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Is intra-household power more balanced in poor households? A parametric alternative

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Abstract:

This note provides a complement to the empirical part of Couprie, Peluso, Trannoy (2009)..It provides a parametric estimate of the intra-household sharing rule using clothes consumption french data.

Keywords: clothes consumption, intra-household inequality

J.E.L. Codes :D63, D13, C31

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1 Introduction

This note provides a complement to the empirical part of Couprie, Peluso, Trannoy (2009), hereafter CPT (2009). It aims at providing, on French data year 2000, a robustness check for the non-parametric analysis. Under CPT (2009) assumptions, the concavity of the public and the private sharing functions with respect to household expenditures implies that intra-household inequality is not worse in poor households than in rich households. The public sharing function concavity corresponds to the shape of household public good consumption, such as housing, with respect to total household expenditures. The private sharing function concavity corresponds to the shape of private expenditures of the 'dominated' individual in the family when household expenditures increases, where the dominated is defined as the individual, male or female, who has the lowest share of household private expenditures. The consequence of the non rejection of concavity of both functions is that intra-household inequality can be ignored to elaborate Lorenz income distribution comparisons on the basis of the sole observation of household incomes.

Under collective household rationality (Chiappori and Ekeland, 2006), a parametric estimation of the intra-household sharing rule is proposed, using clothes as assignable goods and some additionnal assumptions. The quadratic specification presents the advantage of offering a reasonnable trade-off to deal with a limited sample size and keeping some flexibility of the functionnal form necessary to realize a concavity test. The identification method for the individual share of household private expenditures is in the line of Browning and al., 1994, or more recently of Bourguignon and al., 2009. The private sharing function ensues in a straightforward way. Then, parametric global concavity tests are applied against global parametric alternatives.

2 Framework

When modeling household consumption behaviour, collective rationnality is a reasonnable assumption to make (Chiappori, 1988; Apps and Rees, 1988; Chiappori and Ekeland, 2006). Rank tests, realized on demand systems, usually do not reject the collective rationnality against broader alternatives for couples of western countries (Browning and Chiappori, 1998). Assuming collective rationnality is not only in line with empirical evidence but also advantageous. Under some restrictions on individual preferences, detailed in Chiappori and Ekeland (2009), the household decision-making process can be interpreted in a decentralised way where household members first decide a share of expenditures then take individual decisions given the **sharing rule**. This sharing rule, which occurs to be related to the balance of Pareto weights in the household utility function, has a natural interpretation in terms of intra-household inequality. It cannot be directly observed in the data and needs to be identified from the observation of household aggregate consumption. Taking the minimum share obtained by an individual in a couple directlty gives the private sharing function which is of interest in the CPT (2009) paper.

Under egoistic or caring preferences, the observation of an exclusive good, which is a private good for which individual consumption is observed, allows recovering the sharing rule up to a constant. Chiappori (1992) presents an identification proof in a context where couple's aggregate consumption is observed. Browning and al. (1994) present a proof in a context where the consumption of the exclusive good is observed in a population of couples and single individuals. In both cases, the identification is weak as it relies on second order derivatives effects. In the first case, identification can be improved to first order derivatives effects by resorting to distribution factors[1]. In the second case, it is strenghtened by imposing that the female and male shares do sum up to total household private expenditures (this restriction is not rejected in Browning and al., 1994). Finally, in the context of exclusive good consumption, it seems essential to maintain the possibility of public consumption within the household. It has been shown in Blundell and al. (2005) that assuming Hicksian separability between public and private consumption is necessary to maintain identification of the sharing rule.

In the following, we propose to identify the sharing rule in the absence of price variation, by ressorting to the observation of exclusive clothes consumption, for single individuals and couples. Identification issues in this context are essentially presented in Bourguignon and al. (2009).

3 Model

We adopt the following standard assumptions required to identify the sharing rule. (i) Households behave according to collective rationality. (ii) Preferences are egotistic or caring. (iii) Public and private consumption are Hicksian separable in individual subutilities. (iv) Clothes expenditures is an exclusive good. (v) Whether in a couple or not does not impact individual preferences for private goods.

As discussed earlier, all these assumptions are quite standard in the literature, but some of them are more questionnable than others. Assumption (iii) implies that the quantity of public good consumed does only impact private good consumption via an income effect. Hence, it rules out any

[1] Variables that affect the balance of bargaining powers without affecting individual preferences (see Chiappori and al., 2002 for details). Distribution factors that are recognized to have an impact of the sharing rule in the literature are individual indicators of the remariage opportunities, and, if exogenous, individual wage rates, and incomes.

possible substitution or complementarity between private and public good consumption. As we will see in the empirical analysis, disentangling private from public consumption remains arbitrary and questionnable, we will thus provide a sensitivity analysis to tackle with this problem. One should notice that, to our knowledge, no one except Donni (2009), has implemented a test of such an assumption which is always assumed to identify the sharing rule. Assumption (iv) requires the absence of external effect due to clothes consumption in the family. Hence female clothes consumption should not directly enter in male's utility function, it could only impact male's well-being via caring and his partner's utility function. The opposite is also true. Assumption (v) is questionnable as it could be argued that preference for clothes is related to marriage formation and/or dissolution, in such a way that individuals who present specific preferences for clothes will be observed more often in a couple than others. The question of change in preferences due to marital status is also somehow related to the preceeding exlusivity concern, as one might justify such a change in preference by resorting to partner's preferences arguments rather than intrinsic change. Finally, we cannot provide any formal test of any of these assumptions taken individually[2]. Nevertheless, the joint observation of female and male clothes consumption, whether living single or in a couple, provides an overidentifying restriction which is the occasion to check the global coherency of these identification assumptions all taken together.

In order to select the adequate taste shifting variables, we first model a system of household public consumption (mainly housing), G, and clothes expenditures, C, for singles. In the absence of price variation, assuming quadratic Engel curves, and introducing additively individual heterogeneity, one obtains:

$$\begin{cases} G = h^0_{sj} + h^1_{sj}.Y + h^2_{sj}.Y^2 + Z_{sj}\kappa_{sj} + \varepsilon_{sj} \\ C_{sj} = c^0_{sj} + c^1_{sj}.D + c^2_{sj}.D^2 + X_{sj}\beta_{sj} + \varepsilon_{sj}, \text{ where } j = f, m. \end{cases} \quad (1)$$

Z_{sj} and X_{sj} are vectors of socio-demographic covariates, which can potentially contain common or different variables, Y is total household expenditures and D total private expenditures: $D = Y - G$. Both expenditure variables are endogenous and controled with gross household income and its squared.

For couples, the expenditure system for public and clothes expenditures is such that:

$$\begin{cases} G = g_0 + g_1.Y + g_2.Y^2 + Z\gamma + \varepsilon \\ C_f = c^0_f + c^1_f.\phi_f + c^2_f.\phi^2_f + X_f\beta_f + \varepsilon_f \\ C_m = c^0_m + c^1_m.\phi_m + c^2_m.\phi^2_m + X_m\beta_m + \varepsilon_m, \end{cases} \quad (2)$$

[2]Under assumption (i) and given the existence of z-conditional demands, a test of caring and exclusivity of goods is proposed in Bourguignon and al. (2009). As we will see later, the implementation of this test is not possible in our case.

where ϕ_j is the share of private expenditures devoted to individual's j private consumption. ϕ being unobserved, it can be parametrically identified under the assumptions (i) to (v). We assume the following function shape:

$$\phi_j = k_j^0 + k_j^1 D + k_j^2 D^2 + S\kappa_j, \tag{3}$$

where S includes covariates that influence the balance of the intra-household bargaining power but might also contain covariates explaning the observed heterogeneity in taste for clothes. Imposing $c_j^k = c_{sj}^k$ for $j = f, m$ and $k = 1, 2, 3$, allows identifying the parameters of the sharing rule, using only one exclusive good consumption for individual being single or in a couple.

It is then possible to check, for various values of D, and especially at sample mean, whether $\phi_f + \phi_m = D$. This does not constitue an overidentification test per se as in Bourguignon and al. (1994), but our specification is less demanding in terms of functional specification than their approach. Contrary to these authors, we do not rule out the linear case in specifying the model. As soon as both male and female clothes consumption are observed for both family status, imposing the restriction $\phi_f + \phi_m$ allows identifying, in the above system, all the parameters, even in the case where Engel curves are linear. In both cases, identification of parameters is based on non-linear estimation methods and the presence of a global maximum should be checked by resorting to various starting values for the parameters. As each method presents its advantages and drawbacks, we will compare the two in the result section.

Finally, the concavity of the public sharing function can be checked by testing the sign of the g_2 parameter. One should notice that this test is less informative than the non-parametric one as global concavity is tested against local convexity alternatives. The private sharing function must be built in a preliminary step by predicting, for each household, the dominated individual. The concavity test follows straightforwardly.

4 Data

Data are cross-sectionnal, year 2000, and come from the French Family Expenditures Survey (Enquête Budget des Familles). Table 1 illustrates the sub-sampling process. The analysis is restricted to couples or single individuals, households containing other adults are removed. Households with children are usually not considered. This is because it would be harder to justify and define a public-private good consumption separability in this case. In addition to that, children, even small, could impact the decision process via their own preferences. With the age lower than 65, this brings us to 3323 observations. In the data, individuals also report non-assignable clothes such as presents. Restricting to households who report a positive expenditure in assignable clothes further downsizes the sample by more than one third. The two last selection rules are quite costly in terms of data but they are necessary as we do not explicitly model family labour supply decisions or corner solutions. Finally we only keep household with full-time earners. It is indeed very likely that goods consumption and labour supply behaviour are not separable (Browning and Meghir, 1998). This remark makes even more sense in the case of clothes expenditures, where the separability between labour and clothes consumption is essential to adequately identify the Engel curves and the sharing rule. One could argue that clothes consumption is related to the labor market status because people need to be dressed adequately in order to work. Employment and its characteristics depends on the clothes you wear and vice-versa. Moreover, consuming clothes is also a time-consuming activity and we could suspect that controling for the hours of work in the right hand side of the clothes consumption equation would not solve the potential endogeneity problem of working time. Reducing the sample size tends to improve the quality of the fit to the data for the specification proposed. Moreover, assumptions (iv) and (v) become much more convincing when applied only to dual-earner couples.

Table 2 shows descriptive statistics corresponding to the selected sub-sample. Three different distinctions between public and private consumption within the household are maintained, the first one being more restrictive and contains also housing. It is important to notice that as this analysis is situated in a welfare analysis perspective, imputed housing expenditure are used. They correspond to the monetary equivalent of the flow of services coming from housing, even if in practice the individual does not pay or pay a lower rent, which is the case for landlords or subsidized housing (Driant and Jacquot 2005). Naturally, if an imputation is realized, it comes increasing the household expenditures as well. The third definition of public expenditures is much more extensive, it includes car-related expenditures and represents on average 50% of household expenditures. One should note that some clothes consumption are not assignable to female or male, in which case it is aggregated into the other private good consumed category. In all the following, in order to limit outlier problems, and to stay comparable with the non-parametric analysis of CPT (2009), all the regressions are restricted to 2nd to 98th percentiles of expenditures.

5 Results

Empirical analysis starts by selecting the adequate taste shifters for clothes and the public good using single individuals. Table 3 shows the best specification obtained. Very few covariates impact clothes consumption, the only significant variables are age and living in a big city. A system specification is proposed, and appears to be rejected againts OLS using Hausman tests. Expenditures, which are endogenous, are instrumented using gross household income and its squared value. Instrumental variable estimators are also most of the time rejected at standard threshold in the data. This could be due to the small sample size which does not allow efficiency gains to show up. Homoscedasticity is always rejected, so White's estimator for the variance covariance matrix is implemented. Engel curves tend to present a positive slope but the coefficients are only significant for Def2. Second order effects are never significant. Hence, with a quadratic specification, Engel curves for clothes expenditures for males for Def2 tend to present a linearity that is statistically not rejected.

Table 4 shows the results of the estimations obtained for couples. In this case also, a system estimation does not lead to a significant improval in the estimation. More surprisingly, this result holds also statistically for the system female-male clothes consumption. This reduced form model allows selecting the adequate variables and testing the global concavity of public good expenditures against global alternative (Table 5). It occurs that concavity is never rejected for whatever the definition chosen for public expenditures and whatever we choose to restrict to the 10th to 90th percentiles interval.

Finally, their remains to identify potential distribution factors, which are variables, specific to couples' behavior, affecting the decision process without affecting preferences. Among widely recognized distribution factors in the literature (for instance, Lise and Seitz (2007) and Browning and Bonke (2006), we try age difference, education difference and income differences between spouses. In order to control for the external opportunities of both spouses, we need to use individual incomes. But, to remove any possible endogeneity problem related to hours of work choice in the clothes consumption model, the wage rate variables are used instead. Naturally, for the public good consumption, the effect of the distribution factor is made anonymous (minimum or maximum of both spouses wage rates) to test that the poorest in household tries to push public good spending since he will benefit more of it in relative terms. In our data, age plays an important role on preferences, and could also impact the bargaining process, whereas education does not seem to impact significantly clothes consumption. Quite surprisingly compared to other results in the literature, we do not observe any statistically significant impact of the wage rate on the consumption of the exclusive good.

In order to check the robustness of such a result, we choose to use a linear model in line with household rationnality as it is embedded in the structural model of household behavior. This means that the model contains interaction terms between covariates, wage rate variables, expenditure and expenditure squared variables. Table 6 reports the resulting elasticities of clothes consumption to wage rates (controling for total expenditures and all the covariates previously defined). These are neither significant at the 5% level. In these conditions, the existence of distribution factors in this analysis is far from being proven. As a consequence, we cannot implement the test of caring and exclusivity of clothes consumption suggested by Bourguignon and al. (2009) because such a test relies is not implementable in a unitary context (which is probably the case in these data).

Table 7 presents the estimation of the structural model (equ. 2), imposing the restriction that the individual shares should sum up to household aggregate private expenditures. We also present the specification of Browning and al. (1994) which allows an overidentification restriction test. In their paper, expenditures are introduced in log in the demand function and in the female sharing rule function. This rules out the possibility of linear Engel curves and sharing rule. One must admit that the test of the overidentification restriction passes only at the 1% level.

On the last line, we evaluate the prediction errors at sample mean (sum of private predicted individual expenditures in the household minus household observed private expenditures). The estimation never deviates significantly (at a level of 5%). Table 8 presents more detailed results on the prediction process for the private sharing function, depending on whether the shares should sum up to household private expenditures is applied (Table 8A), or not (Table 8B).In this last case, observations leading to negative predicted expenditures are suppressed. This leads to a limited reduction of the sample of 1 to 3%, except for definition 3 for which it is more severe, almost 20%. The average share of female expenditures tends to belong to a 46-48% interval, which is quite narrow (except for definition 3 in the unrestricted case where it goes up to 55%). Comparing the prediction errors, it appears that Browning et al. (1994) method appears to be the best as it presents the lowest average prediction error and prediction error standard deviation. Their specification imposes that the ratio of individual expenditures to household ones should be comprised between 0 and 1. However, the last lines of Table 8A and Table 8B leads to a striking result. With Browning et al. (1994) approach, the individual who has the lowest share in the family is the female in more than 95% of the cases, against a figure which can be comprised between 44% and 66% with the quadratic method. This 95% is much too strong to be realistic and is clearly driven by the parametric concave shape imposed on the individual sharing rule by Browning et al. (1994). This is a serious drawback for the concavity test that we want to implement on the population of 'dominated' individuals which require to be identified adequately.

Finally, Tables 9 and 10 present the regression and concavity test of the private sharing function. We also check the robustness of the result when the sum of shares are not restricted to sum up to household private expenditures. Imposing the restriction tends changes the sign of the effect of the age of female, age of male and the significance of wage rates and age difference effects. The effect of the minimum wage in the household tends to be more precised in the case of definition 1 with the restriction and in the case of definition 2 without the restriction. If overall there remains a doubt about the absence of a wage rate effect on the private sharing function, there is absolutely no doubt about the result of the concavity test, which is never rejected against global alternatives whatever the definition used, whatever the sample is restricted to 10 to 90th percentiles or not and whatever the restriction on the sum of shares is imposed or not.

6 Conclusion

This note replicates the empirical analysis of the CPT (2009) paper in a quadratic demand and sharing rule collective rationnality context. The specification and results are compared to Browning and al. (1994) identification method. The nature of the concavity result proven in the non-parametric analysis does not change when using this parametric alternative.

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Tables and Figures

Table 1: Subsampling

Original sample size 10305 household observations	Number of households	Couples	Single females	Single males
Single headed households or couples	9962	6567	2283	1112
Without children or any other adult member	5517	2876	1645	996
Less than 65 years old	3323	1697	877	749
Consuming assignable good (clothes)	2056	886	674	496
Employment episode in the year	1329	495	462	372
Not in part-time (weekly hours>30 or annual hours>1500)	1021	373	355	316

French Family Expenditure Survey, year 2000

Table 2: Descriptive statistics of the subsample

VARIABLES	COUPLES		SINGLE FEMALES	SINGLE MALES
Household before tax income (100€/year)	384.25		199.65	224.57
	(197.01)		(99.60)	(133.53)
Household's total expenditures incl. imputations (100€/year)	333.73		192.05	194.90
	(165.84)		(80.04)	(83.32)
Public 1: Housing, water, electricity (100€/year)	73.28		61.17	58.58
	(26.01)		(24.70)	(24.33)
Public 2: Public1, furnitures, HH services (100€/year)	101.56		72.49	69.09
	(59.52)		(30.46)	(31.16)
Public 3: Public2, Car-related expenditures (100€/year)	161.44		97.15	101.55
	(89.17)		(49.65)	(53.20)
Assignable clothes (% of HH expenditures) (€/year)	1762.18		947.54	993.44
	(1582.4)		(928.7)	(1337.7)
Unassignable clothes (€/year)*	863.86		250.32	115.72
	(2713.55)		(534.83)	(346.31)
Big city	0.1823		0.2310	0.2215
	(0.3866)		(0.4220)	(0.4159)
Married Couple	0.5281			
	(0.4998)			
	FEMALES	MALES		
Wage rate (€/hour)	8.2893	9.5933	9.0405	9.5837
	(5.5000)	(4.7033)	(4.1514)	(4.6557)
Women's or Men's clothes expenditures (€/year)	860.33	901.85	939.68	989.49
	(810.49)	(991.25)	(923.57)	(1338.1)
Age	36.4209	38.3834	39.7014	38.3196
	(12.1269)	(11.9491)	(11.7185)	(9.8691)
Number of non compulsory schooling years	2.3914	2.1447	2.6648	2.3956
	(2.3296)	(2.4474)	(2.4559)	(2.5915)
Born in France	0.9544	0.9464	0.9155	0.9177
	(0.2088)	(0.2256)	(0.2785)	(0.2752)

Tables 3: Clothes and household public good consumption regressions, single individuals

CLOTHES	FEMALES			MALES		
	DEF1	DEF2	DEF3	DEF1	DEF2	DEF3
Intercept	525.77 *	272.16	349.78	749.93 **	547.06 *	681.57
	(303.8)	(283.2)	(296.1)	(33.1)	(299.3)	(516.8)
Private	2.4910	7.5367 *	7.1218	3.2003	8.0966 *	9.9467
expenditures	(4.6139)	(4.5932)	(5.7992)	(4.5145)	(4.4309)	(10.6435)
Private	0.0098	-0.0080	0.0086	0.0126	-0.0047	0.00248
$expenditures^2$	(0.0173)	(0.0192)	(0.0293)	(0.0156)	(0.0164)	(0.0570)
Age	-4.7365	-4.5066	-6.1734 *	-15.3254 **	-15.4645 ***	-18.7525 ***
	(3.9769)	(3.8729)	(3.6113)	(5.9215)	(5.8082)	(6.1691)
Big city	417.442 ***	424.586 ***	336.428 ***	524.660 **	464.245 **	158.4353
	(134.8)	(132.8)	(116.7)	(203.8)	(206.0)	(169.0)
PUBLIC						
Intercept	1.2321	5.9686	55.1139 **	-80.8098 ***	15.3099	5.8449
	(13.6990)	(16.1984)	(21.5179)	(26.9298)	(21.8885)	(24.2420)
Total	0.0512	0.0426	0.1263	0.5911 ***	-0.0523	0.2415 ***
expenditures	(0.0916)	(0.0984)	(0.0872)	(0.1823)	(0.1044)	(0.0778)
Total	0.000228	0.00045 *	0.00095 ***	-0.0008 **	0.00058 **	0.00069 ***
$expenditures^2$	(0.000226)	(0.00024)	(0.00020)	(0.00039)	(0.00024)	(0.00017)
Age	1.3798 *	1.2822	-1.3597	2.6972 ***	1.5287	1.2948
	(0.7298)	(0.8074)	(1.1122)	(0.9402)	(1.0868)	(1.2719)
Age^2	10.8239 ***	8.9046 **	-7.7353	5.7532	12.1124 ***	-12.0176 **
	(3.8696)	(4.1034)	(4.8021)	(3.8805)	(3.9572)	(5.2769)
Big city	-1.2158	-1.0208	1.7832	-3.0122 **	-1.3932	-1.7887
	(0.9142)	(1.0108)	(1.3653)	(1.2092)	(1.4003)	(1.6136)
Paris region	10.5856 ***	10.8768 ***	9.9015 ***	3.8150	0.5048	1.7845
	(3.2918)	(3.3799)	(3.6916)	(3.0623)	(3.1737)	(4.4366)

When necessary, total expenditures are instrumented using gross household income and its squared value. The appropriate estimator is selected for each case using Hausman specification tests. It occurs that on this sub-sample, in most of the cases, the instrumental variables estimator does not improve the estimations compared to a simple OLS one, expect for male public expenditures using definition 1. A joint system (SUR or 3SLS) estimation is also always rejected at standard levels against the OLS specification. This could be due to the small sample size which does not allow efficiency gains to show up. Heteroscedasticity of the error term is controlled.

Table 4: Clothes and household public good consumption regressions, couples

CLOTHES	DEF1		DEF2		DEF3	
	Female	Male	Female	Male	Female	Male
Intercept	5.9668	142.373	-416.35 *	-164.86	-330.72 *	-315.57 ***
	(258.5)	(256.3)	(232.0)	(298.2)	(189.6)	(207.7)
Private HH	2.8211	2.0786	6.6858 ***	4.3640 *	9.8310 ***	10.1257 ***
expenditures	(1.7977)	(1.8020)	(1.6856)	(2.5124)	(1.9743)	(2.2672)
Private HH	-0.00046	0.001227	-0.0083 ***	-0.0026	-0.0147 ***	-0.0141 ***
expenditures^2	(0.00308)	(0.00301)	(0.0029)	(0.0048)	(0.0047)	(0.0054)
Age Female	8.40016	8.4964	10.1833	10.9279	6.4760	10.2185
	(10.1167)	(12.5137)	(10.3939)	(13.1874)	(9.7425)	(13.3953)
Age Male	-7.50735	-8.8738	-9.3431	-10.6401	-8.4631	-13.2804
	(10.8674)	(13.1228)	(11.4333)	(14.0106)	(10.7043)	(14.0277)
Big city	395.684 ***	465.121 ***	409.263 ***	451.425 ***	331.470 ***	341.069 **
	(124.6)	(154.6)	(126.9)	(155.7)	(118.4)	(139.7)
Female wage rate	-1.2871	-1.5640	-0.3792	1.7003	-2.9981	-1.3167
	(4.0610)	(5.1690)	(3.8656)	(6.1768)	(3.8041)	(6.0567)
Male wage rate	10.6341	9.2536	20.0083	15.1918	10.8446	7.9591
	(11.9231)	(15.6742)	(12.4355)	(15.8093)	(11.3985)	(14.0790)
PUBLIC						
Intercept	-21.9794		-50.8064		-66.7983	
	(16.4194)		(34.2546)		(44.6683)	
Total HH	0.1217 ***		0.2647 ***		0.7912 ***	
expenditures	(0.0201)		(0.0896)		(0.1092)	
Total HH	-0.00008 ***		-0.00009		-0.00035 ***	
expenditures^2	(0.000015)		(0.000104)		(0.000128)	
Age Female	0.2037		2.7743		-1.7330	
	(1.3422)		(2.1668)		(2.7814)	
Age Female^2	0.2752		-2.5817		3.1993	
	(1.6805)		(2.8643)		(3.6303)	
Age Male	2.3409		-0.2985		3.1358	
	(1.3336)		(2.5829)		(3.2946)	
Age Male^2	-3.0334 *		0.0375		-4.8339	
	(1.6483)		(3.3426)		(4.2811)	
Big city	16.5144 ***		20.8912 **		-5.6760	
	(4.0837)		(8.3143) **		(10.341)	
Paris region	-2.9836		-13.2297		-7.6274	
	(2.6108)				(8.0077)	
Maximum hourly	0.2671		0.6781		-0.0566	
wage Rate in the HH	(0.2653)		(0.5148)		(0.3969)	
Minimum hourly	1.0935 *		2.4570 *		-1.2738	
wage rate in the HH	(0.5728)		(1.3301)		(1.7043)	

Table 5: Concavity test of public expenditures for couples

	Parameter	Stderr	Pvalue	Pvalue negativity
DEF1	-0,00008	0,000015	<0,0001	1,0000
DEF2	-0,00009	0,000104	0,3868	0,8066
DEF3	-0,00035	0,000128	0,0062	0,9969
Expenditures belong to P10-P90				
DEF1	-0,00001	0,000172	0,9536	0,5232
DEF2	0,00022	0,000305	0,4707	0,2354
DEF3	0,00017	0,000302	0,5690	0,2845

Table 6: Wage elasticities at sample mean of clothes consumption model: linear model with interactions*

CLOTHES	DEF1		DEF2		DEF3	
	Female	Male	Female	Male	Female	Male
Elasticity female wage	0.5816	-0.9081	-0.4135	-1.4070 *	-0.5682	0.0374
	(0.6751)	(0.7612)	(0.6077)	(0.7727)	(0.6857)	(1.0130)
Elasticity male wage	-0.3693	0.0666	-0.2762	0.6086	-0.2478	-0.4712
	(0.9320)	(0.9539)	(0.8471)	(1.1280)	(0.6400)	(0.9264)

** Covariates are built as the outer product of covariates of Table 4. This model encompasses the structural one presented in Table 7 when focusing only on couples.*

Table 7: Structural model estimation for couples preferences for clothes and sharing rule *

	DEF1	DEF2	DEF3	BBCL94 DEF 2
PREFERENCE FEMALES				
Intercept	144.86	-162.74	210.57	-4.2098
	(199.4)	(182.9)	(176.5)	(3.6880)
Private Expenditures/100	4.5856 *	10.5709 ***	6.6129 *	3.9305 **
(in log for BBCL 94)	(2.6223)	(2.4854)	(3.4640)	(3.6880)
(Private Expenditures/100)^2	0.0012	-0.0211 **	0.0112	-0.3530 **
(in log for BBCL 94)	(0.0097)	(0.0089)	(0.0201)	(0.1715)
Age	2.1168	2.7933	-1.6212	-0.00043
	(3.2204)	(3.1146)	(2.7773)	(0.00028)
Big city	405.866 ***	4442.608 ***	393.778 ***	0.4817 ***
	(115.7)	(112.5)	(94.092)	(0.0785)
PREFERENCE MALES				
Intercept	486.15 *	215.95	-100.32	2.8762
	(270.0)	(240.6)	(205.1)	(2.9077)
Private Expenditures/100	3.6794	8.3643 **	22.0998 ***	0.8256
	(4.0597)	(3.9204)	(2.9753)	(1.2477)
(Private Expenditures/100)^2	0.0111	-0.0046	-0.0519 ***	-0.0146
	(0.0141)	(0.0148)	(0.0122)	(0.1336)
Age	-9.6938 **	-7.6973 *	-11.9064 **	-0.0051
	(4.8660)	(4.6064)	(5.1192)	(0.0034)
Big city	525.776 ***	477.097 ***	164.255	0.5084 ***
	(170.0)	(165.9)	(155.1)	(0.0876)
FEMALE SHARING RULE				
Intercept	18.5622	31.2766	-54.2077 ***	0.1507
	(43.0111)	(35.8920)	(18.8889)	(0.8679)
Private Expenditures/100	0.5538 **	0.4127	1.3842 ***	-0.0456
(in log for BBCL 94)	(0.2718)	(0.2914)	(0.1805)	(0.1694)
(Private Expenditures/100)^2	0.000026	0.000289	-0.0024 ***	
	(0.000426)	(0.000605)	(0.0005)	
Age female	-0.2410	-0.5378	-0.2089	
	(1.6913)	(1.0926)	(0.5878)	
Age male	-0.8249	0.1892	-0.2341	
	(1.8491)	(1.1518)	(0.6388)	
Big city	6.8839	1.4690	-12.7436	
	(28.8781)	(21.3429)	(11.6669)	
Female hourly wage rate	0.0882	-0.0661	-0.0210	
	(0.7585)	(0.4401)	(0.2662)	
Male hourly wage rate	0.0610	-0.3390	-0.1780	
	(1.7384)	(1.3767)	(0.7345)	
Difference in spouses wage rates				-0.0335
(female – male)				(0.0714)
Difference in spouses age				-0.0044
				(0.0106)
UNCONSTRAINED MODEL				
Pvalue of the overidentifying restriction test				0.0464
Sum of shares - HH private	-19.9986	-59.6646 *	-84.4894 *	16.3851
expenditures at sample mean	(16.8216)	(32.5499)	(44.2505)	(22.9914)

** See Table 3. BBCL94 refers to Browning et al. (1994) specification for demand for clothes (where expenditures and demand are in logarithm) and the sharing rule (where distribution factors are defined in difference and expenditures are in log). DEF1 to DEF3 correspond to 3 different distinctions between household public and private consumptions (narrow range to wide range of goods),*

Table 8: Female sharing rule prediction results (*)

With the restriction sum of shares=private HH expenditures	DEF 1	DEF 2	DEF3	BCCL94 DEF 2
Predicted female private expenditures	121.03	110.29	78.4670	102.09
	(64.882)	(56.607)	(32.7935	(43.377)
Predicted male private expenditures	129.09	113.04	85.2984	121.24
	(52.373)	(45.59)	(50.3588)	(57.08)
Predicted share of female private expenditures	0.46933	0.4849	0.4788	0.4614
	(0.0780)	(0.0574)	(0.1049)	(0.0164)
HH private expenditures (observed or predicted)	250.127	223.330	163.77	223.330
	(114.35)	(100.26)	(73.77)	(100.26)
Private expenditures of the dominated	113.26	102.59	69.738	102.02
	(57.084)	(47.480)	(30.336)	(43.431)
The ‘dominated’ individual is the female	0.5627	0.4763	0.4413	0.9777
	(0.4967)	(0.5001)	(0.4972)	(0.1478)
Without the restriction sum of shares=private HH expenditures				
Predicted female private expenditures	110.38	104.47	93.393	103.22
	(65.332)	(56.039)	(42.003)	(44.697)
Predicted male private expenditures	122.70	115.35	91.152	121.66
	(63.121)	(66.235)	(53.645)	(59.26)
Predicted share of female private expenditures	0.4600	0.4784	0.5406	0.4640
	(0.0922)	(0.0854)	(0.1029)	(0.0211)
HH private expenditures (predicted)	233.083	219.824	184.556	224.888
	(126.766)	(119.822)	(94.6926)	(103.58)
Prediction error at the HH level (predicted-observed)	18.8581	-6.6505	2.2539	1.5573
	(52.2391)	(67.9724)	(53.7039)	(21.918)
Private expenditures of the dominated	105.003	98.6458	84.8071	102.97
	(64.059)	(57.2186)	(48.0382)	(44.7966)
The ‘dominated’ individual is the female	0.6638	0.5914	0.4708	0.9526
	(0.4721)	(0.4923)	(0.5000)	(0.2127)
Number of observations	354	350	291	
% lost due to negative predicted share	1%	3%	19%	0%

(*) We recall that private expenditures were divided by 100.

Table 9A: Private sharing function (share of the 'dominated') – with imposing the restriction

PRIVATE SHARING	DEF 1	DEF 2	DEF 3	BCCL94 DEF2
Intercept	-2.2108	-8.3717 ***	-47.484	0.5282
	(2.5944)	(2.4958)	(2.5183)	(0.8376)
Private expenditures	0.5483 ***	0.5957 ***	1.0156 ***	0.4574 ***
	(0.0192)	(0.0192)	(0.0307)	(0.0069)
$(\text{Private expenditures}/1000)^2$	-0.00008 **	-0.00022 ***	-0.00157 ***	-0.00004 ***
	(0.000033)	(0.000040)	(0. 000078)	(0.000014)
Age of Female	-0.2303 **	-0.2245 ***	0.2146 **	-0.5442 ***
	(0.1022)	(0.0744	(0.0938)	(0.0753)
Age of Male	-0.2723 **	-0.0323	-0.2146 **	0.5569 ***
	(0.1081)	(0.0715)	(0.0938)	(0.0757)
Big city	-0.9120	-0,0092	-1.2042	0.6086 **
	(0.8415)	(0.0544)	(0.7862)	(0.2410)
Maximum wage rate in the HH	0.1073	0.0185	0.0766	
	(0.0823)	(0.0544)	(0.0532)	
Minimum wage rate in the HH	0.3685 *	0.0329	0.1921	
	(0.1871)	(0.1568)	(0.1703)	
|Log wage rates difference|				1.0134 *
				(0.5689)
|Age difference|				-0.0621
				(0.0905)

Table 9B: Private sharing function (share of the 'dominated') – without imposing the restriction

PRIVATE SHARING	DEF 1	DEF 2	DEF 3	BCCL94 DEF2
Intercept	-114.299***	-165.737 ***	-208.043	-1.0924
	(3.0205)	(3.2425)	(2.3312)	(3.6015)
Private expenditures	0.7785 ***	1.1871 ***	2.1682 ***	0.4554***
	(0.0236)	(0.0270)	(0.0245)	(0.0284)
$(\text{Private expenditures}/1000)^2$	-0.00043 ***	-0.00138 ***	-0.00347 ***	-0.00004
	(0.000037)	(0.000052)	(0. 000053)	(0.000059)
Age of Female	2.4913 ***	2.4583 ***	0.7329 ***	0.4146
	(0.1561)	(0.1609)	(0.1645)	(0.1933)
Age of Male	-0.7641 **	-0.8373 ***	0.2927 *	-0.3638 *
	(0.1404)	(0.1323)	(0.1593)	(0.1994)
Big city	-4.7152 ***	1.2236	3.7785 ***	2.1090 **
	(1.2289)	(1.0622)	(0.8797)	(1.0031)
Maximum wage rate in the HH	-0.6663	0.9911	-0.7815	
	(0.5924)	(0.7227)	(0.5000)	
Minimum wage rate in the HH	0.3744	1.6812 ***	-0.3642	
	(0.4664)	(0.5601)	(0.3694)	
|Log wage rates difference|				10.8553***
				(2.1312)
|Age difference|				-0.3864 *
				(0.2342)

Table 10: Concavity test of private expenditures of the 'dominated'

	Parameter	Stderr	Pvalue negativity
With the restriction			
DEF1	-0,00008	0,000034	0,9923
DEF2	-0,00022	0,00004	1,0000
DEF3	-0,0016	0,00008	1,0000
BCCL94 DEF2	-0,00004	0,000014	0,9979
Expenditures belong to P10-P90			
DEF1	0,000112	0,000086	0,0964
DEF2	0,000036	0,000074	0,3133
DEF3	0,0000042	0,000158	0,4894
BBCL94 DEF2	-0,00007	0,000025	0,9974
Without the restriction			
DEF1	-0,00043	0,000037	1,0000
DEF2	-0,00138	0,000052	1,0000
DEF3	-0,00347	0,000053	1,0000
BCCL94 DEF2	-0,00004	0,000059	0,7511
Expenditures belong to P10-P90			
DEF1	-0,00047	0,000105	1,0000
DEF2	-0,00143	0,000124	1,0000
DEF3	-0,00373	0,000156	1,0000
BBCL94 DEF2	-0,00031	0,000107	0,9981