

WITHIN –HOUSEHOLD COMPARISONS USING SUBJECTIVE DATA IN  
COLLECTIVE MODEL: AN APPLICATION FOR ITALY

CHIARA RAPALLINI

pubblicazione internet realizzata con contributo della



società italiana di economia pubblica

dipartimento di economia pubblica e territoriale – università di pavia

**XX Siep Conference in Pavia**  
**25-25 September 2008**

**Within –Household Comparisons Using Subjective Data in Collective  
model: an application for Italy.**

**Chiara Rapallini**  
**Dipartimento Studi sullo Stato\***

**Provisional text**

### **Introduction**

Intra-household allocation of resources can be defined in different ways and is crucial for defining welfare policies correctly; for instance, the comparison between different policies against children poverty or for supporting fertility and female labour supply is possible if the intra-household allocation of resources is known, both in terms of time use and flows of income. Traditionally economic theory has considered the family as the basic decision unit and the tools of consumer theory were applied to the household, that means that household choices, both on consumption and labour supply, were analysed as those of one person and the single rational agent hypothesis was applied. Despite the general practice, this approach has weakness as not only in terms of its theoretical foundations<sup>1</sup>, but also in terms of empirical support<sup>2</sup>. A viable alternative to the unitary framework must

---

\* e-mail: chiara.rapallini@unifi.it

<sup>1</sup> The unitary model (UM) is not coherent with individualism, one of the most important rules of the neo-classical microeconomic analysis, which requires each individual to be characterized by his (her) own preferences.

<sup>2</sup> One of the consequences of the UM is the pooling of all household resources and cross substitution effects on labour, or -more generally- symmetry of the Slutsky matrix, while a large number of empirical studies find that

recognize in a nontrivial fashion the involvement of two or more agents, with distinct preferences, in determining family preferences. The collective approach was introduced by Chiappori (1988, 1992) and Bourguignon (1984, 1999) and developed by Bourguignon, Browning, Chiappori and Lechene (1993, 1994). The collective approach, like bargaining models, differs from the unitary framework because household choices are grounded in the individual preferences of each member; therefore family's choices are regarded as the result of a decision process. Bargaining models can be divided in two broad types according to the assumption about the household decision process, which can be regarded as non cooperative or cooperative. In both cooperative and non cooperative bargaining models, the utility received by husband and wife in a Nash bargaining solution depends upon the "threat point": the higher one's utility at the threat point, the higher the one's utility at the Nash bargaining solution (Nash, 1950,1953). In the collective framework, the strong assumption is that household decisions are always efficient in the Pareto sense; nothing is said a priori about the nature of the decision process and the sharing rule governing intra-household allocation has to be estimated from the data rather than postulated ex ante. The advantages of this kind of models are both theoretical and empirical: theoretically speaking the collective approach is more general and reasonable as far as the assumption on the household decision process is concerned. As argued by Donni (2000), the "efficiency assumption allows to generalize models of household based on bargaining". Actually the collective approach is more general in the sense that cooperative bargaining Nash solutions, at least under symmetric information, are always Pareto efficient. The collective approach seems to be more reasonable concerning the assumption on the nature of the decision process which may be assumed to be both cooperative and non cooperative. In particular, how the Browning and Chiappori (1994) motivate their assumption of Pareto optimality is quite strong. They argue that the marital environment possesses characteristics, such as a long term relationship, relatively good information and a stable bargaining environment, which would promote efficient outcomes not only in a cooperative game but also in a repeated non-cooperative game.

This paper provides an application of the collective model to the Italian data adopting a methodology proposed by Kalugina, Radtchenko and Sofer in two different papers (2005, 2006). In the collective model adopted here household resources are labour income, non labour income and the output of the household production<sup>3</sup>. Following the methodology proposed by KRS, the analysis of intra-household resources allocation is done using data on self reported satisfaction in life; more precisely the sharing rule of the collective model is recovered empirically from these data. Actually the present literature on collective model identify the derivatives of the sharing rule, but not the sharing rule itself, while KRS identify the sharing rule with a few assumptions linking self reported satisfaction and the theoretical results of the collective models. In particular, the assumption done is that there is a link between equal distribution of self reported satisfaction in life between the two spouses and the intra-household equality of indirect utility.

The paper is organised as follows: Section 1 present the model, basically a collective model with household production. Section 2 describes the Italian data used in the estimation, both the satisfaction and income information and some estimation results. Section 3 discusses the results of the sharing rule estimation while Section 4 concludes.

## **1. The model: a collective model with household production**

Following the usual notation, consider the two adult members of the household ( $i=f,m$ ); in a collective model each individual has a utility function and the Pareto efficient outcome is the solution of a decentralised maximisation program. In this paper the individual utility function depends on  $L_i$ , the leisure (assignable and observed), on consumption  $C_i$  of a Hicksian composite good with a normalized price equal to 1 (unobservable) and on a vector  $Y_i$  of member  $i$ 's consumption of a domestic goods. Briefly, the individual utility function is the

---

<sup>3</sup> see Apps and Rees (1997), Chiappori (1997), Rapoport, Sofer and Solaz (2003 and 2006), Bourguignon and Chiuri (2005).

following:  $U_i = U_i(L_i, C_i, Y_i, z)$ , where  $\mathbf{z}$  is an  $N$ - vector of household characteristics. Let the production function of the  $k^{th}$  domestic good be:

$$Y^k = g^k(t_f^k, t_m^k, z) \quad k = 1, \dots, K$$

Let  $T$  be the total time available and  $t_i = \sum_k t_i^k$  ( $i = f, m$ ) the total time that household member  $i$  devotes to the production of the domestic good  $k$ . Let  $\mathbf{s}$  be an  $R$ -vector of distribution factors,  $y$  the household's non labour income and  $w_f$  and  $w_m$  the female and male wage rate, respectively.

The Pareto efficient solution of a collective model with household production is the result of the following program (P1):

$$\begin{aligned} & \underset{L_f, C_f, Y_f, L_m, C_m, Y_m}{Max} \left( \mu_f(\cdot) U_f(L_f, C_f, Y_f, \dots, z) + \mu_m(\cdot) U_m(L_m, C_m, Y_m, \dots, z) \right) \\ & s.t \\ & C_f + C_m + pY_f + pY_m + L_f w_f + L_m w_m \leq T w_f + T w_m + y + \Pi(w_f, w_m, p) \end{aligned}$$

where  $\mu_i = \mu_i(w_f, w_m, y, s, z)$  are in  $[0,1]$  continuously differentiable weighting factors such that  $\mu_f + \mu_m = 1$ .  $\Pi(w_f, w_m, p)$  is the profit function of the household production; domestic goods are marketable and  $\mathbf{p}$  is a vector of domestic goods prices, exogenous and equal for all households.

Following Chiappori (1997) and his second theorem of welfare economics result extension to the household equilibrium, the previous program can be decentralised and the solution obtained in two stages. First of all, the household maximizes the profit function by allocating the time of each member in the domestic production. In that way, the output of the domestic production is considered as another income flows. In the second stage, consumption is decentralized by the appropriate choice of share  $\phi_i$  ( $i = f, m$ ) of total full income. Program (P1) can be reformulated in (P2.1) and (P2.2) as follow:

$$\begin{aligned}
& \underset{t_f, t_m}{\text{Max}} \Pi = pY - w_f t_f - w_m t_m \\
& \underset{C_i, L_i, Y_i}{\text{Max}} U_i = (L_i, C_i, Y_i, \dots; z) \quad i = f, m \\
& \text{s.t} \\
& C_i + pY_i + L_i w_i \leq \phi_i \\
& L_i + h_i + t_i = T
\end{aligned}$$

Where the two constraints are a budget and a time constraint, respectively, and  $\phi(w_f, w_m, p, y; s, z)$  is the part of the full income allocated to the member  $i$ , such that:  $\phi = \phi_f + \phi_m = (w_f + w_m)T + y + \Pi$ . Program (P2) can be reformulated as follow to recover the Marshallian demands for leisure:

$$\begin{aligned}
& \underset{t_f, t_m}{\text{Max}} \Pi = pY - w_f t_f - w_m t_m \\
& \underset{C_i, L_i, Y_i}{\text{Max}} U_i(L_i, C_i, Y_i, \dots, z), i = f, m \\
& \text{s.t} \\
& C_f + pY_f + w_f(T - h_f) \leq \phi_f \\
& C_m + pY_m + w_m(T - h_m) \leq \phi_m
\end{aligned}$$

where  $h_i$  is member's  $i$  working time on the market,  $i=f,m$ .

$$\begin{aligned}
& \phi_m + \phi_f = \phi \\
& L_i + h_i + t_i = T \\
& L_f = L^f(w_f, \phi_f(w_f, w_m, y, s, z); z) \\
& L_m = L^m(w_m, \phi - \phi_f(w_f, w_m, y, s, z); z)
\end{aligned}$$

where  $L_f$  and  $L_m$  are the Marshallian demands for leisure.

### 1.1 The sharing rule: utility comparison and the use of subjective data.

In KRS (2005 e 2006) two different approaches to the intra-household equality are proposed. In KRS (2005) the within household equality is interpreted

as an equal distribution of the full income. More in details, full income is the sum of monetary and non monetary incomes and the subjective answer to the income perception of each member of the couple is related with the income each member of the household objectively receives. In KRS (2006) the method adopted in KRS (2005) is generalized and the within household equality is interpreted as an equal distribution of utility. In this framework the equal satisfaction scales given by the two partners is interpreted as an equal distribution of utilities. As shown further on, in this paper the satisfaction scale comes from the answers to a question made on a whole satisfaction of his/her present life to each partner.

Let  $V_f = V_f(w_f, \phi_f)$  and  $V_m = V_m(w_m, \phi_m)$  be the female and male in direct utility functions and  $g$  the indirect utility function:

$$\frac{V_f(w_f, \phi_f)}{V_m(w_m, \phi_m)} = g(w_f, \phi_f, w_m, \phi_m)$$

In case of equality

$$V_f(w_f, \phi_f) = V_m(w_m, \phi_m)$$

$$\text{or } \frac{V_f(w_f, \phi_f)}{V_m(w_m, \phi_m)} = 1 = g(w_f, \phi_f, w_m, \phi_m)$$

## 2. The data

The data used in econometric analysis come from two different surveys. The main survey is the Italian Time Use Survey-2002 (TUS), collected by ISTAT (the Italian National Statistics Institute), which contains data on individual time, on family composition and household condition as for as education, labour, housing and satisfaction is concerned. As for the 2002, the TUS sample is about 21075 households and 55.773 individuals, distributed over all the Italian regions. As far as time use is concerned, information is collected from three sources: the first one is a general questionnaire; the second is a questionnaire on the weekly use of time, while the third source is diary of a whole day. In the weekly questionnaire, time use is recorded hourly during seven days, normally those of the previous week of the

interview. In the diary questionnaire information is reported every then minute, along a day chosen by the interviewed.

No information about income, either from labour or non-labour, is reported in TUS. This is the reason why a second survey is required. Information on incomes is taken by the Italian Survey on Income and Wealth (SHIW) done by the Bank of Italy. The 2002 SHIW sample comprises 8,011 households and 22.148 individuals, distributed over about 300 Italian municipalities. In this survey there are individual data about income, family composition, educational level and housing condition. Using this survey an equation wage and a non labour income equation are estimated and the coefficients of these equations are used for imputing the individual hourly wage and the individual non labour income in the TUS sample.

## **2.1 The wage equations estimation**

The individual hourly wage and the non labour income are estimated by selecting a sub sample of households from the SHIW. More precisely, households in which there is a couple, married or the facto, are chosen; as a consequence there are not households with a single parent in the sample. Second, couples are necessarily with both working parents. Finally, households could be with or without children and with or without isolated members. In the estimation independent variables are a few individual characteristics that are recoverable both in SHIW and in TUS and useful for estimating the sharing rule too.

As far as SHIW is concerned the sample selected comprises 1453 households (out of 8011) and 4925 individuals (out of the original 22.148). Table 2 shows some descriptive statistics of this sample. First of all, notice that about 60 per cent of the households are from the North of Italy, while the Centre and the south are represented –respectively- by a 20 per cent of the sample. Probably Northern households are over represented because of the two working couple selection. Considering the male employment status, blue-collar workers and with collar are both about 30 per cent of the sample, school teachers are 2 per cent, while managers are 3 per cent; almost 10 per cent are sole proprietors/members of the arts or professions and 17 per cent are self-employed. As for the female

employment status, the two main differences with are the percentage of teachers (14 per cent of the female sample) and the number of self employed workers (12 per cent of the female sample). Besides, part time jobs are significantly more common for women (around 60 per cent of couples), than for men (34 per cent). The educational level of the sub sample is coherent with the well know structure of the Italian society: the degree is not widespread and women are generally more educated than men. Finally, in about 80 per cent of households there are one or more kids.

To estimate non labour income data on the education of the father of the person which is responsible of the interview and the family posses of the house are taken into account.

**Tab. 1 Bank of Italy sample.**

4925 individuals	8,925,681
1454 households in which both parents are workers	4,171,849

**Tab. 2 Descriptive statistics of the Bank of Italy sample.**

	Men			Women		
	Obs.	Obs. weighed	Perc.	Obs.	Obs. weighed	Perc.
eta (mean)	44.66	43.77		41.6	40.76	
reg1 North	817	2,481,821	0.595	818	2,481,821	0.595
reg2 Centre	312	824,336	0.198	312	824,336	0.198
reg3 South	324	865,691	0.208	324	865,691	0.208
wst1 Blu collar employee	431	1,269,505	0.304	389	1,089,897	0.261
wst2 White collar/ soldier	409	1,192,141	0.286	524	1,536,027	0.368
wst3 Teacher	43	108,097	0.026	227	614,693	0.147
wst4 Upper white collar	117	328,631	0.079	33	113,505	0.027
wst5 Manager (headmaster, judge, university teacher)	53	149,468	0.036	16	49,482	0.012
wst6 Self employed/entrepreneur	139	398,636	0.096	68	195,494	0.047
wst7 Shareholder-manager of small firm/head of family firm	257	715,001	0.171	182	528,559	0.127
wst8 Other self employed (co.co.co)	4	10,371	0.002	15	44,193	0.011
e_years=3 no degree	5	21,254	0.005	5	23,147	0.006
e_years=5 elementary degree	114	296,310	0.071	104	303,380	0.073
e_years=8 short secondary degree (compulsory level)	477	1,480,005	0.355	391	1,092,073	0.262
e_years=11 work training degree	104	288,853	0.069	118	377,016	0.090
e_years=13 secondary degree	531	1,450,227	0.348	590	1,702,117	0.408
e_years=16 short university degree	8	23,461	0.006	23	71,215	0.017
e_years=18 long university degree	206	593,950	0.142	221	599,748	0.144
e_years=21 post lauream	9	17,789	0.004	2	3,154	0.001
kid no kids	278	784,912	0.188	278	784,912	0.188
kid kids	1176	3,386,937	0.812	1176	3,386,937	0.812
ptime2 <30 hours per week	492	1,422,262	0.341	865	2,484,530	0.596
ptime3 > 30 hours per week	962	2,749,586	0.659	589	1,687,319	0.404

Source: Microsimulation model on the Bank of Italy Income Survey, 2002

The selection of households in the main survey, TUS, is the same previously illustrated for SHIW, i.e. households with married and de facto couples,

couples with both working parents, households with or without children and isolated members. In this case, a further condition is lay down: couples in the sample should had answered to the satisfaction question, while missing records are deleted. In this way the final sample for estimating the sharing rule and the home production functions comprises 4673 households and 15823 individuals.

The male and female wage equations are estimated with OLS and quite a few coefficients are significant (see table 3). These coefficients are afterwards used to multiply, for each individual in the TUS, the characteristics chosen (area of residence, age, employment status, years of education, working part time) and an individual hourly wage sample is recorded for each record of the TUS. Also the estimation of the log of the non labour income is done starting with the SHIW sample, while the second step is the imputation of the coefficients in the TUS sample. Notice that in this case the significant variables are different for the women and men.

**Tab. 3 Male and female wage equations.**

	Male wage		Female wage	
<b>eta</b>	0.00596288	**	0.1002138	***
<b>reg2</b>	-0.04782204		-0.08589549	
<b>reg3</b>	-0.26199602	***	-.17707977	***
<b>wst2</b>	-0.60258456	***	-.07667672	
<b>wst3</b>	-0.0963795		0.19402035	*
<b>wst4</b>	0.33013314	***	0.32388017	*
<b>wst5</b>	0.62017947	***	0.63516505	***
<b>wst6</b>	0.76983229	**	1.0742807	**
<b>wst7</b>	0.418355		0.89626326	**
<b>wst8</b>	0.53102588		0.73329496	***
<b>sett2</b>	0.58172446	***	0.66345526	***
<b>sett3</b>	0.41328606	***	0.38539321	*
<b>sett4</b>	0.41710087	***	0.42431298	***
<b>sett5</b>	0.49655632	***	0.64857963	***
<b>sett6</b>	0.87014787	***	0.46781359	***
<b>sett7</b>	0.562235	***	0.30239362	**
<b>sett8</b>	0.386779	**	0.67646539	***
<b>sett9</b>	0.55278929	***	0.67646539	***
<b>e_years</b>	0.04131416	***	0.04278159	***
<b>d_aut</b>	-1.0321689	***	-.59008621	*
<b>d_dip</b>	-0.59059722	*	0.16616766	
<b>ptime3</b>	-0.74597314	***	-0.30022059	***
<b>_cons</b>	2.2646365	***	0.50975731	

Source: Author's estimations

More precisely, both female and male wages are positively correlated with age, while for women the coefficient is higher. The couple residence is important in determining the wages: people living in the Centre and in the South are less paid than those living in the North of Italy and the difference between North and South is more significant. The wage is increasing with the level of education and the part time jobs are less paid. The fact to be a self employed worker seems to decrease labour income with respect to employed workers. As shown by table 3, both the work status (wst2-8) and activity sector are important in defining the wage.

## 2.2 Non labour income estimations

**Tab. 4 Estimation of the non labour income (male and female)**

	Male non labour income (ln)	Female non labour income (ln)
<b>stupcf</b>	0.08271706 **	-
<b>studio</b>	0.13074256 **	0.02495767 *
<b>pmwage</b>	0.34503525 *	-
<b>eta</b>	0.0300021 ***	-
<b>reg2</b>	-0.19452496 *	0.0173016
<b>reg3</b>	-0.6117569 ***	-0.47816464 ***
<b>d_abp_f</b>	1.1348428 ***	0.75450179 ***
<b>eta</b>	-	0.02609646 ***
<b>kid</b>	-	0.05694721
<b>wst2</b>	-	0.46811259 ***
<b>wst3</b>	-	0.59723829 ***
<b>wst4</b>	-	0.14474086
<b>wst5</b>	-	0.38095356
<b>wst6</b>	-	0.87773784 ***
<b>wst7</b>	-	0.64654929 ***
<b>_cons</b>	3.2907174 ***	4.3966677 ***

Source: Author's estimations

In the estimation of the individual non labour income, variables that are significant in the male estimation aren't in the female estimation and vice versa. As an example, the level of education of the father of the interviewed and the wage are both significant just in the male estimation. On the contrary the age, the presence of children and the work status are significant simply for the female estimation.

Table 5 reports some descriptive statistics of the sample finally used to estimate the sharing rule and the home production functions. A few characteristics of the Italian society are very well represented in this sample. First of all, as in the SHIW, couples with both working partners are concentrated in the North (over the 56 per cent of the sample) while over forty per cent of the two working couples are resident in the Centre and in the South. Secondly, the level of education of women is higher than the level reached by men; in the sample the 66 per cent of women has a technical or higher education, while men in the same position are 58 per cent of the sample. In other words women are more educated in the 30 per cent of couples considered. Besides, children are very few: 67 per cent of couples haven't a child aged less than seven years and in 25 per cent of the couples the child is only one.

**Tab. 5 Descriptive statistics of the Time Use Sample**

Name of the variable in the dataset	Description	
lnsalhrtor	Man wage rate (mean of ln hourly wage) *	2.830
lnsahtocjr	Woman wage rate (mean of ln hourly wage)	2.080
diffsal	lnsahtocjr-lnsalhrtor	-0.748
age	Man's age	43.440
age2	Man's age squared	1972.00
ageconj	Woman's age	40.43
agec2	Woman's age squared	1712.00
difage	Age difference	-3.02
techsupc	Woman has technical or higher education (% of workers)	66.70
techsup	Man has technical or higher education (% of workers)	58.31
anneduc	Male education (mean of e_years of workers)	11.27
fEdu	Woman has higher degree of education than man (% of women workers)	29.63
hhnonlaborr	Household non-labor income	

Source: TUS, 2002

\**mh*wage=9.82, *wh*wage=6.39, *lnps* hw=8.48

Name of the variable in the dataset	Description		
ncat1	Number of children 0-7 years old (% on H.)	0	67.17
		1	25.09
		2	7.26
		3	0.48
ncat2	Number of children 7-18 years old (% on H.)	0	42.93
		1	29.69
		2	23.01
		3	3.85
		4	0.44
ncat56	Number of elderly personos in the hosehold (n=1, % on H.)	5	0.09
			1.77
lnm2	Number of rooms in the house (mean)		4.73
ownauto	Automobile owned (% on H.)	yes	98.70
		no	1.28
awnwash	Washing machine owned (% on H.)	yes	99.44
		no	0.55
reg1	Regional dummies (North, % on H.)		56.40
reg2	Regional dummies (Centre, % on H.)		20.08
reg3	Regional dummies (South, % H.)		23.50

Source: TUS, 2002

### 2.3 The Satisfaction question

The subjective data adopted in this paper for estimating the sharing rule is derived from the answers to the following question: “On the whole, are you

satisfied or unsatisfied of your present life?”. The possible answers are: “I’m very satisfied”, “I’m satisfied enough”, “I’m not much satisfied” and “I’m not satisfied at all”. The assumption done is that if household’s members give the same answer, they get the same share (the half) of household total income. Table 6 summarizes answer frequencies: the first point to underline it is that over 70 per cent of people interviewed declare they self satisfied enough; this is true both men and women. Secondly, a quite significant group, over 14 per cent of men and over 16 per cent of women, declare they self to be not much satisfied. Less than 2 per cent of the sample is not satisfied at all and there is no answer for 1.63 per cent of men and 3.5 per cent of women. Generally speaking, the differences between the female and the male answer are not remarkable.

**Tab. 6 Answers to the satisfaction question in the survey**

	Men		Woman	
	Freq.	Percent	Freq.	Percent
0	76	1.63	166	3.55
1	418	8.95	405	8.67
2	3,433	73.46	3,290	70.4
3	673	14.4	757	16.2
4	73	1.56	55	1.18
Total	4,673	100	4,673	100

*Source: TUS, 2002*

**Tab. 7 Differences in the satisfaction question between partners  
(female-male answer)**

diff_soddis	Freq.	Percent
-3	6	0.06
-2	82	0.88
-1	1,272	13.61
0	6,738	72.1
1	1,166	12.48
2	78	0.83
3	4	0.04
Total	9,346	100

*Source: TUS, 2002*

More in details, table 7 shows the differences between the two members of the couple as far as satisfaction is concerned. In over 72 per cent of the couples

there is no difference in the answer: that it means that the two spouses evaluate their general condition in equal terms. In 13 per cent of the couples interviewed the female evaluation is worse than that of the men, even if the difference is the lowest possible, i.e. one degree. As for example, if the male declares himself “satisfied enough”, the spouse declares herself “not much satisfied”. 12 per cent of couples are such that women declare themselves more satisfied than their spouses, while in less than 1 per cent of couples these differences are more than one degree.

### 3. The estimation of the sharing rule and of the home production function.

**Tab. 8 Estimation of the sharing rule and home production function**

	Women domestic labour supply	Male domestic labour supply	Index
<b>Variable</b>			
<b>figliot</b>	-.20196854* <sup>1</sup>	-	-
<b>p<sub>time2</sub></b>	.1872449***	.72433521***	-
<b>p<sub>time3</sub></b>	.125616212***	.9539338***	-
<b>lnsahtocjr</b>	.01080822**	-	-
<b>ln_h_nlincome</b>	0.01076086	.10296754***	.01829243**
<b>ncat1</b>	.59042273***	.41895622***	-
<b>ncat2</b>	.34345653**	-	-
<b>reg2</b>	.1094831*	-.07035302	0.0740708
<b>reg3</b>	.16400961***	-.29689655***	0.1194421**
<b>ageconj</b>	-	-.04314434***	-
<b>techsup</b>	-	.15867326**	-
<b>_cons</b>	3.9652302***	2.2047831***	-0.75660051**** 1.413382***

Source: Author's estimations

Table 8 shows the result of the estimation of the sharing rule: the dependent variable of the oprobit estimation is an index which is equal to zero if the woman is less satisfied than the man, is equal to zero if there are no differences in satisfaction and is equal to two if the women is more satisfied than the man. Two independent variables are significant, i.e. the log of household's non labour income and the region of residence of the couple. As for the domestic labour supply, the OLS estimation shows several significant variables. First of all, female household production is negative related with the number of children (figliot) but women

domestic labour supply is increasing when children are aged less than seven years (ncat1 means less than seven years, ncat2 means more than seven years). The female household production is positive related with female wage and increasing if the worker has a part time job (ptime==2). The female domestic production is increasing if she's resident in the South or in the Centre of Italy. Male household production in South is less than in Centre and in North of Italy; it is positive related with the education of the wife and negative related with her age. The presence of children aged less than seven years increases the male domestic participation, like the household non labour income. The estimation seems to signal an increasing male domestic production for full time workers with respect of part time workers.

### **Conclusions (provisional)**

This paper provides an application of the collective model to the Italian data adopting a methodology proposed by Kalugina, Radtchenko and Sofer, in which the sharing rule of the collective model is recovered empirically from data on satisfaction in life. In the collective model adopted here household resources are labour income, non labour income and the output of the household production.. Actually the present literature on collective model identify the derivatives of the sharing rule, but not the sharing rule itself, while KRS identify the sharing rule by assuming that there is a link between equal distribution of self reported satisfaction in life of the two spouses and the intra-household equality of indirect utility. As in numerous estimations of the sharing rule, the oprobit model shows just two independent variables significant, i.e. the log of household's non labour income and the region of residence of the couple. On the contrary the OLS estimation of the domestic labour supply shows several significant variables: female household production is negative related with the number of children and is increasing when children are aged less than seven years. The female household production is positive related with female wage and increasing if the worker has a part time job. As expected, female domestic production is increasing if she's resident in the South or in the Centre of Italy. Male household production in South of Italy is less than in Centre and in North of Italy; it is positive related with the education of the wife and

negative related with her age. The presence of children aged less than seven years increases the male domestic participation.

## References

Apps P.A. and Rees R. (1997): *Collective Labour Supply and Household Production*, Journal of Political Economy, vol. 105, n.1, pp. 178-190

Banca d'Italia, (2002) *Indagine sui redditi e sulla ricchezza delle famiglie italiane*, Roma.

Bourguignon F. and Chiuri M.C. (2005), "Labor Market Time and Home Production: a new test for collective models of intra-household allocation", CSEF Working Paper 131.

Bourguignon, F. Browning M., Chiappori P.A. (1995): 'The Collective Approach to Household Behaviour', Delta WP n. 95-04.

Bourguignon, F., Browning, M., Chiappori, P.A. and Lechene, V. (1993), 'Intrahousehold Allocation of Consumption: A Model and Some Evidence from French Data', *Annales d'Economie et de Statistique* vol.29: 137-566.

Bourguignon, F., Browning, M., Chiappori, P.A. and Lechene, V. (1994), 'Incomes and outcomes: A Structural Model of Intrahousehold Allocation', Journal of Political Economy, vol. 102 (6): 1067: 1096.

Browning, M. and Chiappori, P.A. (1994), 'Efficient Intrahousehold Allocations: A General Characterization And Empirical Tests', *Econometrica*, vol. 66 (6): 1241-1278.

Chiappori, P.A. (1988), 'Nash-Bargained Household Decisions: A Comment', *International Economic Review*, vol.9 (.4): 791-796.

Chiappori, P.A. (1988), 'Rational Household Labor Supply', *Econometrica*, vol. 56 (1): 63-89.

Chiappori, P.A. (1992), 'Collective Labor Supply and Welfare', Journal of Political Economy, vol.100 (3): 437-467.

Chiappori (1997), *Introducing Household Production in Collective Models of Labour Supply*, Journal of Political Economy, vol. 105, n.1, pp. 191-209

Chiappori, P.A., Fortin, B. and Lacroix, G. (2002), 'Marriage Market, Divorce legislation and Household Labour Supply', Journal of Political Economy, 37-72..

Donni, O. (2003), 'Collective Household Labor Supply: Non-participation and Income Taxation', Journal of Public Economics, Vol. 56, Issues 5-6, pp.1179-1198.

*Istat, Indagine sull'Uso del Tempo* (2002), Roma.

Nash, J. (1953), 'Two-Person Cooperative Games', *Econometrica*, vol.:128-140.

Nash, J.(1950), 'The Bargaining Problem', *Econometrica*, vol.18:155-162.

Rapoport B., Sofer C. and Solaz A. (2003). "Household Production in a Collective Model: Some New Results", TEAM Working Paper, Université Paris 1-Panthéon-Sorbonne.

Rapoport B., Sofer C. and Solaz A. (2006). "La production domestique dans les modèles collectifs", *Actualité Economique*, à paraître.