The "Passive Drinking effect"

Intra-Household Distribution of Resources and Alcohol Consumption

Luca Piccoli
Introduction

- When analyzing alcohol consumption, household level analysis have almost no sense.

- Processes that leads toward addiction and its negative consequence are personal.

- Often people involved in the negative effects alcohol abuse are not the consumers, but other members of its household.

- These household-level negative effects should be taken into account by public decisors.
Introduction (2)

- Among the many possible negative effects of alcohol abuse (such as violence, diseases, degrade, psychological difficulties, etc) there is also an economic measurable negative effect.

- This economic effect is the impact of strong alcohol consumption on the allocation of resources within the household.

- Peluso and Trannoy (2006) show that this question is relevant for income distribution and well-being analysis also at the aggregate level.
Introduction (3)

- The natural framework for our analysis is the Collective theory by Chiappori (1988, 1992 and following).

- Thanks to these models we can recover some information of household distribution of resources and bargaining power even if data is collected at the household level.

- The hypothesis that we are willing to test is that strong alcohol consumption may involve a perturbation of the “natural” equilibrium.
Collective Consumption

- Differently from most of literature on collective model, for the identification of the sharing rule we rely only on expenditure information.

- Identification is provided by the definition of 2 kind of goods

  - Ordinary goods \((o)\): private consumption is not observed and cannot be deduced.

  - Exclusive or assignable goods \((e)\): private consumption is observed (exclusive) or can be recovered (assignable).
Collective Consumption (2)

Consider a household composed just by the husband and the wife.

The available information set is

\[ \{e^m, e^f, o; y; (p_m, p_f; p)\} \]

Where

- \( e^m, e^f \) are exclusive goods for husband and wife
- \( o \) is a set of ordinary goods
- \( y \) is total household expenditure (income)
- \( p_m, p_f \) are prices of the exclusive goods
- \( p \) is the vector of prices for the ordinary goods
Collective Consumption (3)

- The maximization problem of each household member is

\[
\max_{e^j, o} U^j(e^j, o)
\]

\[
s.t. \quad p_j e^j + o \leq \phi^j(p_m, p_f, y)
\]

\[
e^j \geq 0, o > 0, j = m, f
\]

- Where \(o\) is composed by just one composite good, which price have been normalized to 1 and \(\phi^j\) is the sharing rule governing intra-household allocation of resources, or the \(j\)-th member’s assigned income.
CQAIDS

- For the estimation of the sharing rule we set-up a Collective Quadratic Almost Ideal Demand System, as

\[ w_i = \alpha_i + t_i(d) + \sum_j \gamma_{ji} \ln p_j^* + \beta_i^m \left( \ln y_i^m - \ln a(p^*) \right) + \frac{\lambda_i^m}{\beta_m(p^*)} \left( \ln y_i^m - \ln a(p^*) \right)^2 \]

\[ + \beta_i^f \left( \ln y_i^f - \ln a(p^*) \right) + \frac{\lambda_i^f}{\beta^f(p^*)} \left( \ln y_i^f - \ln a(p^*) \right)^2. \]

- where

\[ \ln y_i^m = \ln \phi_i^m(p_m, p_f; y) - \sum_i t_i(d) \ln p^*, \quad \ln y_i^f = \ln \phi_i^f(p_m, p_f; y) - \sum_i t_i(d) \ln p^*. \]

\[ \phi_i^m(p_m, p_f; y; s) = m_i^m(p_m, p_f; s) y_i^m, \]

\[ \ln \phi_i^m(p_m, p_f; y; s) = \ln y_i^m + \ln m_i^m(p_m, p_f; s). \]

\[ \ln a(p^*) = \alpha_0 + \sum_i \alpha_i \ln p_i^* + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln p_i^* \ln p_j^* \]

\[ \ln b(p^*) = \sum_i \beta_i \ln p_i^*, \text{ or } b(p^*) = \prod_i (p_i^*)^{\beta_i}. \]
CQAIDS (2)

- Exclusive goods allows us to identify the sharing rule since we can use them to recover to member’s assigned income.

\[ \ln y^j = w_j \ln y \]

- \( w_j \) can be determined by means of a weighted sum of expenditures on exclusive goods and ordinary goods

\[ w_j = \frac{1}{y} \left( e^j + \frac{1}{2} (y - e^m - e^f) \right) \]
Since by construction it must hold that
\[ \ln \phi^m(p_m, p_f; y; s) + \ln \phi^f(p_m, p_f; y; s) = \ln y \]
then
\[ \ln m^m(p_m, p_f; s) = -\ln m^f(p_m, p_f; s). \]
and we can write
\[ \ln y^{m*} = w_m \ln y + \ln m(\cdot) - \sum_i t_i(d) \ln p^* \]
\[ \ln y^{f*} = w_f \ln y - \ln m(\cdot) - \sum_i t_i(d) \ln p^*. \]
which provide identification of the sharing rule as if it were Barten-like income scaling.
Empirical strategy

- A rank test, together with Engel curve analysis suggests a rank 3 demand system, so we use CQAIDS.

- This is not an obvious choice since controlling for demographic variables may reduce the rank to 2.

- Also estimation of a quadratic demand system is much more demanding in terms of computation time and numerical performances.

- Non-linearity adds particular issues in estimating the $b(p)$ function, but on the other side helps identifying the sharing rule parameters.
Empirical strategy (2)

- We use ISTAT’s 2004 household expenditures survey, which do not record prices or unit values.

- So we use a procedure to estimate unit values originally proposed by Lewbel.

- The heavy zero expenditures observed in alcohol and edu-rec shares suggests us to correct them by means of Shonkwiler-Yen estimator.

- The technique uses a first stage probit estimates to construct estimated pdf and cdf which are used in the second stage.
Empirical strategy (3)

- Some problems remain unresolved.

- The issue of zero expenditure remains for the determinants of the sharing rule that do not enter the demand equation.

- To overcome this problem we are trying to implement a correction technique based on imputed shares, but we are in early stages of development.

- The other issue regards endogeneity of the sharing rule, which, especially for goods like alcohol, may depend on consumption shares. We will follow Basu (‘99, ‘02, ‘06).
Working hypothesis

- To give as much responses as possible to the question of whether alcohol consumption influences the distribution of resources and bargaining power we perform two separate estimates.

- We consider only household composed by couples with small children (0-14 y.o.)

- And assume that the bargaining power can be represented by the sharing rule between husband and wife.

- The distribution of resources is represented by the sharing rule between adults and children.
Working hypothesis (2)

- At the moment, we provide 2 separate estimates of the sharing rule, since identification of a “three sided” sharing rule has not been proven yet.

- However we plan to estimate this “three sided” sharing rule, which we believe is identified provided that at least an assignable good is present for each member.

- Estimation itself may be feasible if at least one (but possibly even all) distribution factor is different in the two processes.
Results

- Parameters of the demand functions are rather similar for the two estimates and are consistent with consumption theory, showing negative own price uncompensated elasticities.

- Demographic variables show a tendency to reveal small parameters values.

- In general however they are significant, with the exception of alcohol equation demographics.

- Distribution factors’ parameters reveals bigger the demos ones, especially in the m&f case.
Results (2)

- Part of the effect of alcohol consumption is caught by the “habits” variable, which is defined over smoking and drinking behavior.

- This variable strongly influence m&f sharing rule in favor of the husband in case of strong habits.

- The same parameter in the a&c sharing rule is not significant.

- However, to capture the effect of alcohol and other variables we have drawn some non-parametric regressions.
Sharing Rule m&f

Figure 2

Sharing Rule Strong Drinkers

- Reduced Sample Scatter Plot
- Strong Drinkers
- Anonymous

Figure 3

Sharing Rule Small Children

- Reduced Sample Scatter Plot
- Children < 5 years old
- No children < 5 years old

Sharing Rule Wife Working

- Reduced Sample Scatter Plot
- Wife working
- Wife not working

Sharing Rule by Schooling

- Reduced Sample Scatter Plot
- High school or more
- Less educated
Sharing rule a&c

Figure 6

Figure 7

Figure 8

Figure 9
Conclusions

- These results show that bargaining power and the distribution of resources within the household are influenced by alcohol consumption and we expect similar results for tobacco (which we cannot analyze because we cannot recover its unit value).

- Nevertheless, these results should be taken with some care, since they are preliminary.

- Similar estimates conducted using a Collective AIDS show results in line with what exposed, but with different magnitudes and different estimation issues.
Conclusions (2)

- One possible solution to avoid some of the difficulties of estimating a QAIDS (also for unitary models!) could be equation by equation estimation and parameters restrictions to be recovered by MDE.

- Other further developments are the already cited zero-correction technique, the “three sided” sharing rule and the endogeneity of the sharing rule.

- Finally the analysis may include a collective optimal taxation analysis (Blacklow and Ray 2003)
Our project

This work is part of the project

*Dynamic Analysis of Addiction: Intra-Household Resources allocation, Social Welfare and Public Health*

If anyone is interested, please visit

dse.univr.it/addiction