1023	1189	2201

Table 2: Descriptive Statistics on the Full sample

Variable	Single Women	Women In Couple	Men in Couple
In Employment	56.58 %	71.61 %	84.53 %
If in work, usual weekly hours of work declared (including overtime) – H	33.56 (13.42)	31.63 (12.82)	44.29 (10.86)
Hours spent on Housework per week – t	14.32 (11.05)	17.38 (11.78)	5.51 (5.72)
Weekly Hours of Leisure – L	134.70 (18.47)	127.97 (16.57)	124.09 (18.38)
Usual Net Wage (in $£_{1991}$/hour) – w	4.11 (1.89)	4.18 (2.01)	5.24 (2.81)
Non Labour Income (in $£_{1991}$/week) – y	71.67 (70.60)	26.33 (41.89)	30.84 (72.29)
Full Income (in $£_{1991}$/week) - FI	761.46 (316.66)	727.89 (339.89)	911.06 (477.80)
Child	40.96 %	51.84 %	51.84 %
Age of youngest child	6.21 (2.68)	5.53 (3.00)	5.53 (3.00)
Number of children if child	1.75 (0.89)	1.90 (0.86)	1.90 (0.86)
Age	41.39 (13.30)	38.48 (11.52)	40.55 (11.66)
Married Couple		80.59 %	80.59 %

Table 3: Leisure Demand, fixed effect estimator

	Model 1	Std		**Model 2**	Std		**Model 3**	Std	
Constant	86.84	*1.885*	***	- 113.2	*29.16*	***	114.3	*2.005*	***
Married with child	2.578	*1.201*	**	3.111	*1.779*	*	0.832	*1.117*	NS
Married without child	1.576	*1.058*	NS	2.896	*1.409*	**	0.898	*0.987*	NS
Cohabiting with child	- 1.773	*1.101*	NS	- 2.082	*1.779*	NS	1.509	*1.033*	NS
Age of youngest child	- 0.451	*0.074*	***	- 0.524	*0.080*	***	- 0.616	*0.069*	***
Number of children	5.529	*0.800*	***	6.000	*1.059*	***	6.603	*0.744*	***
(Number of children)^2	- 1.033	*0.198*	***	- 1.148	*0.198*	***	- 1.053	*0.184*	***
$\delta \times t$							- 0.696	*0.045*	***
$\delta \times (t^s)$							- 0.604	*0.091*	***
$\delta \times (t^s)^2$							0.013	*0.003*	***
$(1-\delta) \times t$							- 0.517	*0.051*	***
$(1-\delta) \times t^2$							- 0.003	*0.001*	***
$1/w$	- 25.81	*1.161*	***	- 24.49	*1.487*	***	- 17.68	*1.112*	***
$(1-\delta) \times \widetilde{FI}/w$	0.310	*0.011*	***	0.206	*0.014*	***	0.180	*0.011*	***
$\delta \times 1/w$	406.1	*206.8*	**	372.1	*301.7*	NS	472.6	*199.7*	**
δ	51.81	*1.855*	***	35.07	*2.991*	***	32.99	*2.078*	***
$\delta \times w^s/w$	2.769	*0.214*	***	3.136	*1.235*	**	0.959	*0.245*	***
$\delta \times y/w$	0.192	*0.012*	***	0.235	*0.020*	***	0.177	*0.011*	***
$\delta \times y^s/w$	0.050	*0.008*	***	0.047	*0.008*	***	0.035	*0.007*	***
$\delta \times$ Birth year / w	- 0.200	*0.105*	*	- 0.183	*0.151*	NS	- 0.246	*0.101*	**
$\delta \times$ Mar. with ch. / w	11.30	*4.605*	**	8.439	*5.937*	NS	13.33	*4.286*	***
$\delta \times$ Mar. without ch. / w	- 8.736	*3.716*	**	- 15.48	*5.471*	***	- 7.484	*3.472*	**
$\delta \times$ Cohab. with ch. / w	17.67	*4.532*	***	17.40	*5.352*	***	5.882	*4.223*	NS
$\delta \times$ Age youngest ch. / w	- 1.713	*0.260*	***	- 1.640	*0.390*	***	- 1.660	*0.242*	***
$\delta \times$ Children / w	- 13.95	*3.770*	***	- 14.08	*3.834*	***	- 11.05	*3.536*	***
$\delta \times$ (Children)^2/ w	2.277	*0.847*	***	2.376	*0.844*	***	0.922	*0.793*	NS
$\delta \times$ Trend / w	0.628	*0.231*	***	0.393	*0.430*	NS	0.923	*0.217*	***
$\delta \times t / w$							0.603	*0.146*	***
$\delta \times t^s / w$							1.204	*0.329*	***
$\delta \times t^2 / w$							- 0.015	*0.002*	***
$\delta \times (t^s)^2 / w$							- 0.032	*0.009*	***
$\delta \times PUBEXP/w$	- 0.478	*0.010*	***	- 0.543	*0.290*	*	- 0.046	*0.032*	NS
wave 2	0.415	*0.510*	NS	- 0.253	*0.547*	NS	0.712	*0.474*	NS
wave 3	0.274	*0.468*	NS	- 0.253	*0.465*	NS	0.584	*0.436*	NS
wave 4	0.207	*0.428*	NS	- 0.432	*0.516*	NS	0.496	*0.398*	NS
wave 5	0.362	*0.397*	NS	- 0.044	*0.456*	NS	0.544	*0.368*	NS
wave 6	0.570	*0.364*	NS	0.243	*0.416*	NS	0.549	*0.338*	NS
wave 7	0.894	*0.326*	***	0.629	*0.345*	*	0.923	*0.302*	***
wave 8	0.782	*0.304*	**	0.387	*0.316*	NS	0.784	*0.281*	***
wave 9	0.503	*0.261*	*	0.338	*0.265*	NS	0.468	*0.241*	*
Observations	17734			17343			17734		
Overall R2	0.1541			0.1751			0.1280		

Table 4: preference Parameters

	Model 1	Std		**Model 2**	Std		**Model 3**	Std	
Subsistence Level of Consumption (£$_{91}$/week)									
γ - (constant)	83.11	*3.81*	***	119.1	*10.3*	***	98.45	*5.28*	***
Subsistence Level of Leisure (hours / week)									
constant	125.97	*4.56*	***	133.0	*8.21*	***	139.3	*110*	***
married with child	3.739	*2.09*	*	3.916	*3.97*	NS	1.015	*1.36*	NS
married without child	2.286	*1.62*	NS	3.646	*2.49*	NS	1.094	*1.20*	NS
cohabiting with child	- 2.572	*1.76*	NS	- 2.621	*2.74*	NS	1.839	*1.26*	NS
age of youngest child	- 0.654	*0.01*	***	- 0.659	*0.01*	***	- 0.751	*0.08*	***
number of children	8.020	*0.93*	***	7.552	*1.37*	***	8.049	*0.91*	***
(number of children)^2	- 1.498	*0.06*	***	- 1.445	*0.04*	***	- 1.283	*0.22*	***
$\delta \times t$							- 0.849	*0.05*	***
$\delta \times t^s$							- 0.737	*0.11*	***
$\delta \times (t^s)^2$							0.016	*0.003*	***
$(1-\delta) \times t$							- 0.631	*0.061*	***
$(1-\delta) \times t^2$							- 0.004	*0.001*	***

Table 5: Sharing Rule

	Model 1	Std		**Model 2**	Std		**Model 3**	Std	
Constant	1307.7	*664.5*	**	1810.2	*1508.3*	NS	2631.1	*1111.2*	**
w	166.81	*2.820*	***	170.58	*16.87*	***	183.69	*6.362*	***
w^s	8.915	*0.752*	***	15.258	*6.577*	**	5.337	*1.405*	***
y	0.617	*0.043*	***	1.144	*0.146*	***	0.988	*0.084*	***
y^s	0.161	*0.026*	***	0.228	*0.045*	***	0.193	*0.042*	***
Year of birth	- 0.643	*0.337*	*	- 0.892	*0.757*	NS	- 1.369	*0.563*	**
Married with child	36.40	*14.91*	**	41.054	*28.20*	NS	74.198	*24.44*	***
Married without child	- 28.13	*11.98*	**	-75.290	*28.79*	***	- 41.668	*19.46*	**
Cohabiting with child	56.88	*14.71*	***	84.645	*28.17*	***	32.750	*23.51*	NS
Age of youngest child	- 5.515	*0.857*	***	- 7.979	*2.157*	***	- 9.244	*1.441*	***
Number of children	- 44.93	*12.26*	***	- 68.515	*18.79*	***	- 61.544	*20.16*	***
(Number of children)^2	7.333	*2.743*	***	11.558	*4.257*	***	5.133	*4.432*	NS
Trend	2.023	*0.741*	***	1.911	*2.034*	NS	5.140	*1.220*	***
PUBEXP	- 1.538	*0.062*	***	- 2.644	*1.507*	*	- 0.257	*0.181*	NS
t							3.360	*0.842*	***
t^S							6.702	*1.870*	***
t^2							- 0.083	*0.013*	***
$(t^s)^2$							- 0.177	*0.052*	***

Figure 2: Impact of time spent at housework on female's private expenditures

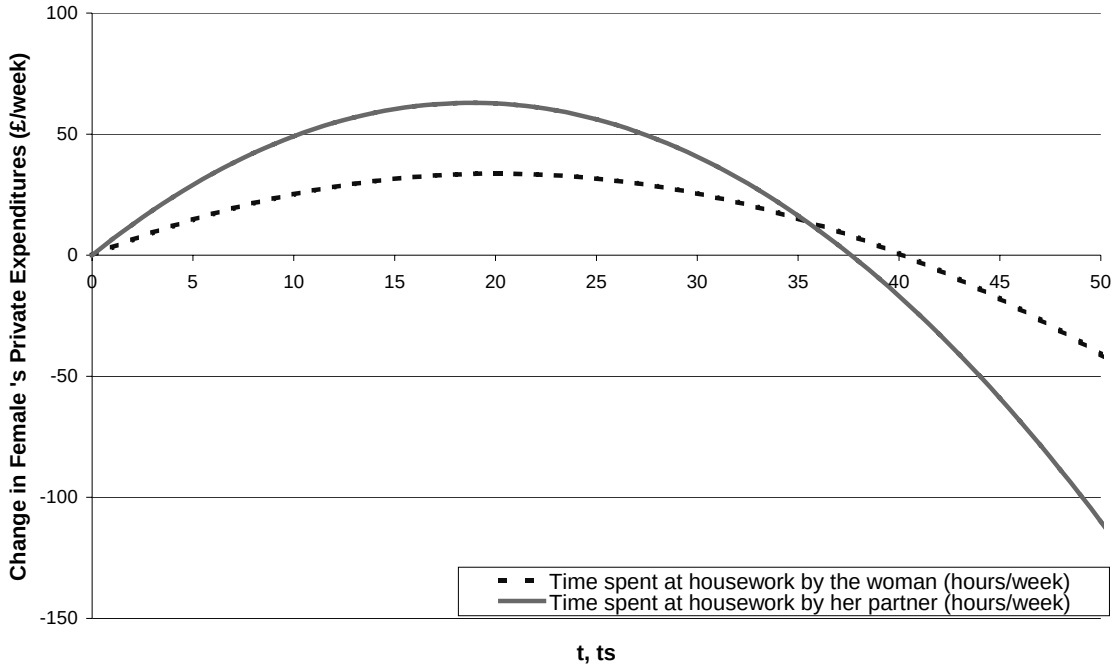


Table 6: Average Sharing Rule obtained by the woman (Restricted Sample)

	Model 1	Std	**Model 2**	Std	**Model 3**	Std
Consumption and Leisure Expenditures (in £$_{91}$/week)						
• Without domestic good	782.86	349.1	829.70	364.3	727.59	386.3
• With domestic good	647.15	323.7	597.89	325.4	753.98	381.3
Ratio of Household Private Expenditures						
• Without domestic good	0.4974	0.098	0.5281	0.100	0.4543	0.113
• With domestic good	0.4331	0.106	0.3974	0.122	0.5033	0.121

Table 7: Average marginal effects on welfare (Restricted Sample)

	Model 1	**Model 2**	**Model 3**
SINGLE			
- wage	13.5 (8.14)	15.2 (8.93)	15.9 (6.54)
- time spent to housework	- 2.65 (0.74)	- 3.09 (1.03)	- 0.83 (0.46)
COUPLE			
- wage	8.66 (10.2)	- 0.99 (19.8)	39.0 (7.16)
- partner's wage	0.25 (5.67)	0.69 (10.7)	3.59 (1.01)
- time spent to housework (t)	- 4.06 (1.23)	- 8.16 (2.93)	23.0 (28.1)
- time partner spend to housework (t^s)	- 4.91 (2.00)	- 9.70 (3.99)	4.53 (2.10)

Figure 3: Distribution of woman's share of household private expenditures

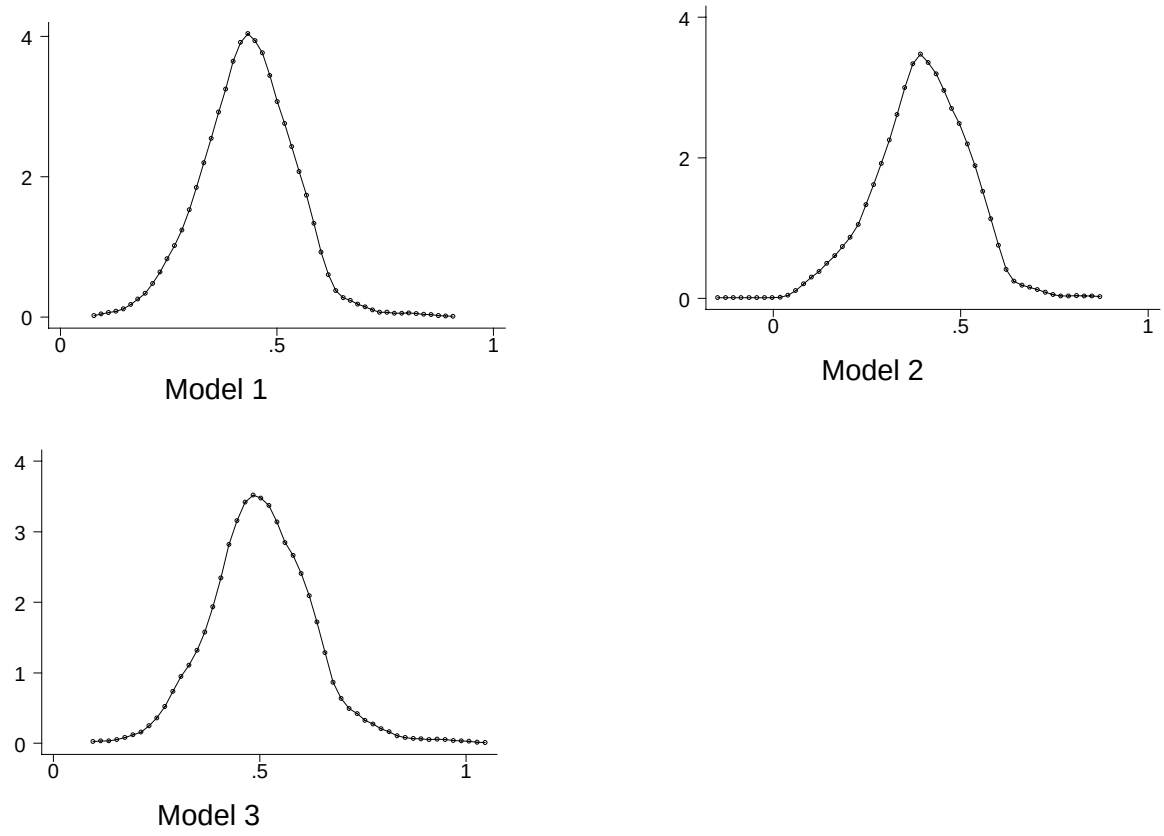
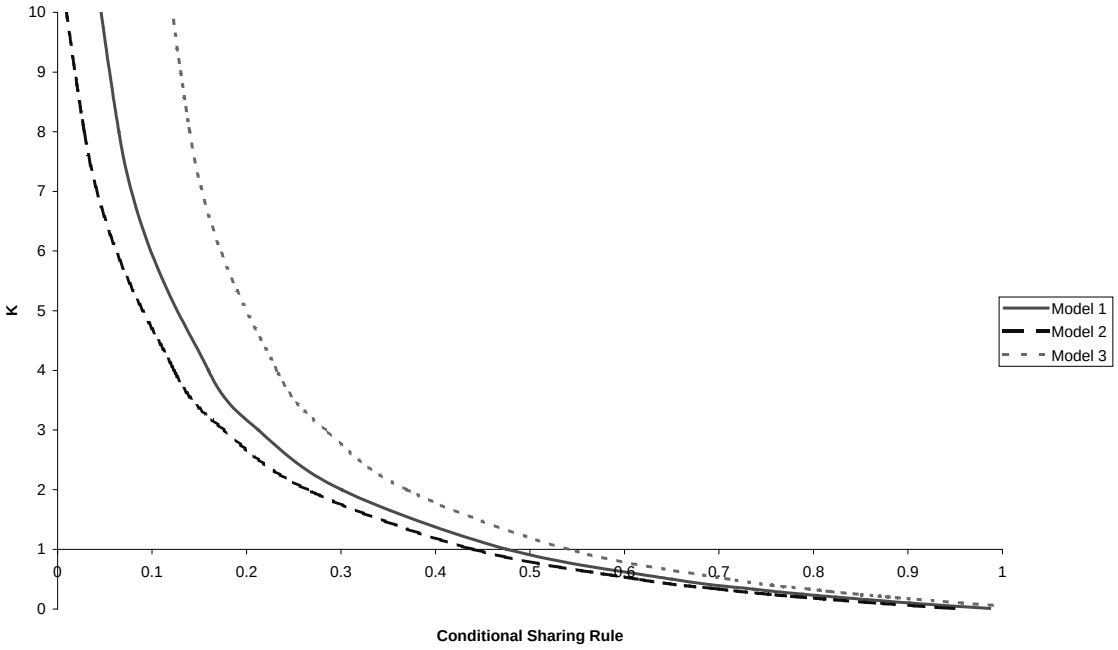


Figure 4: Average sharing rule for different values of $w^s/w=k$



Working Papers / Documents de Travail

Le GREQAM. diffuse une série de documents de travail qui prend la suite de celle diffusée depuis 1982 par le GREQE. Cette série comporte 4 sous séries - respectivement : "théories", "applications", "méthodologie", "Tirés à part"

Certains papiers sont disponibles sous la forme de fichiers PDF. Adobe Acrobat vous permet de les lire, de les transférer et de les imprimer.

http://durandal.cnrs-mrs.fr/GREQAM/dt/dt.htm

Adresses du GREQAM

GREQAM
Centre de la Vieille Charité
2 Rue de La Charité
13002 MARSEILLE
tél. 04.91.14.07.70
fax. 04.91.90.02.27
E-mail : greqam@ehess.cnrs-mrs.fr

GREQAM/
LEQAM
Château La Farge
Route des Milles
13290 LES MILLES
tél. 04.42.93.59.80
fax. 04.42.93.09.68
E-mail : leqam@romarin.univ-aix.fr

GREQAM/
C.R.I.D.E.S.O.P.E.
Faculté d'Économie Appliquée
Bât. Austerlitz
15-19 Allée Claude Forbin
13627 Aix-en-Provence Cedex 1
Tel : 04 42 96 12 31
Fax : 04 42 96 80 00