Is power more evenly balanced in poor households?

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Is intra-household power more balanced in poor households?

Structure of the talk

I. Introduction
II. Theory
III. Empirics
IV. Results
I. Introduction

MEASURE OF INEQUALITY AND WELFARE

Is the object of a vast literature which propose a theoretical framework essentially based on the measure of individual well-being (e.g: using individual consumption)

BUT

Most of the households are made off several members. The direct observation of individual welfare is impossible in such households

WHY?

The household forms an « informational screen » (or a black box) to the observation of individual welfare. Consumption, for example, is only observed at a household level and not at an individual level
For the moment, theory does not propose fully satisfying solution to the problem.

In practice,
Economies of scales due to the household size are controlled, intra-household equality being implicitly assumed.

(e.g: equivalence scales such as the OECD one: HH equivalent income=HH income/√n)

This article is one of the first to address the question of the incidence of intra-household inequality for the construction of welfare normative criteria.
II. Theory of welfare comparisons

Welfare comparisons are usually based on observation of income distributions with different averages.

Two different approaches are possible

1/ The Cardinal Criterion
   Indicator such as: Gini coefficient, Variance, etc.

2/ The Ordinal Criterion
   Comparing Generalized Lorenz Curves (LG)
   One income distribution A is better than a distribution B if it is all points of A are above the points of B.
Example: **Generalized Lorenz Comparison**  
(Atkinson, Shorrocks)

Mean Income $\bar{Y}_A$ × Cumulative Densities $\bar{Y}_B$  
Income A is preferred to B  
Whatever the shape of the social welfare utility function  
Under the assumptions:  
- Equality in needs (homogenous Households)  
- Inequality aversion  

Interpretation: progressive transfers inter-households
And what if the population is made off heterogenous households?

Is there a difference in needs that dependents on observed household characteristics?

1) If **Cardinal** approach ➔ Define an **Equivalence Scale**

2) If **Ordinal** approach ➔ Define an **ordering for needs**

Sequential Dominance Criterion
(Atkinson and Bourguignon, 1987)

**Axioms Required:**
The social welfare utility increases in case of

1) A progressive transfer **intra-group** (riche couple->poor couple or rich single->poor single)

2) A progressive transfer **inter-groups** (from a single to a couple)
Should we consider inequalities inside the household?

1) **Cardinal Approach**: YES
Haddad and Kanbur (EJ 1991) and Lise and Seitz (WP 2007) both papers evaluate Gini indexes at the household and at the individual level (based on consumption data and or time alloc. data)

2) **Ordinal Approach**: ?
We propose a theoretical normative answer and an empirical test on french data

**Difficulty**
The HH is an informationnal screen (or black box)
A lot of consumptions are joint
Should we consider inequalities inside the household?

Answering to this question using theoretical normative tools is equivalent to answer the following question:

**Does a diminution in inter households inequality also lead to a reduction of intra household inequalities?**

If YES ➔ It is worthless to try to focus on inter-individual inequalities for ordinal comparisons
If NO ➔ One need to control for intra-household Inequalities to implement meaningful ordinal comparisons
Assumption

We define the individualized income \( y \) of a poor individual \( p \) living in a household \( i \):

\[
y_{ip} = \alpha g(Y_i) + f_p(Y_i^*)
\]

Private expenditures of the couple \( \alpha \in \left[ \frac{1}{2}, 1 \right] \)

Public expenditures of the poor individual

Theoretical Result

Given a population of couples or single-living people

If \( g \) and \( f_p \) are concaves

Then a Sequential Lorenz comparison is preserved when we go from an income distribution at the household level to the individual level

\[ \text{Intuition?...} \]
How to define individual incomes?
What are the links between our approach and a structural analysis?

• In general:

\[ y_{ip} = h(f_g, f_p, Y_i) \]
\[ y_{ir} = h(f_g, f_r, Y_i) \]

• We assume

\[ y_p = f_g (Y) + f_p (y^*) \]
\[ y_p = f_g (Y) + f_p (y^*) \]

• Idea: flexibility of individual preferences
An example

• 2 goods: a Hicksian good $z$ (price 1) and a public good $g$ (price $p$)

• A couple chooses the amount of public good $g_0$ in an efficient way, that is respecting Lindhal conditions.

• At the same time, the private consumption of each individual is decided. Here we focus on one individual, which receives $z_0$ for private consumption.
The “individual equivalent” income

$$E(p, U(G_0, z_0))$$
The “individual income” – case $\alpha=1$

\[ pG_0 + z_0 \]

\[ E(p, U(G0, z0)) \]

\[ U(G_0, z_0) \]
\[ pG_0 + z_0 = \text{Max} \left( E(p, U'(G_0, z_0)) \right), \text{for any } U' \text{ quasi-concave} \]
Assumption

We define the individualized income \((y)\) of a poor individual \((p)\) living in a household \((i)\):

\[
y_{ip} = \alpha g(Y_i) + f_p(Y_i^{*})
\]

Private expenditures of the couple \(\alpha \in \left[\frac{1}{2}, 1\right]\)

Public expenditures

Private expenditures

Of the poor individual

Theoretical Result

Given a population of couples or single-living people

If \(g\) and \(f_p\) are concaves

Then a Sequential Lorenz comparison is preserved when we go from an income distribution at the household level to the individual level

................. Intuition?...>
Effect of a progressive transfer between HH on inequality within HH

- If the functions \( g \) and \( f_p \) are linear
  The shares of public and private consumptions do not vary with income; there is no effect on the share of individualized income

- If \( g \) is concave and \( f_p \) is linear
  Poor HH tend to spend a higher part of their income in public good than rich HH, this will lead to lower inequalities within the HH for poor HH then for rich ones

- If \( g \) is linear and \( f_p \) is concave
  Poor HH tend to spend a higher share of private expenditures in favour of the poor individual within the HH (than rich HH), this tends to reduce intra-household inequalities
III. Empirics

The concavity test requires to use non-parametric methods. WHY?
Because parametric specifications of the utility functions lead to parametric restrictions on the sharing rule (e.g. CARA Utility functions $\Rightarrow$ linear sharing rule)
(see Peluso and Trannoy, 2004)

For the «public sharing» function $\Rightarrow$ no real difficulty we implement various test based on various definitions and controls for public expenditures.
For the «private sharing» function $\Rightarrow$ observation problem for individual private expenditures
2 Ethical rules

**NEEDS:**
No control

\[ G_i = g(Y_i) + \varepsilon_i \]

Public good Expenditures \[
\]
Total HH Expenditures

**MERITS:**
Control

\[ W = \log \left( 1 + \frac{\min(w_f, w_m)}{\max(w_f, w_m)} \right) \]

\[ G_i = g(Y_i) + \gamma W_i + \varepsilon_i \]
Endogeneity Control

\[ G_i = g(Y_i) + \varepsilon_i \]

with

Assumption:

\[ \varepsilon_i = \rho v_i + u_i \]

with \( E(u_i / Y_i) = 0 \)

and \( Y_i = \Xi_i' \xi_i + v_i \)

Estimate expectancy of \( G \) given \( Y \) (i), evaluate \( v \) by ols, estimate expect of \( v \) given \( Y \) (ii)

Ols residuals (i) on residuals (ii) -> correction term \( \rho \)
Method in a few words

1) Non-parametric observation of the relationship between expenditures of an assignable good (clothes) and total expenditures at the individual level
2) Assumption of identical income effects across family status
3) Prediction of individualized incomes for men and women living in a couple by inverting the relation observed for singles
4) Simulation of a cloud of point using the residual at the HH level
Predicting the «private sharing function»

Clothes expenditures for single living women

\[ C_f = c_f(Y_f^*) + X_f \beta_f + \varepsilon_f, \quad E(\varepsilon_f / Y_f^*) \neq 0 \]

Specificities

The approach is non-parametric (kernel smoothing)
The estimation is monotonicity-constrained
Demographic controls \((-\rightarrow\) parametric)\)
Endogeneity control for HH private expenditures \((-\rightarrow\) parametric)\)
Same estimation for single living men
Identical income effects - identifying assumption

They use the same kind of assumption in different contexts
**Parametric, Linear sharing rule,**
Demographic controls are quite numerous and allow to take into account difference in preferences across family status

**Here, the approach in non-parametric, the sharing rule can be non-linear**
As a counterpart, controls for difference in preferences between individuals living single or in-couple are weak.
**Controls: city size, wage differences**
To avoid support pbms, we use the smoothed expenditure function rather than the observed clothe expenditures.
Simulation of a cloud of point

from the residual at the HH level

The same method is applied for men. Normally, the sum of predicted expenditures of females and males within the couple should be equal to observed expenditures at the HH level:

\[ Y_{cm}^* + Y_{cf}^* = Y^* \]

Prediction errors at the HH level are used to impute prediction errors at the individual level in order to simulate individual expenditures. The simulated share of the poor individual within the HH is then deduced by using the following relation:

\[ Min\{\tilde{Y}_{cm}, \tilde{Y}_{cf}\} \]

where \( \tilde{Y}_{cf} \) is the simulated value of private expenditures for females living in a couple.
Concavity Test

Abrevaya and Jiang: principle

The test statistic is built at a local level, by counting the number of combinations of triplets which satisfy Jensen inequality.

Two ethical rules are used

Approach « Needs »: without any control variable
Approach « Merits »: in this one income differences are controlled

Three possible definitions of public expenditures

Déf1: minimum: Accommodation (imputed rents), water, electricity.
Déf2: Intermédiaire: includes also furnitures.
Déf3: Extensive definition: includes also cars expenditures.
### Variables

<table>
<thead>
<tr>
<th></th>
<th>All Couples</th>
<th>Couples consuming clothes and aged 65 or less</th>
<th>Single women consuming clothes and aged 65 or less</th>
<th>Single men consuming clothes and aged 65 or less</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household before tax income (€/year)</strong></td>
<td>29873.85 (19950.89)</td>
<td>34570.40 (21792.89)</td>
<td>16445.69 (9919.13)</td>
<td>18681.39 (13287.72)</td>
</tr>
<tr>
<td><strong>Female’s individual income (€/year)</strong></td>
<td>8661.79 (8308.92)</td>
<td>11005.14 (9071.78)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Male’s individual income (€/year)</strong></td>
<td>17989.39 (12967.32)</td>
<td>19946.34 (16008.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Household’s total expenditures</strong></td>
<td>27353.82 (14281.75)</td>
<td>31758.95 (15487.12)</td>
<td>17549.69 (9919.13)</td>
<td>17728.17 (8487.49)</td>
</tr>
<tr>
<td><strong>Public 1: Housing, water, electricity</strong></td>
<td>7140.68 (2717.86)</td>
<td>7331.53 (2745.38)</td>
<td>5902.26 (2441.50)</td>
<td>5388.97 (2342.36)</td>
</tr>
<tr>
<td><strong>Public 2: Public1 + furniture, HH services</strong></td>
<td>9297.91 (4881.20)</td>
<td>9859.14 (5084.55)</td>
<td>7021.92 (3149.26)</td>
<td>6272.23 (2924.33)</td>
</tr>
<tr>
<td><strong>Public 3: Public2 + Car-related expenditures</strong></td>
<td>13668.72 (8310.27)</td>
<td>15879.38 (8723.92)</td>
<td>9028.23 (5404.64)</td>
<td>8918.23 (4939.84)</td>
</tr>
<tr>
<td><strong>Women’s clothes</strong></td>
<td>435.59 (1559.80)</td>
<td>804.56 (799.11)</td>
<td>855.95 (931.50)</td>
<td></td>
</tr>
<tr>
<td><strong>Men’s clothes</strong></td>
<td>536.31 (703.39)</td>
<td>783.50 (907.00)</td>
<td>855.27 (1151.92)</td>
<td></td>
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<tr>
<td><strong>Unassignable clothes</strong></td>
<td>370.41 (683.99)</td>
<td>650.88 (2039.35)</td>
<td>228.77 (540.34)</td>
<td>114.60 (570.19)</td>
</tr>
<tr>
<td><strong>Age of household’s head</strong></td>
<td>58.40 (683.99)</td>
<td>45.70 (2039.35)</td>
<td>42.04 (540.34)</td>
<td>39.31 (12.21)</td>
</tr>
<tr>
<td><strong>Education level (1 to 5)</strong></td>
<td>2.84 (1.31)</td>
<td>3.20 (1.37)</td>
<td>3.44 (1.48)</td>
<td>3.24 (1.56)</td>
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<tr>
<td><strong>Home Ownership</strong></td>
<td>0.70 (0.46)</td>
<td>0.58 (0.49)</td>
<td>0.36 (0.48)</td>
<td>0.32 (0.12)</td>
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<tr>
<td><strong>Big city</strong></td>
<td>0.11 (0.31)</td>
<td>0.13 (0.33)</td>
<td>0.17 (0.38)</td>
<td>0.17 (0.38)</td>
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<td><strong>Medium city</strong></td>
<td>0.62 (0.49)</td>
<td>0.64 (0.48)</td>
<td>0.70 (0.46)</td>
<td>0.69 (0.46)</td>
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<tr>
<td><strong>Countryside</strong></td>
<td>0.27 (0.44)</td>
<td>0.23 (0.42)</td>
<td>0.12 (0.33)</td>
<td>0.13 (0.34)</td>
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<tr>
<td><strong>Share of Public 1 (% of household expenditures)</strong></td>
<td>29.54 (11.33)</td>
<td>25.53 (9.42)</td>
<td>36.56 (13.12)</td>
<td>34.60 (13.57)</td>
</tr>
<tr>
<td><strong>Share of Public 2 (% of household expenditures)</strong></td>
<td>36.56 (12.13)</td>
<td>32.86 (11.02)</td>
<td>42.47 (13.33)</td>
<td>39.55 (14.26)</td>
</tr>
<tr>
<td><strong>Share of Public 3 (% of household expenditures)</strong></td>
<td>50.22 (12.99)</td>
<td>48.71 (12.96)</td>
<td>52.01 (13.14)</td>
<td>52.73 (14.28)</td>
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<tr>
<td><strong>Assignable clothes</strong></td>
<td>4.02 (4.84)</td>
<td>6.75 (5.38)</td>
<td>6.24 (5.44)</td>
<td>5.40 (5.16)</td>
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</tbody>
</table>
Results: public expenditures (g)

**LINEAR**
Whatever the Definition of public
And whatever the Ethical rule used
### Parameter Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Std err.</th>
<th>T-stat</th>
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<tbody>
<tr>
<td>a</td>
<td>0.004368</td>
<td>-10.23464</td>
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<tr>
<td>b</td>
<td>0.007016</td>
<td>-6.641392</td>
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<td>c</td>
<td>0.008481</td>
<td>7.683934</td>
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### Parameter Table 2

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<td>a</td>
<td>429.1858</td>
<td>-5.90905</td>
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<tr>
<td>b</td>
<td>1511.035</td>
<td>-2.09835</td>
</tr>
<tr>
<td>c</td>
<td>836.4001</td>
<td>2.10568</td>
</tr>
</tbody>
</table>

**Endogeneity Correction Coefficient (ρ)**

**Effect of Inequality in individual incomes (γ)**
## Public expenditures concavity test

<table>
<thead>
<tr>
<th>Public</th>
<th>Needs</th>
<th>Merit</th>
<th>Public 2</th>
<th>Needs</th>
<th>Merit</th>
<th>Public 3</th>
<th>Needs</th>
<th>Merit</th>
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<tr>
<td></td>
<td></td>
<td>P-value</td>
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<td>P-value</td>
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<td>P-value</td>
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<td></td>
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<td>(concavity)</td>
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<td></td>
<td>(concavity)</td>
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<td>(concavity)</td>
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</tr>
<tr>
<td>Public 1</td>
<td>M-stat</td>
<td>S-stat</td>
<td>P-value</td>
<td>M-stat</td>
<td>S-stat</td>
<td>P-value</td>
<td>M-stat</td>
<td>S-stat</td>
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<tr>
<td>[0-70000+]</td>
<td>2.0488</td>
<td>2.1946</td>
<td>0.3789</td>
<td>1.9838</td>
<td>2.4984</td>
<td>0.4287</td>
<td>0.2676</td>
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<tr>
<td>[15000-42000]</td>
<td>1.8835</td>
<td>1.8835</td>
<td>0.2998</td>
<td>1.7799</td>
<td>1.7799</td>
<td>0.3606</td>
<td>0.5911</td>
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<tr>
<td>Public 2</td>
<td>M-stat</td>
<td>S-stat</td>
<td>P-value</td>
<td>M-stat</td>
<td>S-stat</td>
<td>P-value</td>
<td></td>
<td></td>
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<tr>
<td>[0-70000+]</td>
<td>1.5608</td>
<td>2.4540</td>
<td>0.7986</td>
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<td>1.9939</td>
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<td>[15000-42000]</td>
<td>1.5608</td>
<td>1.5608</td>
<td>0.5145</td>
<td>1.9853</td>
<td>1.9853</td>
<td>0.2481</td>
<td>0.4347</td>
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<tr>
<td>Public 3</td>
<td>M-stat</td>
<td>S-stat</td>
<td>P-value</td>
<td>M-stat</td>
<td>S-stat</td>
<td>P-value</td>
<td></td>
<td></td>
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<tr>
<td>[0-70000+]</td>
<td>2.0819</td>
<td>2.0819</td>
<td>0.3551</td>
<td>1.5141</td>
<td>1.9714</td>
<td>0.8346</td>
<td>0.6849</td>
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<tr>
<td>[15000-42000]</td>
<td>1.5760</td>
<td>1.5760</td>
<td>0.5028</td>
<td>1.3080</td>
<td>1.5337</td>
<td>0.7154</td>
<td>0.7842</td>
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</tbody>
</table>
c) Single females, monotonic
Engel curves partial effects

<table>
<thead>
<tr>
<th>Endogeneity correction term (p)</th>
<th>Parameter</th>
<th>Std Error</th>
<th>T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Females (Figures 3a, 3c)</td>
<td>-0.000070</td>
<td>0.010639</td>
<td>-0.00658</td>
</tr>
<tr>
<td>Single males (Figures 3b, 3d)</td>
<td>-0.004880</td>
<td>0.011590</td>
<td>-0.42102</td>
</tr>
<tr>
<td>Without controlling for individual incomes</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Couples Females (Figure 4a)</td>
<td>-0.018614</td>
<td>0.003717</td>
<td>-5.00797</td>
</tr>
<tr>
<td>Couples Males (Figure 4b)</td>
<td>-0.017891</td>
<td>0.004159</td>
<td>-4.30190</td>
</tr>
<tr>
<td>Controlling for individual incomes</td>
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</tr>
<tr>
<td>Couples Females (Figure 4c)</td>
<td>-0.019809</td>
<td>0.003844</td>
<td>-5.15374</td>
</tr>
<tr>
<td>Couples Males (Figure 4d)</td>
<td>-0.018695</td>
<td>0.004306</td>
<td>-4.34148</td>
</tr>
<tr>
<td><strong>Big city</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Females (Figures 3a, 3c)</td>
<td>352.6543</td>
<td>90.52687</td>
<td>3.89558</td>
</tr>
<tr>
<td>Single males (Figures 3b, 3d)</td>
<td>401.5580</td>
<td>120.1803</td>
<td>3.34130</td>
</tr>
<tr>
<td>Without controlling for individual incomes</td>
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</tr>
<tr>
<td>Couples Females (Figure 3e)</td>
<td>248.9634</td>
<td>73.56489</td>
<td>3.38427</td>
</tr>
<tr>
<td>Couples Males (Figure )</td>
<td>375.3277</td>
<td>82.31385</td>
<td>4.55971</td>
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<tr>
<td>Controlling for individual incomes</td>
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<tr>
<td>Couples Females (Figure 4c)</td>
<td>249.9099</td>
<td>73.65475</td>
<td>3.39299</td>
</tr>
<tr>
<td>Couples Males (Figure 4d)</td>
<td>373.9847</td>
<td>82.51472</td>
<td>4.53234</td>
</tr>
<tr>
<td><strong>Share of individual income in HH income</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Couples Females (Figure 4c)</td>
<td>-24.54546</td>
<td>49.61205</td>
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<tr>
<td>Couples Males (Figure 4d)</td>
<td>-12.83123</td>
<td>55.57991</td>
<td>-0.23086</td>
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</table>
Prediction of female’s share

(A) Female's share

Household Private Expenditures

Female's private expenditures

Egalitarian Sharing
Prediction of Private expenditures of individuals living in a couple (def2)

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>stderr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Female Private Expenditures (^{(A)})</td>
<td>9179.60</td>
<td>4882.58</td>
</tr>
<tr>
<td>Predicted Male Private Expenditures (^{(B)})</td>
<td>9544.51</td>
<td>4722.69</td>
</tr>
<tr>
<td>Sum of Predicted Private Expenditures</td>
<td>18724.1</td>
<td>9510.67</td>
</tr>
<tr>
<td>HH Private Expenditures (observed)</td>
<td>20073.0</td>
<td>8114.20</td>
</tr>
<tr>
<td>Prediction Errors (^{(C)})</td>
<td>1348.91</td>
<td>2180.42</td>
</tr>
<tr>
<td>Private Expenditures of the dominated (^{(D)})</td>
<td>8833.93</td>
<td>4612.56</td>
</tr>
<tr>
<td>Number of observations</td>
<td>785</td>
<td></td>
</tr>
</tbody>
</table>

A) Inversion of Female’s Engel curve of clothes expenditures.
B) Inversion of Male’s Engel curve of clothes expenditures.
(C) At the household level, prediction errors are the difference between observed private expenditures and predicted private expenditures.
(D) At the individual level, private expenditures of the dominated are given by the minimum of predicted private expenditures for the female \((A)\) and for the male \((B)\).
Private expenditures of the « poor » individual in the HH \((fp)\)

**b/ Definition 2**

LINEAR

Whatever the Definition of Public and Ethical rule
Parameter | Std err. | T-stat
---|---|---
a | -51.87462 | 76.20604 | -0.680715
b | 107.0113 | 59.00481 | 1.813603
c | -19.73361 | 41.47523 | -0.475793

Effect of Inequality in individual incomes (γ)
## Private sharing concavity test

<table>
<thead>
<tr>
<th>Definition 1</th>
<th>Needs</th>
<th>Merit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-stat</td>
<td>S-stat</td>
</tr>
<tr>
<td>Whole sample</td>
<td>1.9494</td>
<td>1.9494</td>
</tr>
<tr>
<td>Between P10 and P90</td>
<td>1.9494</td>
<td>1.9494</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definition 2</th>
<th>Needs</th>
<th>Merit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-stat</td>
<td>S-stat</td>
</tr>
<tr>
<td>Whole sample</td>
<td>2.2499</td>
<td>2.2499</td>
</tr>
<tr>
<td>Between P10 and P90</td>
<td>2.2499</td>
<td>2.2499</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Definition 3</th>
<th>Needs</th>
<th>Merit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-stat</td>
<td>S-stat</td>
</tr>
<tr>
<td>Whole sample</td>
<td>1.8520</td>
<td>2.1709</td>
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<tr>
<td>Between P10 and P90</td>
<td>1.5495</td>
<td>1.8564</td>
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</tbody>
</table>
CONCLUSION

Is intra-household power more balanced in poor households?

- No. There is no apparent link between HH income and intra-household inequalities
- So, it appears useless to observe individualized incomes to realized comparisons of income distributions in France (ordinal criterion only)).

More surprising maybe:

- Wage inequalities between spouses do not have a significant effect on expenditures of the assignable good
- Real need to multiply these kind of analysis in order to check the robustness of such a result
Another related work:
Do couples really cooperate?
Experimental evidence

100 Couples from Toulouse recruited via articles in the newspapers

5 different games:

1) Prisonner dilemma
2) Risk aversion (Holt and Laury)
3) Bargaining game
4) Distribution choice
5) Joint lottery choice