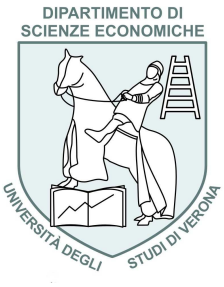

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The Passive Drinking Effect: A Collective Demand Application

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Abstract

This paper investigates whether consumption of alcoholic beverages has a passive effect on the distribution of resources among household members. The term *passive drinking* evokes the negative impact that the drinking behavior of a household member may have on other household members' well-being. To investigate this issue we rely on the collective framework and estimate a structural collective demand system using Italian micro data. The results show that a high level of alcohol consumption of one household member significantly affects the allocation of household resources and may have quasi-external effects. Public costs that are transferred to other household members should be taken into account when designing social policies.

JEL Classification Codes: C31, C34, C51, D12, D13.
Keywords: collective model, demand system, sharing rule, alcohol consumption, intra-household resources distribution, passive drinking.

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1 Introduction

This paper addresses the issue of whether a high level of individual alcohol consumption leads to negative consequences for other family members' well-being. The analogy with the harming effect produced by smoking behavior is direct, but the transmission mechanism of the passive effect of alcohol consumption is more complex. It may be caused both by the behavior of the drinker when altered by excessive alcohol consumption, such as violence and drink-driving, and by the fact that the excessive private consumption of a potentially addictive good increases the probability of loosing a job and, in general, reduces the amount of resources available for the other family components. Considering that in consumption surveys the effects of aggressive or irresponsible behavior on households' welfare are usually not observed, we capture the "passive drinking" effect by estimating how the presence of heavy-drinking family members affect intra-household resource allocations and the well-being of other members of the household. To explore this issue, we model household behavior using the collective approach (Chiappori, 1992) that allows us both to recover the rule governing the intra-household allocation of resources and to measure well-being at the individual level.

Often, the consumption analysis of addictive substances is conducted at the individual level using inter-temporal models of rational addiction. The individual chooses to drink because the actualized disutility of not drinking is higher than the disutility of drinking. The process leading to addiction is strictly private and depends on the quantities consumed in the past and the personal tolerance to addictive substances (Becker and Murphy, 1988; Shi and Epstein, 1993; Gruber and Köszegi, 2001). For persons who enjoy moderate drinking without suffering any side effect, alcohol consumption can be reasonably considered a private good. When the intake of alcoholic beverages is heavy, consumption becomes a private bad for its undesirable potential second-hand effects and a public bad when tangible quasi-external effects on other household members are involved.

In our study, the social toll of alcohol is limited to the household environment and measures the harm, in terms of welfare reduction, suffered by a family member because of another member's drinking. The presence of a passive worsening of the level of a person's well-being provoked by another family member is however a matter of public concern both at the family and society level. Evoking John Stuart Mill's (1857) classical argument against the limitations to human liberty, we recognize that the individual act of having a drink may not necessarily cause a crime, but we also intend to verify whether having more than a drink can cause harm to others, thus justifying the public interference with the expression of personal liberties by another family member or an external authority.

In the context of our empirical application based on micro consumption data, we do not know whether the heavy drinking behavior of a member of a specific household is causing harm in the sense of a tangible external cost to society or a quasi-external cost to other household members (Sloan et al., 2006; Suhrcke et al., 2006). Harm is intended here as the loss of individual welfare due to an unfair resource allocation because of heavy drinking. That is, the allocation is assumed to be Pareto efficient, but is not perceived as equitable (Varian, 1974; Pazner and Schmeidler, 1974, 1978). The consumption of alcoholic drinks by one partner does not usually generates envy in the other partner's feelings. Not necessarily the other partner prefers what the other is enjoying. Rather, one member of the couple may reasonably claim the right to allocate differently the expenditure on alcohol either to oneself or on goods different from alcohol. This claim may be motivated both by egoistic reasons and by a feeling of caring for the partner's health. If the claim on the misused family resources is reiterated and goes unheard, then the unfair allocation

may become a source of hostility within the family rather than simply generating a form of "benign envy" (Rawls, 1971). The concept of fairness is appealing, because it does not require interpersonal comparisons of utility. Examples of misused family resources can be found in Seccombe (1995) who reports that, at the beginning of the Industrial Revolution in England, "egoistic" husbands used to "drink their salary" at the pub on Friday evening leaving very little for the wife and children, and in Borelli and Perali (2003) for households of Djibouti, where husbands spend much of their wage on qat, a legal drug, depriving other members of basic needs and opportunities. In these cases, consumption of alcohol and qat is clearly an adult bad and with a well-identified gender dimension.

We estimate the collateral effects of alcohol consumption on the welfare levels of each member of Italian couples using the collective approach introduced by Chiappori (1988, 1992), which extends the unitary framework by explicitly modeling the household as a collection of individuals. Based on the assumption of Pareto-efficient outcomes, the collective theory represents each member of the household with its own preferences and explains how resources are distributed within the household according to a sharing rule. Chiappori (1988, 1992) shows that for the identification of the sharing rule is sufficient to observe the private consumption of at least one assignable good, which is analogous to the observation of some consumption of a family member living alone.

In order to recover the sharing rule, we adopt an estimation strategy similar to the one proposed by Browning et al. (1994), in which the estimation of a structural collective consumption model is performed. Differently from these authors, we estimate a complete collective demand system, rather than a subset of equations, and exploit the available information on assignable goods adopting novel identifying conditions introduced by Menon and Perali (2011). The identification strategy roots on the observation of uneven consumption of assignable goods across family members that, if income is fixed, must be associated with a redistributive transfer of resources within the household. For example, as shown in Table 1, in families where one partner is a heavy drinker, the other member consumes less of other goods *coeteris paribus*. As it is reasonable to expect, heavy alcohol consumption reduces the expenditure on other goods such as clothing, especially clothing for women considering that in heavy drinkers households the main alcohol consumer is the man, and recreation for all income classes. Interestingly, the rich family with heavy drinkers spends on food much more as compared to the rich family with no drinkers, while it is true the opposite in terms of recreation expenditures. Thus, there is support for measuring the passive drinking effect as the modification induced on the sharing rule by a high level of alcohol consumption with respect to households where alcohol is not or is only moderately consumed.

The analysis of the results adds two novel dimensions to the analysis of consumption associated with the estimation of both individual income effects and distributional impacts within the household. To our knowledge, in the literature there are no previous empirical applications studying the link between alcohol consumption and the intra-household distribution of resources. Though we cannot compare our results with previous work, our findings are meaningful. In our Italian sample, for about 85 percent of the households with a large consumption of alcoholic beverages the heavy drinker is the man. According to our estimates, alcohol consumption significantly affects the intra-household distribution of resources which is biased towards the husband, especially for low income households. Considering that from our estimation alcoholic beverages have a non-negligible own-price elasticity, a policy intervention increasing taxes on alcohol consumption may have the benefit of both significantly reducing consumption, especially for men, and of increasing the well-being of women in heavy drinking families. Policy interventions aim-

ing at increasing the bargaining power of the wife, exploiting the significantly larger alcohol income elasticity of men, may result effective as well in curbing male alcohol consumption and guaranteeing a more fair distribution of resources within the household.

The paper is organized as follows. Section 2 shows the collective model of consumption choices. In Section 3 we specify both the functional structure of the sharing rule and the collective demand system. In Section 4 we describe the data used in the empirical application and present the econometric method used to deal with observed corner solutions. The results are discussed in Section 5 that lends special emphasis to the income elasticities estimated at the individual level. In Section 6 we report conclusive remarks and novel policy considerations suggested by the collective approach.

2 Collective Consumption Theory

The proposed household model is based on the collective approach developed by Chiappori (1988, 1992) in order to estimate the rule governing the intra-household allocation of resources. The model is applied to verify if there is a passive drinking effect as captured by comparing how resources are allocated within families with different drinking habits.

Alcohol is assumed to be a private good consumed by the adult either male or female. In the long-run, alcohol consumption can be considered as a private bad for non moderate or addicted drinkers, in the sense that it imposes internal costs on the drinker that are not appropriately taken into account in everyday decisions to drink. In the short run, alcohol is a private good for the drinker but it may be considered a bad for other individuals in the household who care about the potentially harmful effects of heavy drinking. It is a public bad when drinking generates tangible externalities or quasi-externalities. Although it is not possible to observe whether there are tangible externalities, because not reported in the micro data, the passive drinking effect results from Pareto allocations that are welfare reducing because unfair.

We assume that the family decision process, conducted in a deterministic environment, leads to Pareto-efficient outcomes provided that individual utility functions are well-behaved and the budget sets are convex. These assumptions of the collective approach are common to all cooperative models and are necessary to implement the Second Fundamental Welfare Theorem leading to the decentralized decision program (Chiappori, 1992).

Market goods are assumed to be consumed privately by each household member. Consumption of private goods can be either assigned or non-assigned to a specific member of the household. Goods like food items are traditionally non-assignable because consumption surveys do not record individual consumption of food. On the other hand, clothing is a common example of private good whose consumption can be assigned to a specific member of the family. Interestingly, alcohol consumption is an assignable good if all household members can drink alcoholic beverages without restrictions and their individual consumption is observable. Alcohol is an exclusive good if only a member consumes it. In the context of our work, we observe the individual expenditure of clothing and alcohol.[1] For non-assignable goods, we assume that every household member has the opportunity to consume them in equal proportions.

Assumption 1 (*Equal Access*)**.** *Every member of the household has equal access to the consumption of non-assignable goods whose individual consumption is not observed.*

[1] In general, alcohol consumption can be assigned to the adult component of the family because it is plausible to assume that alcohol consumption of young children is negligible.

The implication of Assumption 1 is that in the empirical work of the paper expenditures of non-assignable goods will be shared equally between household members.[2] What is relevant is to observe some information about exclusive consumption, that is not equally consumed, from which it is possible to recover the rule governing how resources are shared within a Pareto efficient family.

In our set up, the household of interest is composed by two adults indexed as $k = 1, 2$. We assume that the couple purchases N non-assignable goods c_j^k for $j = 1, ..., N$ and n assignable goods q_i^k, among which alcohol, for $i = 1, ..., n$. For clarity of notation, we maintain that the index $k = 1, 2$ refers to household members, while j and i index goods. Further, superscript $k = 1, 2$ is associated with endogenous variables and subscript $k = 1, 2$ with exogenous variables. Each privately consumed good q_i^k can be assigned to a specific family member, while for the non-assignable goods we can observe only consumption at the household level so that $c_j = c_j^1 + c_j^2$. The associated vectors of market prices for assignable and non-assignable goods are $\mathbf{p}_{\mathbf{q}^k}$ and $\mathbf{p}_{\mathbf{c}}$, respectively. Note that market prices of non-assignable goods are not specific to each household member, but they are observed at the household level.[3] The set of demographic characteristics $\mathbf{d} = (\mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12})$ describes observable heterogeneity composed by the subset of characteristics specific to each individual k and the subset of household characteristics common to the family $\mathbf{d}_{12}$.

Caring Preferences The family is the natural place where bonding relations are developed and non-altruist behaviors, when each member would be indifferent to the others' problems, are not expected to be common. It is especially relevant to recognize the presence of caring in the case of alcohol consumption because a member of the household may perceive alcohol consumption of other members as a potential harm to them and to herself. Suppose that one member of the household is a heavy consumer of a non harmful good, such as beauty products. In this case, the "passive" effect takes place only through the household budget constraint and does not involve any feeling of caring from the other member.

In our analysis each family member has caring preferences in the sense that the level of utility of one member U^k depends also on the level of the sub-utility of the other member u^k whose arguments are the respective private goods, their own characteristics $\mathbf{d}_k$ and the household characteristics $\mathbf{d}_{12}$ affecting each individual preferences as follows

$$U^k\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) = W^k\left(u^1\left(\mathbf{c}^1, \mathbf{q}^1; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}\right), u^2\left(\mathbf{c}^2, \mathbf{q}^2; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}\right)\right) \quad (1)$$

for $k = 1, 2$, where U^k is a monotonically increasing function in both arguments aggregating the preferences of both members. The individual sub-utility functions u^k are assumed to be continuous, twice differentiable, quasi-concave in all their arguments and increasing in $\mathbf{c}^k$ and $\mathbf{q}^k$. It is relevant to note that the demographic specification of equation (1) implies that all members have full information about the demographic characteristics of each other and of household

[2]Menon and Perali (2011) show that this assumption does not affect the estimation of the rule governing the intra-household allocation of resources.

[3]We recognize that it would be possible to derive shadow prices at the individual level using, for example, a Barten (1964) scaling transformation. We do not do so here because our main source of identification is an income rather than a price effect. In order to recover the underlying structure of the collective model, that is the sharing rule function and the system of demand equations, we use the available information about the private consumption of clothing and alcohol. The skewed consumption of assignable goods induces an income redistribution effect within the couple. For example, at the same level of total expenditure, families with a male heavy drinker may spend less on female goods. Our empirical identification strategy intends to capture these income reallocation effects.

characteristics. In presence of caring, it is natural to assume that the demographic characteristics of each individual $\mathbf{d}_k$ are known by each household member and affecting the consumption decisions of both. Therefore, the sub-utility function u^k is non-separable in observable heterogeneity $\mathbf{d} = (\mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12})$. An implication of this assumption is that the underlying individual demands and income effects interact with the full set of demographic characteristics of the family. Interestingly, this form of caring may originate from a worry about the other member's detrimental consumption habits, such as drinking or smoking, or from an attention about the other member's tastes, for example, when we would like to buy a gift. In the case of egoistic preferences, it may be acceptable that individuals' utility is demographically separable (Deaton et al., 1989, Perali, 2003)

A possible representation of equation (1) (Browning et al., 2006, 2011; Lise and Seitz, 2011) assumes that U^k is additively separable in the individual sub-utilities as follows

$$\begin{aligned} U^1\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) &= u^1\left(\mathbf{c}^1, \mathbf{q}^1; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}\right) + \delta_1 u^2\left(\mathbf{c}^2, \mathbf{q}^2; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}\right), \quad (2) \\ U^2\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) &= u^2\left(\mathbf{c}^2, \mathbf{q}^2; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}\right) + \delta_2 u^1\left(\mathbf{c}^1, \mathbf{q}^1; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}\right), \quad (3) \end{aligned}$$

where the weight $0 < \delta_k < 1,\ \forall k = 1, 2$ represents how much a member of the household cares about the other member. The amount of caring for the other is assumed to be always lower than the amount of caring the members have for themselves.[4] If $\delta_k = 0$, then altruistic preferences collapse to the egoistic case. Alcohol consumption is assumed to be a private good with an increasing marginal effect on the consumer's own utility. However, the higher is the consumption of what is perceived as a "bad" by the other household member, the smaller is δ_k and, as a consequence, the smaller is the positive contribution of the utility level of the consumer of bads on the utility of the non consumer.

The household maximizes a caring welfare function U^H of the Bergsonian type specified as follows

$$\begin{aligned} U^H &= \mu U^1\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) + U^2\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) = \quad (4) \\ &= \mu\left(u^1\left(\mathbf{c}^1, \mathbf{q}^1; \mathbf{d}\right) + \delta_1 u^2\left(\mathbf{c}^2, \mathbf{q}^2; \mathbf{d}\right)\right) + \left(u^2\left(\mathbf{c}^2, \mathbf{q}^2; \mathbf{d}\right) + \delta_2 u^1\left(\mathbf{c}^1, \mathbf{q}^1; \mathbf{d}\right)\right), \end{aligned}$$

where μ is the weight describing how household welfare varies as the sub-utilities of member 1 and 2 vary accounting for the amount of caring felt by the other member. As an example, the more a person cares about the other's drinking habit, the smaller is δ_k. Simple manipulation shows that household preferences U^H can be rearranged so that

$$\begin{aligned} U^H &= \mu U^1\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) + U^2\left(\mathbf{c}^1, \mathbf{c}^2, \mathbf{q}^1, \mathbf{q}^2; \mathbf{d}\right) = \quad (5) \\ &= \tilde{\mu} u^1\left(\mathbf{c}^1, \mathbf{q}^1; \mathbf{d}\right) + u^2\left(\mathbf{c}^2, \mathbf{q}^2; \mathbf{d}\right), \end{aligned}$$

where the transformed Pareto weight $\tilde{\mu} = \frac{\mu + \delta_2}{1 + \mu\delta_1}$ subsumes the caring scaling parameter of both members. We will proceed our analysis in the sub-utilities space because our main interest is not the identification of the caring weight δ_k. Note that any allocation that is Pareto efficient for the caring preferences is also Pareto efficient for the egoistic ones, when $\delta_k = 0\ \forall k$ and $\tilde{\mu} = \mu$.

Chiappori (1992) has shown that, if household decisions are Pareto efficient, the maximization of the Bergsonian household welfare function with Pareto weight μ leads, at the optimum, to the same individual demands that can be obtained from the solution of a program where individuals, in the context of a decentralized household economy, maximize their utility functions subject to

[4] Excessive altruism may lead to unrealistic household outcomes. Thus, the values taken by δ_k are in general bounded between zero and one (Bernheim and Stark, 1988; Bergstrom, 1989; Browning et al., 2011).

their own budget constraint that is unobservable but can be identified by a sharing rule function ϕ_k.[5]

In the present study, we exploit this result and elect the sharing function ϕ as our measure of resource allocation. Therefore, in the next subsection, we derive optimal consumption bundles of the family using the decentralized collective framework.

The Decentralized Collective Model Collective rationality allows decentralizing the household decision process into two stages. In the first stage household members decide how to share household total expenditure y assigning to each of them a given amount ϕ_k of the household resources so that $y = \phi_1 + \phi_2$. The function ϕ_k represents the sharing rule and in a consumption model it must be greater than zero $\phi_k > 0$ because the level of expenditure for each family member cannot be zero or negative. Then, in the second stage each member chooses her/his own optimal consumption bundle maximizing her/his utility function given her/his budget constraint.

Formally, in the primal representation of the decentralized program, each family member maximizes her own utility function

$$\max_{\mathbf{c}^k, \mathbf{q}^k} \quad u^k(\mathbf{c}^k, \mathbf{q}^k; \mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_{12}) \tag{6}$$

subject to her own budget constraint

$$\mathbf{p}'_{\mathbf{c}}\mathbf{c}^k + \mathbf{p}'_{\mathbf{q}^k}\mathbf{q}^k = \phi_k, \tag{7}$$

where, in line with the caring assumption, individual utility functions may be affected also by characteristics of the other household members. The solution of this problem yields the following individual Marshallian demand functions

$$\hat{\mathbf{q}}^k = \mathbf{q}^k\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^k}, \phi_k, \mathbf{d}\right), \tag{8}$$

$$\hat{\mathbf{c}}^k = \mathbf{c}^k\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^k}, \phi_k, \mathbf{d}\right), \tag{9}$$

where optimal consumption of the non-assignable good is observed at the household level as a function of the sharing rule, prices and demographic attributes.

The aggregate collective Marshallian demand system at the household level is

$$\hat{\mathbf{q}}\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, y, \mathbf{d}\right) = \mathbf{q}^1\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^1}, \phi_1, \mathbf{d}\right) + \mathbf{q}^2\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^2}, \phi_2, \mathbf{d}\right), \tag{10}$$

$$\hat{\mathbf{c}}\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, y, \mathbf{d}\right) = \mathbf{c}^1\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^1}, \phi_1, \mathbf{d}\right) + \mathbf{c}^2\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^2}, \phi_2, \mathbf{d}\right), \tag{11}$$

with $\phi_2 = y - \phi_1$.

The dual representation of program (6) minimizes individual expenditure y_k

$$\min_{\mathbf{c}^k, \mathbf{q}^k} \; y_k\left(\mathbf{p}_{\mathbf{c}}, \mathbf{p}_{\mathbf{q}^k}, \bar{u}_k, \mathbf{d}\right) = \mathbf{p}'_{\mathbf{c}}\mathbf{c}^k + \mathbf{p}'_{\mathbf{q}^k}\mathbf{q}^k \tag{12}$$

subject to a fixed level of individual utility $\bar{u}_k$ obtainable, for example, in the case the individual were living alone

$$u^k(\mathbf{c}^k, \mathbf{q}^k; \mathbf{d}) \geq \bar{u}_k, \tag{13}$$

[5]The centralized and decentralized program are linked together by a one-to-one relationship between the Pareto weight μ and the sharing rule ϕ as illustrated in Proposition 2 by Browning et al. (2008) where the Pareto weight is equal to the ratio of the marginal effect of the sharing rule on the indirect utility of member 1 and member 2 obtained by equating the Lagrange multiplier from the first order conditions of the centralized and decentralized problem.

with corresponding Hicksian demand functions equal to

$$\bar{\mathbf{q}}^k = \mathbf{q}^k\left(\mathbf{p_c}, \mathbf{p_{q^k}}, \bar{u}_k, \mathbf{d}\right), \tag{14}$$
$$\bar{\mathbf{c}}^k = \mathbf{c}^k\left(\mathbf{p_c}, \mathbf{p_{q^k}}, \bar{u}_k, \mathbf{d}\right). \tag{15}$$

Aggregation of the individual collective Hicksian demands gives

$$\bar{\mathbf{q}}\left(\mathbf{p_c}, \mathbf{p_{q^1}}, \mathbf{p_{q^2}}, \bar{u}_1, \bar{u}_2, \mathbf{d}\right) = \mathbf{q}^1\left(\mathbf{p_c}, \mathbf{p_{q^1}}, \bar{u}_1, \mathbf{d}\right) + \mathbf{q}^2\left(\mathbf{p_c}, \mathbf{p_{q^2}}, \bar{u}_2, \mathbf{d}\right), \tag{16}$$
$$\bar{\mathbf{c}}\left(\mathbf{p_c}, \mathbf{p_{q^1}}, \mathbf{p_{q^2}}, \bar{u}_1, \bar{u}_2, \mathbf{d}\right) = \mathbf{c}^1\left(\mathbf{p_c}, \mathbf{p_{q^1}}, \bar{u}_1, \mathbf{d}\right) + \mathbf{c}^2\left(\mathbf{p_c}, \mathbf{p_{q^2}}, \bar{u}_2, \mathbf{d}\right). \tag{17}$$

The *collective household expenditure function,* denoted $y(\cdot)$, is additively separable in the individual expenditure functions $y_k\left(\mathbf{p_c}, \mathbf{p_{q^k}}, \bar{u}_k, \mathbf{d}\right)$

$$\begin{aligned} y\left(\mathbf{p_c}, \mathbf{p_{q^1}}, \mathbf{p_{q^2}}, \bar{u}_1, \bar{u}_2, \mathbf{d}\right) &= y_1\left(\mathbf{p_c}, \mathbf{p_{q^1}}, \bar{u}_1, \mathbf{d}\right) + y_2\left(\mathbf{p_c}, \mathbf{p_{q^2}}, \bar{u}_2, \mathbf{d}\right) = \\ &= \left(\mathbf{p}'_{\mathbf{c}}\bar{\mathbf{c}}^1 + \mathbf{p}'_{\mathbf{q}^1}\bar{\mathbf{q}}^1\right) + \left(\mathbf{p}'_{\mathbf{c}}\bar{\mathbf{c}}^2 + \mathbf{p}'_{\mathbf{q}^2}\bar{\mathbf{q}}^2\right), \end{aligned} \tag{18}$$

where quantities are at their optimal Hicksian values.

Demand functions derived by the individual optimization problem (6) satisfy the properties of homogeneity of degree zero in prices and income, adding-up, symmetry and negative semi-definiteness of the Slutsky matrix (Menon et al., 2011).

Proposition 1 (*The Decentralized Slutsky Equation*)**.** *The substitution matrix of a decentralized collective demand system is a symmetric matrix given by the sum of the decentralized symmetric Slutsky equation for each individual in the household.*

Proof. Let us consider the assignable good q for individual k. At the optimum, the following dual identity holds

$$q_i^k\left(\mathbf{p_c}, \mathbf{p_{q^k}}, \bar{u}_k, \mathbf{d}\right) \equiv q_i^k\left(\mathbf{p}_c, \mathbf{p_{q^k}}, y_k\left(\mathbf{p_c}, \mathbf{p_{q^k}}, \bar{u}_k, \mathbf{d}\right), \mathbf{d}\right), \tag{19}$$

where the term on the left-hand side of equation (19) is the Hicksian demand function, while the term on the right-hand side is the Marshallian demand function. Differentiation with respect to both elements of the set of prices $p_1 = (p_c, p_{q_1})$ gives the symmetric Slutsky equation of a decentralized demand system for individual 1

$$\frac{\partial q_i^1}{\partial p_1}_{|du_1=0} = \frac{\partial q_i^1}{\partial p_1} + \frac{\partial q_i^1}{\partial \bar{y}^1}\frac{\partial y^1}{\partial p_1} = \frac{\partial q_i^1}{\partial p_j} + \frac{\partial q_i^1}{\partial \hat{\phi}_1}\frac{\partial \phi_1}{\partial p_1} = \frac{\partial q_i^1}{\partial p_1} + x_j^1\frac{\partial q_i^1}{\partial \hat{\phi}_1}, \tag{20}$$

and with respect to prices $p_2 = (p_c, p_{q_2})$ for individual 2

$$\frac{\partial q_i^2}{\partial p_2}_{|du_2=0} = \frac{\partial q_i^2}{\partial p_2} + \frac{\partial q_i^2}{\partial \bar{y}^2}\frac{\partial y^2}{\partial p_2} = \frac{\partial q_i^2}{\partial p_2} + \frac{\partial q_i^2}{\partial \hat{\phi}_2}\frac{\partial \phi_2}{\partial p_2} = \frac{\partial q_i^2}{\partial p_2} + x_j^2\frac{\partial q_i^2}{\partial \hat{\phi}_2}. \tag{21}$$

Note that the expenditure function $\bar{y}_k$ and the sharing rule $\hat{\phi}_k$ both define the minimum expenditure necessary at individual k to attain a specific level of utility at given prices, and therefore at the optimum $y_k\left(\mathbf{p_c}, \mathbf{p_{q^k}}, \bar{u}_k, \mathbf{d}\right) = \hat{\phi}_k$. Further, in equations (20) and (21) we use the envelope theorem for the terms $\frac{\partial \phi_1}{\partial p_j} = x_j^1$ and $\frac{\partial (y-\phi_1)}{\partial p_j} = x_j^2$, with $x^k = \left(q_j^k, c_j^k\right)$.

The individual Slutsky matrices can be aggregated to obtain the following symmetric matrix

$$\frac{\partial q_i}{\partial p_j} = \left(\frac{\partial q_i^1}{\partial p_j} + x_j^1\frac{\partial q_i^1}{\partial \hat{\phi}_1}\right) + \left(\frac{\partial q_i^2}{\partial p_j} + x_j^2\frac{\partial q_i^2}{\partial (y-\phi_1)}\right) \tag{22}$$

and aggregating the price and income effects

$$\frac{\partial q_i}{\partial p_j} = \left(\frac{\partial q_i^1}{\partial p_j} + \frac{\partial q_i^2}{\partial p_j}\right) + \left(x_j^1 \frac{\partial \hat{q}_i^1}{\partial \hat{\phi}_1} + x_j^2 \frac{\partial \hat{q}_i^2}{\partial (y - \phi_1)}\right), \tag{23}$$

where $\hat{\phi}_2 = y - \phi_1$ and $p_j = (p_c, p_{q_1}, p_{q_2})$. Similarly, for a non-assignable good $\mathbf{c}$. □

Both the substitution and income individual effects are recomposed at the household level maintaining symmetry.[6]

In the next section, we specify the collective demand system used in the context of a Quadratic Almost Ideal Demand System (QUAIDS) introduced by Banks et al. (1997).

3 The Collective Demand System

This section extends the QUAIDS (Banks et al., 1997) to the collective framework. Following the theory presented in Section 2, we first define the individual expenditure function (12) and derive the associated budget share. Because individual prices are observed only for assignable goods, it is not possible to estimate individual specific demands as in Caiumi and Perali (2010). Prices of the non-assignable goods are derived at the household level as unit values. For this reason, individual share equations are aggregated into the household level shares, keeping however the individual income effects associated with the sharing rule. Individual total expenditures or income[7] y_k in log terms are deduced using the available information about the observed expenditure on assignable goods as defined in the following assumption.

Assumption 2. *Individual log expenditures are defined as*

$$\ln y_k = \sigma_k \ln y, \tag{24}$$

where the individual resource shares of total household expenditure $\sigma_k \in (0, 1)$ are deduced from the observable information in the following way

$$\sigma_k = \frac{\mathbf{p}'_{\mathbf{q}^k} \mathbf{q}^k + \mathbf{p}'_{\mathbf{c}} \mathbf{c}^k}{y}, \tag{25}$$

for $k = 1, 2$ and $\sigma_1 + \sigma_2 = 1$. In line with Assumption 1, we maintain that both household members have equal access to the non-assignable good and set $\mathbf{c}^k = 0.5\mathbf{c}$.

The knowledge of the resource share σ_k is not as exact as if all expenditures were observed at the individual level, but it incorporates the information about the consumption of assignable goods that is sufficient to identify the sharing rule and the individual Engel effects as shown in Menon and Perali (2011).

We now derive the QUAIDS (Banks et al., 1997) for the collective model. For clarity of exposition we omit, for the time being, demographic information. Let the extended PIGLOG individual cost function be

$$\ln y_k (u_k, \mathbf{p}) = \ln A_k (\mathbf{p}) + \frac{\varphi(u_k) B_k (\mathbf{p})}{1 - \varphi(u_k) \lambda_k (\mathbf{p})} = \ln A_k (p) + \frac{B_k (\mathbf{p})}{\varphi(u_k)^\star - \lambda_k (\mathbf{p})} \tag{26}$$

[6]The Slutsky conditions satisfied by the centralized and decentralized demand systems are different. Because the Pareto weight is a function of both prices and income, the household utility function is price-dependent and, thus, the centralized compensated term is not symmetric (Browning and Chiappori 1998). In a centralized framework, a price change affects both the budget constraint and the objective function giving rise to the "Symmetry plus Rank One" (SR1) condition.

[7]Throughout the paper we use the terms "total expenditure" and "income" interchangeably.

where $\varphi(u_k)^\star = 1/\varphi(u_k)$ is an index decreasing in utility $\varphi(u_k)$. In line with the tradition of the Almost Ideal demand systems, the differentiable and concave price aggregators have the following functional forms

$$\ln A_k(\mathbf{p}) = \frac{1}{2}\left(\alpha_0 + \sum_i \alpha_i \ln p_i + \frac{1}{2}\sum_i \sum_j \gamma_{ij} \ln p_i \ln p_j\right), \tag{27}$$

and

$$B_k(\mathbf{p}) = \beta_0 \prod_i p_i^{\beta_i^k}, \tag{28}$$

the term $\lambda_k(\mathbf{p})$ is a differentiable function of prices p

$$\lambda_k(\mathbf{p}) = \sum_i \lambda_i^k \ln p_i. \tag{29}$$

The translog term $A_k(\mathbf{p})$ can be interpreted as the level of subsistence expenditure of individual k when $u_k = 0$. It is a portion of household subsistence expenditure. In line with Assumption 1, we maintain that both members have equal access to household subsistence expenditure as if both members faced same individual shadow prices and thus define $\ln A_k(\mathbf{p}) = 0.5 \ln A(\mathbf{p})$.[8] The price aggregators $B_k(\mathbf{p})$ and $\lambda_k(\mathbf{p})$ are associated with individual utility variation, in the expenditure definition, and with individual incomes in the budget share equation. It is the variation in individual incomes that permits the identification of the individual specific parameters $\left(\beta_i^k, \lambda_i^k\right)$.

By Shephard's lemma the individual budget share of good i is given by the following Hicksian demand

$$w_i^k = \frac{\partial \ln y_k(u_k, \mathbf{p})}{\partial \ln p_i} = \frac{\partial \ln A_k(\mathbf{p})}{\partial p_i} + \frac{\left[\frac{\partial \ln B_k(\mathbf{p})}{\partial \ln p_i}\left(\varphi(u_k)^\star - \lambda_k(\mathbf{p})\right) + B_k(\mathbf{p})\frac{\partial \lambda_k(\mathbf{p})}{\partial \ln p_i}\right]}{\left(\varphi(u_k)^\star - \lambda_k(\mathbf{p})\right)^2} \tag{30}$$

The inversion of the individual expenditure function gives the value of

$$\varphi(u_k)^\star - \lambda_k(\mathbf{p}) = \frac{B_k(\mathbf{p})}{\ln y_k(u_k, \mathbf{p}) - \ln A_k(\mathbf{p})}, \tag{31}$$

that substituted into equation (30) yields the individual budget share of good i

$$w_i^k = \frac{\partial \ln A_k(\mathbf{p})}{\partial \ln p_i} + \beta_i^k\left(\ln y_k - \ln A_k(\mathbf{p})\right) + \lambda_i^k \frac{\left(\ln y_k - \ln A_k(\mathbf{p})\right)^2}{B_k(\mathbf{p})}. \tag{32}$$

Because in our case individual prices are not known, we cannot estimate decentralized budget shares as derived above. Therefore, the estimable budget share of good i is aggregated at the household level as

$$\begin{aligned} w_i = w_i^1 + w_i^2 = {} & \frac{\partial \ln A_1(\mathbf{p})}{\partial \ln p_i} + \beta_i^1\left(\ln y_1 - \ln A_1(\mathbf{p})\right) + \lambda_i^1 \frac{\left(\ln y_1 - \ln A_1(\mathbf{p})\right)^2}{B_1(\mathbf{p})} + \\ & \frac{\partial \ln A_2(\mathbf{p})}{\partial \ln p_i} + \beta_i^2\left(\ln y_2 - \ln A_2(\mathbf{p})\right) + \lambda_i^2 \frac{\left(\ln y_2 - \ln A_2(\mathbf{p})\right)^2}{B_2(\mathbf{p})}, \end{aligned} \tag{33}$$

[8] We remark that the assignment of half the committed expenditure to each member of the couple is used here to illustrate the derivation of individual demands but has no implications for the estimation of the collective demand system because the term $\ln A(\mathbf{p}) = \ln A_1(\mathbf{p}) + \ln A_2(\mathbf{p})$ is specified at the household level.

corresponding to

$$w_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i^1 \left(\ln y_1 - \ln A_1\left(\mathbf{p}\right)\right) + \lambda_i^1 \frac{\left(\ln y_1 - \ln A_1\left(\mathbf{p}\right)\right)^2}{B_1\left(\mathbf{p}\right)} + \tag{34}$$
$$+ \beta_i^2 \left(\ln y_2 - \ln A_2\left(\mathbf{p}\right)\right) + \lambda_i^2 \frac{\left(\ln y_2 - \ln A_2\left(\mathbf{p}\right)\right)^2}{B_2\left(\mathbf{p}\right)},$$

where $\ln y_k = \sigma_k \ln y$.[9]

While the price elasticities of the collective demand system are the same as in the general QUAIDS, we report here the income elasticities specific to our collective model describing the individual Engel effects

$$e_i^k = \frac{\partial \ln x_i}{\partial \ln y_k} = 1 + \frac{\beta_i^k}{w_i} + \frac{2\lambda_i^k}{B_k\left(p\right)} \left(\ln \frac{y_k}{A_k\left(p\right)}\right) \frac{1}{w_i}, \tag{35}$$

where $x_i = (q_i, c_i)$.[10]

Observed heterogeneity is introduced using a translating household technology $t_i\left(\mathbf{d}\right)$ that modifies the demand system (34) so that demographic characteristics interact additively with income in a theoretically plausible way (Gorman, 1976; Lewbel, 1985; Perali, 2003). Thus, the collective share equation w_i (34) demographically modified becomes

$$w_i = \alpha_i + t_i(\mathbf{d}) + \sum\nolimits_j \gamma_{ji} \ln p_j + \beta_i^1 \left(\ln y_1^\star - \ln A_1(\mathbf{p})\right) \tag{36}$$
$$+ \frac{\lambda_i^1}{B_1(\mathbf{p})} \left(\ln y_1^\star - \ln A_1(\mathbf{p})\right)^2 + \beta_i^2 \left(\ln y_2^\star - \ln A_2(\mathbf{p})\right) + \frac{\lambda_i^2}{B_2(\mathbf{p})} \left(\ln y_2^\star - \ln A_2(\mathbf{p})\right)^2,$$

where $\ln y_1^\star$ and $\ln y_2^\star$ are the log individual expenditures (24) modified by a translating household technology as

$$\ln y_k^\star = \ln y_k - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i, \tag{37}$$

where for empirical convenience the translating demographic functions $t_i\left(\mathbf{d}\right)$ are specified as $t_i\left(\mathbf{d}\right) = \sum_r \tau_{ir} \ln d_r$ for $r = 1, ..., R$. The system of budget shares (36) allows estimating individual income parameters β_i^1, β_i^2, λ_i^1 and λ_i^2 and the associated individual Engel effects, but the intercept α_i, the price parameters γ_{ji}, and the parameters of the scaling function $t_i(\mathbf{d})$ are estimated at the household level.

The key object describing the passive drinking effect is the sharing function $\phi_k(\cdot)$, which represents the best estimate of the unobserved amount of resources allocated to each household member and that may be affected by a non moderate consumption of alcoholic beverages. So far, the resource share σ_k has be assumed to be fully observed. In reality, at the individual level only consumption of assignable or exclusive goods is observed, that if exploited properly, it is sufficient information to learn how household resources are shared within the household. Now, acknowledging that the resource share is known with measurement error because of limited

[9]Note that the same system of shares (34) can be obtained by Shephard's lemma using the household cost function defined as $\ln y\left(u_1, u_2, \mathbf{p}\right) = \ln y_1\left(u_1, \mathbf{p}\right) + \ln y_2\left(u_2, \mathbf{p}\right)$, where $\ln y_k\left(u_k, \mathbf{p}\right) = \ln A_k\left(\mathbf{p}\right) + \frac{\varphi(u_k) B_k(\mathbf{p})}{1-\varphi(u_k)\lambda_k(\mathbf{p})}$.

[10]Individual income elasticities (35) can be aggregated to obtain a measure of family income elasticity as

$$e_i = \frac{\partial \ln x_i}{\partial \ln y} = 1 + \frac{\sigma_1 \beta_i^1 + (1-\sigma_1)\beta_i^2}{w_i} + \frac{2\left(\sigma_1 \lambda_i^1 + (1-\sigma_1)\lambda_i^2\right)}{B_1\left(p\right) + B_2\left(p\right)} \left\{\ln\left[\frac{y}{A_1\left(p\right) + A_2\left(p\right)}\right]\right\} \frac{1}{w_i},$$

where the income parameters β^k and λ^k, weighted by the resource share σ_k, sum up to a household income effect β and λ of a unitary QUAIDS model.

information about assignable goods, it is possible to correct for this imprecision by scaling the partially observed resource share σ_k with a latent linear function $m(.)$, depending on background exogenous variables predicting the unobserved income transfer (Goldberger, 1972, Zellner, 1970, Bekker et al., 1985).

The sharing function is specified by selecting, in a parsimonious fashion, a subset of the exogenous variables of the collective models that includes assignable prices $\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}\right)$, individual income y_k and distribution factors $\mathbf{z}$. The parametric representation is as follows.

Definition 1 (*Functional Specification of the Sharing Rule*)**.** The sharing function $\phi_k(y_k, \mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z})$ is specified as the product of the observed individual income y_k and an income scaling function $m_k(\mathbf{p}_1, \mathbf{p}_2, \mathbf{z})$

$$\phi_k\left(y_k, \mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right) = y_k m_k(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}), \tag{38}$$

for $k = 1, 2$ and where the value of the scaling function $m_k\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right)$ must be in the range between $m_k(\cdot) \in \left(0, \frac{y}{y_k}\right)$. The income modifying function $m_k(\cdot)$ behaves as a scaling index that describes the transfers between household members. When the scaling function is less than 1 the expenditure transfer goes from, say, $k = 1$ to $k = 2$. The direction of the transfer is inverted for $m_k(\cdot) > 1$. Therefore, the scaling function $m_k(\cdot)$ explains both the amount and direction of the allocation of resources between household members. It also clarifies that the amount of resources allocated to member k, that is $\phi_k(\cdot)$, differs from the observable amount of individual spending y_k by the amount $\phi_k(\cdot) - y_k$.

The sharing rule function can be interpreted as a shadow income allocation. The scaling function $m\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right)$ is analogous to the price scaling function introduced by Barten (1964) or the income scaling function described in Lewbel (1985, Theorem 8). It properly interprets the cross-households variation in the observed individual expenditures as explained by the variables included in the scaling function. The explanation about the conditions for identification of the sharing rule parameters as defined in equation (38) is provided in Menon and Perali (2011).

With the collective QUAIDS in budget share form, equation (37) is expressed in natural logarithm as

$$\ln \phi_1\left(y, \mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right) = \ln y_1 + \ln m_1\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right), \tag{39}$$

$$\ln \phi_2\left(y, \mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right) = \ln y_2 + \ln m_2\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right), \tag{40}$$

where $\ln \phi_1(\cdot) + \ln \phi_2(\cdot) = \ln y$.

Note that the estimation of the sharing rule is conditional on the functional specification of the sharing rule in equations (39), (40) and the restriction $\sum_k \ln \phi_k = \ln y$. These choices imply the following relation

$$\ln m_2\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right) = -\ln m_1\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right), \tag{41}$$

that is equivalent to write $\ln m_1(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}) = \ln m(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z})$ and $\ln m_2(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}) = -\ln m(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z})$ permitting the estimation of just one scaling function $m(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z})$. This constraints says what one member gives is what is received by the other member.

Given equations (39), (40) and (41), equation (38) in log terms can be rewritten as

$$\ln y_1^* \to \ln \phi_1^\star = \ln \phi_1 - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i = \left(\ln y_1 + \ln m\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right)\right) - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i, \tag{42}$$

$$\ln y_1^* \to \ln \phi_2^\star = \ln \phi_2 - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i = \left(\ln y_2 - \ln m\left(\mathbf{p}_{\mathbf{q}^1}, \mathbf{p}_{\mathbf{q}^2}, \mathbf{z}\right)\right) - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i. \tag{43}$$

In our empirical study, we specify the scaling function $m\left(\mathbf{p_{q^1}}, \mathbf{p_{q^2}}, \mathbf{z}\right)$ as a Cobb-Douglas function, so that the logarithmic specification is linear in the parameters

$$\ln m\left(\mathbf{p_{q^1}}, \mathbf{p_{q^2}}, \mathbf{z}\right) = \phi_{\mathbf{p}_r} \ln \mathbf{p_r} + \sum_{l=1}^{L} \phi_{z_l} \ln \mathbf{z}_l, \tag{44}$$

where $\mathbf{p_r} = \frac{\mathbf{p_{q^1}}}{\mathbf{p_{q^1}} + \mathbf{p_{q^2}}}$ is a price ratio and L is the dimension of vector $\mathbf{z}$.

The next section describes the household data and the estimation method employed in the empirical analysis.

4 Data and Estimation

Italian Expenditure Data We estimate the collective QUAIDS using household data drawn from the Italian household expenditure survey pooling three cross sections for years 2002-2004. To carry out the analysis of the passive drinking effects we require data on individual consumption of alcohol, not available in the household expenditure survey. Therefore, we match expenditure data with individual alcohol consumption data from the ISTAT 2002 standard of living survey (*Indagine Multiscopo su Stili di Vita e Condizioni di Salute*) where information is collected on an individual basis. It is thus possible to derive the share of alcohol consumed by the husband and the wife.[11] Estimation of the collective demand system along with the sharing rule requires also data on at least one exclusive good. Clothing expenditure, which is separately recorded by gender, and individual alcohol consumption are used as information about exclusively consumed goods. Because the ISTAT survey records only expenditure information, the lack of information about purchased quantities precludes the possibility to calculate household specific unit values directly. For this reason, to derive unit values we use a procedure proposed by Atella et al. (2003) and Hoderlein and Mihaleva (2008) based on theory results developed by Lewbel (1989).

We select households composed by married couples without dependent children and with positive expenditure of both male and female clothing. To ensure a demographically homogeneous sample, we exclude households in which at least one member is retired from work. In this way we restrict our study to working couples with a similar lifestyle. The sample includes 1728 couples. We consider only expenditures of non durable goods, where the aggregated expenditure categories considered are food, alcohol, clothing, education and recreation, and other goods.

Table 2 shows the average monthly expenditures in alcoholic beverages conditioning on "heavy drinkers" and on positive consumption of alcoholic beverages. Heavy drinkers are defined as those households belonging to the last decile of the alcohol budget share distribution, corresponding to more than 3.3 percent of the whole budget. At the country level, heavy drinkers spend about three times as much as compared with the expenditure of household with positive consumption of alcoholic drinks and about five times as compared to the average household in the sample. The average level of budget spent on alcoholic beverages for the heavy drinkers category amounts to about 110 Euro per month. Thinking that an average quality beer-can costs about 0.5 Euro at the supermarket, then the quantity is of about 220 beer-cans a month or about 10 bottles a month of a high quality wine. This observation suggests that the passive

[11] The imputation of individual alcohol expenditures is conducted using the hotdeck imputation method (Rubin and Schenker, 1986). Hotdeck imputation replaces missing information for a non-respondent with observed values from a respondent that is similar to the non-respondent with respect to characteristics observed by both cases.

drinking problem may be directly related to an excessive consumption or, indirectly, to an excessive expenditure on alcoholic beverages because of quality effects. Heavy drinkers are more concentrated in the North and Center of Italy. Inspecting the level of alcohol expenditure by age cohorts reveals no significant differences across cohorts. In proportion, young couples are relatively more heavy drinkers than middle age and old couples. Within the households with heavy consumption, men consume about 2.65 times more alcohol than women. In 85 percent of the sample, the male is the heavy drinker of the household and only in 10 percent of the cases both male and female are heavy drinkers. The employment status does not seem to be a significant factor in the selected sample. In heavily drinking households where men are employed, corresponding to 65 percent of the sample, expenditures on alcohol are higher. However, in the situations where the male is unemployed the level of expenditure is likely a higher share of total expenditure and a potentially critical factor affecting the distribution of resources within the household.

We estimate a demand system comprising 5 equations for food, alcohol, clothing, recreation and other goods whose shares are reported in Table 3. Durables are excluded from the system. Table 3 shows that 61 percent of the households consume alcohol and the average unconditional budget share of alcohol is 1.2 percent of total household expenditure. The maximum unconditional budget share of alcohol in our sample is 27.5 percent. Recreation too presents zero expenditures in about 10 percent of the cases. It is interesting to note that the unit values for alcoholic beverages are lower than the values of the other expenditure categories as a result of the truncation.

The set of demographic variables comprises dummy variables for macro regions (North-East, North-West and Center), seasonality (December),[12] if the household does not live in urban areas (rural), if the husband is employed, if at least one member of the couple smokes (smoke), if the household head has a university or higher degree, and the survey year.

The exogenous variables chosen for the specification of the sharing rule are the price ratio (price-r) defined as the price of male clothing divided by the sum of male and female clothing prices and two distribution factors, the age ratio (age-r), defined as the husband's age divided by the sum of both members' age, and the education ratio (edu-r), defined as the husband's years of schooling divided by the sum of both members years of schooling.

The choice of a quadratic specification of the AIDS is driven by a graphical analysis of the Engel curves (Figure 1) supported also by testing the rank of the demand system (Gill and Lewbel, 1992 and Perali, 2003). Most of the Engel curves show a non-linear relationship between the budget share and the logarithm of total expenditure. and the results of the rank test (reported in Table 4) show that the demand system has a rank no greater than three with a probability of 99.7 percent against the probability of a rank no greater than two of only 21.7 percent. This means that a linear specification would be inadequate and justifies the choice of a quadratic demand specification.

Estimation Cross-section household expenditure data often involve positive as well as zero purchases. The behavioral information contained in the observations with zero expenditures has significant econometric as well as economic implications. It is the manifestation of a choice that needs to be explained. Often, the household deliberately chooses not to consume particular goods given its current budget and the prices it faces. The realization of zero expenditures can be also explained by the short duration of the recall period of the survey design.

[12]Christmas' and new year's celebration are likely to increase alcohol expenditure.

In our sample of Italian couples alcohol expenditure and recreational expenditure are censored in non negligible size (Table 3). We assume that the decision process generating the corner solutions is based on disposable income, prices and preferences. This assumption underlies the Tobit model (Amemiya, 1985; Maddala, 1983) which we implement in a system-wide setting with an Heckman two-steps estimator (Heckman, 1979) where the sample selection bias is connected with the inverse Mill's ratio, which is the ratio between density and cumulative probability function of the standard normal distribution.

In this work, we use a generalization of the Heckman two-step estimator in (Amemiya, 1978, 1979; Heien and Roheim, 1990; Shonkwiler and Yen, 1999; Arias et al., 2003), Heien and Roheim (1990), Shonkwiler and Yen (1999) and Arias et al. (2003) who propose a consistent two-step generalized Heckman estimator for a censored system of equations.

Consider the following limited dependent variables system of $i = 1, .., M$ equations

$$\begin{aligned} x_i^* &= x(g_i, \theta_i) + \epsilon_i, \quad h_i^* = s_i'\tau_i + \upsilon_i, \\ h_i &= \begin{cases} 1 & \text{if } h_i^* > 0 \\ 0 & \text{if } h_i^* \leq 0 \end{cases}, \quad x_i = h_i x_i^*, \end{aligned} \tag{45}$$

where $x(g_i, \theta_i)$ represents the observed collective QAIDS shares, h_i are the indicator variables, x_i^* and h_i^* are the latent variables, g_i and s_i are vectors of exogenous variables, θ_i and τ_i are parameters, and, ϵ_i and υ_i are random errors. System (45) can be summarized as

$$x_i = \Psi(s_i'\tau_i)x(g_i, \theta_i) + \eta_i\psi(s_i'\tau_i) + \xi_i, \tag{46}$$

where $\Psi(\cdot)$ and $\psi(\cdot)$ are univariate normal standard cumulative distribution and probability density functions respectively. The element $\xi_i = x_i - E[x_i|g_i]$ belongs to the vector $\xi \sim MVN(0, \Omega)$. The system can be estimated by means of a two-step procedure. The vector of parameters τ_i is estimated using a Maximum Likelihood probit estimator to obtain $\Psi(s_i'\tau_i)$ and $\psi(s_i'\tau_i)$. Successively, estimates of θ_i and η_i are obtained by Full Information Maximum Likelihood.

In our specification the demand equation is in budget share form, so x_i is replaced by w_i, and $x(g_i, \theta_i)$ by the right hand side of equation (47). The estimated collective QUAIDS is given by

$$\begin{aligned} w_i &= \hat{\Psi}_i[\alpha_i + t_i(\mathbf{d}) + \sum\nolimits_j \gamma_{ji} \ln p_j + \beta_i^1 (\ln \phi_1^\star - \ln A_1(\mathbf{p})) + \frac{\lambda_i^1}{B_1(\mathbf{p})} (\ln \phi_1^\star - \ln A_1(\mathbf{p}))^2 \\ &\quad + \beta_i^2 (\ln \phi_2^\star - \ln A_2(\mathbf{p})) + \frac{\lambda_i^2}{B_2(\mathbf{p})} (\ln \phi_2^\star - \ln A_2(\mathbf{p}))^2] + \eta_i\hat{\psi}_i + \epsilon_i, \end{aligned} \tag{47}$$

where a spheric error term ϵ_i has been added to equation (36). Equation (47) is estimated imposing the conditions of adding-up $\sum_i \alpha_i = 1$, homogeneity $\sum_i \tau_{ir} = 0$, $\sum_i \gamma_{ij} = \sum_j \gamma_{ij} = 0$ and $\sum_i \beta_i^k = \sum_i \lambda_i^k = 0$ for each $k = 1, 2$ and symmetry $\gamma_{ij} = \gamma_{ji}$.

5 Results

Table 5 shows the estimates of the collective QUAIDS demand system. Intercepts α_i and income parameters β_i^1,β_i^2, λ_i^1, λ_i^2 associated with individual Engel effects are statistically significant. The parameter η_i associated with the selection control are not statistically significant for alcohol indicating that the participation equation for alcohol is uncorrelated with the respective demand. On the other hand, the η_i parameter for recreation is significant at 5 percent, thus justifying the

application of a Heckman estimator to correct for selection bias. Table 5 also shows the importance of individual quadratic terms in real expenditure for several goods, as the nonparametric analysis of Engel curves examined in the data section suggested.

In general, demographic variables do not significantly affect alcohol demand, except for geographical dummies. A positive and significant effect is observed if the household lives in the North of Italy. This is as expected in light of the descriptive statistics of our data set and conforms to specialized reports on alcohol consumption and abuse in Italy (Adamo and Orsini, 2006). This regional difference is partly associated with climate differences. In the South, a warmer temperature discourages consumption of alcoholic beverages especially in the summer. The significant effect of the seasonality variable lends support to this observation, and controls for the higher expenditures on alcohol likely observed in December due to Christmas' and new year's celebration. Interestingly, the education parameter is not statistically significant in explaining alcohol consumption suggesting that alcoholic beverages are uniformly consumed irrespectively of the education level. Similarly, there is not a statistically significant difference between the consumption of alcoholic beverages of rural and urban households. The presence of a smoker in the household is not associated with higher consumption of alcoholic beverages. However, the estimates of the participation equation (Table 6) show that there is a positive and significant effect between the presence of a smoker and the consumption of alcoholic beverages. It follows that a smoker has a higher probability of being a drinker, but smoking does not influence how much one drinks. As it is reasonable to expect, age is also a significant factor in determining the drinking choice. On the basis of this evidence, as most other studies of alcohol demand such as Banks et al., 1997, Heien and Pompelli (1987), Cook and Moore (2000) and, for the italian case, Perali (2000) and Aristei et al. (2008), we also stress the importance of social variables in understanding alcohol consumption, but we emphasize that demographic factors are especially important in affecting the entry choice rather then the quantity of alcohol consumed.

The parameters of the price ratio and of the distribution factors in the sharing rule, that is education and age ratio, are all statistically significant (Table 5). In particular, the estimation shows that the husband's sharing rule is negatively influenced by the price of male clothing.[13] If the husband is more educated or is older than his wife, the male is in a predominant position within the family and attracts a higher share of resources towards himself. On the other hand, women with higher education with respect to the husband and with a smaller age gap have relatively more power.

Table 7 shows individual-specific income elasticities, uncompensated and compensated price elasticities and standard deviations derived using a bootstrap method. Own-price elasticities are all consistent with the Slutsky requirements computed at the variables' mean. The impact of price on alcohol consumption is a delicate measurement for its policy relevance in determining alcohol specific taxes or restrictions that in turn affect prices. Our estimated compensated elasticity is lower than the one estimated by Banks et al. (1997), but still in the elastic range (-1.24).[14]

The top panel of Table 7 shows individual income elasticities. As shown in Proposition 1, the income effect at the household level is decomposable into the individual specific income effects. It

[13]Recall that the price ratio is equal to the price of male clothing diveded by the sum of male and female clothing prices. The age ratio is defined as the husband age divided by the sum of both members' age, and similar for the education ratio defined as the husband years of schooling divided by the sum of both members years of schooling.

[14]The Banks et al. (1997) estimate reflects also a cohort effect because the authors use a UK sample of repeated cross-sections for the period 1970-1986.

is striking to observe that the impact of an increase in individual income on the consumption of alcoholic beverages is almost nine times as large for the husband suggesting that the distribution of resources within the household can be a key policy factor in preventing the development of non moderate alcohol consumption of men into an addictive habit or in improving the equity in the distribution of household resources.

Table 8 shows the mean value of the sharing rule both in levels and in shares for the whole sample and for different levels of alcohol expenditure. A t-test performed on the average sharing rule of heavy drinking and non drinkers families show that there is a statistically significant difference at the 99 percent confidence level.[15] For heavy drinker households, the husband's share of the income cake is larger as compared to non drinker households. As expected, testing the difference of the sharing rule between moderate drinkers and non-drinkers reveals no significant difference.

To investigate more closely how resources are distributed between husbands and wives in the sample, Figures 2 through 6 show the sharing rule, expressed as the ratio between the predicted husband expenditure and total household expenditure in log terms ($\ln \phi_1(\cdot) / \ln y$), using a local polynomial smoothing. The graphs report average relations between the sharing rule and total household expenditure for selected groups of households with some characteristics of interest.

In Figure 2, we compare the sharing rule of the group of non drinker households and the group of heavy drinker households.[16] The share of household resources under the husband's influence does not vary significantly as income increases, though the share controlled by the husband is relatively higher at low income levels. The husband obtains a larger share of the resource cake especially in low income households, where alcohol consumption is higher (Table 2), also in association of larger education and age gaps (Table 5). Indeed, the effect on the sharing rule associated with these distribution factors is positive and statistically significant. The share controlled by the husbands in heavy drinking families, about 2.87, is significantly above the husbands' share, about 2.76, in households that do not drink alcohol along the whole income scale.

Figure 3 shows how the level of the sharing rule varies as the level of total expenditure increases for the group of heavy drinking households, distinguishing whether the main drinker[17] is the husband or the wife. The comparison group is the group of non drinkers households. When the husband is the main drinker, the share under his control in heavy drinking households presents a similar shape and range of variation as in the previous figure. When the main drinker is the man, the dominant effect of the husband over the distribution of household resources is evident. Interestingly, when the wife is the main drinker, the husband's control over household resources is strictly below what husbands obtain in non drinkers households. At all income levels husbands or wives who are heavy drinkers keep a larger share of household resources for themselves. This is a clear evidence supporting the presence of quasi-external effects associated with non moderate consumption of alcoholic beverages. This suggests that passive drinking is a real concern in Italy that may justify public intervention curbing heavy alcohol consumption.

[15] The relative sharing rule for non drinker households has an average value of 0.55, corresponding to the natural logarithm of individual incomes, with a standard deviation of 0.04 over a subsample of 688 observations, while the sharing rule of heavy drinkers has an average value of 0.57 with a standard deviation of 0.04 over a subsample of 169 observation. The test value is 4.56 with 248 degree of freedom, which rejects the null hypothesis of no difference.

[16] We consider as heavy drinker households that have an alcohol budget share above 0.033. These households represent the last decile of the alcohol budget share's distribution.

[17] A household member is the main consumer if he/she consumes at least 75 percent of household alcohol consumption. In 85 percent of the cases the main drinker is the husband.

Figure 4 shows that a lower level of education of the household's head is associated with a distribution of resources especially in favor of the husband at low income levels. The education effect dissipates at higher levels of income where the husband maintains a relatively higher control over household resources around 55 percent. Italian women belonging to less affluent households work relatively less[18] also because they are often less educated. It is then reasonable to deduce that in poorer households the wife has relatively less bargaining power.

Figure 5 depicts the effect of age difference on the sharing rule. The objective is to capture three typical cases that are potentially characterized by a different distribution of resources: a) the spouses have about the same age (*same age* in the figure), which is the typical family, b) the wife is older than the husband (*wife older*), where the woman is expected to have more decisional power, and c) the husband is al least 20 percent older than the wife (*husband is* older), which is supposed to capture the case of a mature man married with a younger, and probably weaker, woman. The graph shows a pattern that is in line with these expectations though differences across the three cases are not large. The modifications of the sharing rule induced by the age gap do not seem to vary significantly across households of different income strata.

Similarly, Figure 6 shows that the sharing rule does not vary significantly across Italian macro-regions along the income distribution. The regional effects are significant factors of alcohol demand that is higher in the North as compared to the Center and the South of Italy (Table 5) but there is no significant impact on how resources are distributed within the family.

Because of the likely external effects caused by non moderate consumers on the rest of society, it is common practice to encourage optimal taxation policies of alcoholic beverages. Such policy aiming at curbing consumption may be appropriate also in the present situation where the alcohol own-price elasticity is positive and large, making the implementation of optimal tax scheme effective (Perali, 2000). The observation of quasi-external effects stemming from the consumption behavior of the husband at the expenses of the wife suggests that the objective of preventing potential harm from one member to another member of the family can be achieved by fostering empowerment policies favoring greater female participation to the labor market and the transfer of public resources for the poorest households directly to the weaker component of the family. These actions should be effective in increasing the bargaining power of the wife and her command over household resources and, specifically, abnormal expenses on alcoholic beverages for the husband.

6 Conclusions

This study estimating a collective demand system contributes two novel dimensions to the analysis of consumption: the estimation of the sharing rule governing the distribution of resources within the household and individual Engel effects. The estimated collective demand system applied to the passive drinking problem in Italy shows that an excessive alcohol consumption can significantly affect the intra-household distribution of resources, which is biased towards the husband.

This is evidence of a passive drinking effect where the non moderate consumption behavior of the man generates a quasi-external effect on the wife both by determining an unfair allocation and causing potential harm. The existence of a passive drinking effect justifies society's decision makers to use public resources in order to equilibrate the balance of power within a couple

[18]In the sample, 52.8 percent of women belonging to the low tail of the total expenditure distribution are employed at a low salary. In the upper tail, women's participation rate is 71 and 73 percent respectively.

and, borrowing Mill's words, "to prevent harm to others." Therefore, we deem that in the short run empowerment policies of the woman, given that non moderate drinking is mainly a male problem in our Italian sample, favoring greater participation in the labor market or making easier to reconcile family with labor duties should prove very effective in curbing male alcohol consumption. As a consequence, if women can exert greater bargaining power it is also possible to guarantee a better distribution of resources within the household and to prevent the development of non moderate alcohol consumption into a potentially harmful and often irreversible addictive habit. For poor households, it may be of interest to consider the transfer of public resources directly to the female component needing both more power and resources. Interestingly, empowerment policies directly affect the distribution of resources and income in the households. Considering the nine times more elastic income elasticity associated with alcohol consumption of the husband with respect to the elasticity of the wife, then it is reasonable to expect that policies strengthening the position of the wife in the family political and ethical arena may result highly socially efficient.

Our future research plans to extend this analysis also to couples with children where passive drinking effects may express their harm also in the long run and suggest policy interventions that are both gender and generation specific.

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Appendices

Appendix A: Tables

Table 1: Average Monthly Expenditures by Drinking and Economic Status, 1728 Observations

	Drinking and economic status								
	Heavy drinkers			Moderate drinkers			Non drinkers		
	Poor	Middle	Rich	Poor	Middle	rich	Poor	Middle	Rich
Food	282	578	1118	314	560	920	279	453	638
Alcohol	38	98	241	12	23	43	0	0	0
Alcohol - men	30	69	180	8	16	28	0	0	0
Alcohol - women	8	29	61	4	7	16	0	0	0
Clothing	137	284	708	149	334	769	152	342	790
Clothing for men	67	128	271	64	140	310	66	148	311
Clothing for women	59	133	359	75	160	364	75	167	388
Recreation	23	105	672	32	177	965	37	159	1204
Other goods	246	595	1339	284	684	1293	288	736	1279

Note: All averages are computed at the family level except for the average expenditures differentiated by gender that is computed at individual level. "Heavy drinkers" are defined as those households with an alcohol budget share greater that 0.033 corresponding to the upper decile of the alcohol budget share distribution.

Table 2: Conditional and Unconditional Average Monthly Expenditure in Alcoholic Beverages, 1728 Observations

	Heavy Drinkers	All Drinkers	HD/AD	All Sample	HD/AS
Sample proportion	10%	60%	-	100%	-
All sample	109.6	38.1	2.9	23.3	4.7
Macro-region					
North-West	124.7	48.6	2.6	28.3	4.4
North-East	135.2	44.1	3.1	22.4	6.0
Center	121.4	35.5	3.4	23.2	5.2
South	76.1	26.7	2.9	17.5	4.3
Island	56.6	30.6	1.8	22.5	2.5
Age cohort					
Young (<36)	106.4	34.3	3.1	24.8	4.3
Middle age	113.0	38.8	2.9	27.8	4.1
Old (>55)	105.4	41.6	2.5	18.3	5.8
Gender					
Male	79.6	29.0	2.7	16.3	4.9
Female	30.0	17.6	1.7	6.9	4.3
Working male					
Yes	112.3	38.7	2.9	23.3	4.8
No	78.3	30.7	2.6	22.5	3.5

Note: All averages are computed at the family level except for the average expenditures differentiated by gender, that is computed at individual level. "Heavy drinkers" are defined as those households with an alcohol budget share greater that 0.033 corresponding to the last decile of the alcohol budget share distribution.

Table 3: Descriptive Statistics, 1728 Observations

	Trunc. %	Mean	Std. Dev	Min	Max
Shares					
Food	0	0.311	0.128	0.011	0.733
Alcohol	39.81	0.012	0.020	0.000	0.275
Clothing	0	0.191	0.116	0.003	0.817
Recreation	9.84	0.097	0.134	0.000	0.843
Others	0	0.388	0.142	0.035	0.915
Other relevant shares					
Clothing for men	0	0.082	0.062	0.002	0.580
Clothing for women	0	0.092	0.071	0.002	0.520
Total expenditure and unit values					
Total expenditure		5.092	0.494	3.426	6.724
Food (p_{food})		3.829	0.227	2.789	4.487
Alcohol (p_{alc})		1.026	0.164	0.655	1.412
Clothing (p_{cloth})		2.412	0.213	1.753	3.015
Clothing for men (p_{q^1})		1.940	0.179	1.630	2.268
Clothing for women (p_{q^2})		2.715	0.185	2.365	3.060
Recreation (p_{rec})		2.742	0.180	2.331	3.024
Others (p_{oth})		4.776	0.232	3.740	5.307
Demographic variables					
North-East		0.219	-	0.000	1.000
North-West		0.299	-	0.000	1.000
Center		0.181	-	0.000	1.000
December		0.103	-	0.000	1.000
Rural		0.156	-	0.000	1.000
Employed (1 if husband works)		0.273	-	0.000	1.000
Smoke (1 if there is at least a smoker)		0.368	-	0.000	1.000
University (if the male has a university degree)		0.616	-	0.000	1.000
2003 dummy		0.334	-	0.000	1.000
2004 dummy		0.322	-	0.000	1.000
Price-r ($p_{q^1}/(p_{q^1}+p_{q^2})$)		0.416	0.023	0.356	0.482
Edu-r (educ. male/(educ. female + educ. male))		0.491	0.086	0.000	1.000
Age-r (age male/(age female + age male))		0.519	0.027	0.325	0.690

Note: Total expenditure and unit values are in natural logarithms.

Table 4: Rank Test for the Quadratic Demand System

Rank	$r=1$	$r=2$	$r=3$	$r=4$
test	51.60	4.44	0.005	0.000
p-value	0.000	0.217	0.997	1.000

Table 5: Parameters of the Collective Quadratic Almost Ideal Demand System

Parameter	Food	Alcohol	Clothing	Recreation	Others
			Intercepts, Prices and Income Variables		
α_i	0.120***(0.029)	0.014(0.016)	0.371***(0.034)	0.191***(0.042)	0.305***(0.063)
γ_{ij}	−0.135***(0.012)	−0.002(0.004)	−0.024***(0.009)	0.052***(0.010)	0.110***(0.018)
		−0.005(0.005)	0.004(0.004)	0.000(0.004)	0.004(0.008)
			0.044***(0.015)	−0.005(0.013)	−0.019(0.022)
				−0.121***(0.016)	0.073***(0.023)
					−0.167***(0.038)
β_i^1	−0.099***(0.033)	0.013***(0.005)	0.052(0.057)	0.138***(0.021)	−0.105(0.069)
β_i^2	−0.126***(0.026)	0.004(0.008)	0.145***(0.030)	0.190***(0.026)	−0.212***(0.048)
λ_i^1	−0.038***(0.011)	−0.001(0.003)	0.076***(0.016)	0.019*(0.011)	−0.056**(0.023)
λ_i^2	−0.007(0.007)	0.005*(0.003)	0.032***(0.007)	0.015*(0.008)	−0.045***(0.014)
η_i	-	−0.017(0.009)	-	−0.297**(0.135)	-
			Demographic variables		
North-East	−0.037***(0.009)	0.010***(0.004)	−0.032***(0.008)	−0.027**(0.014)	0.087***(0.019)
North-West	−0.038***(0.009)	0.007***(0.003)	−0.031***(0.008)	−0.028*(0.015)	0.090***(0.019)
Center	−0.028***(0.009)	−0.002(0.002)	−0.028***(0.009)	−0.007(0.012)	0.064***(0.017)
December	−0.001(0.009)	0.006**(0.003)	0.010(0.009)	−0.026***(0.009)	0.012(0.016)
University	−0.021***(0.008)	−0.002(0.002)	0.019**(0.008)	0.013*(0.008)	−0.010(0.014)
Dep. worker	−0.006(0.006)	0.003(0.002)	−0.005(0.006)	0.005(0.006)	0.003(0.011)
Rural	0.000(0.008)	0.000(0.002)	−0.012(0.008)	0.015(0.010)	−0.003(0.015)
Smoke	−0.009(0.006)	−0.003(0.002)	−0.018***(0.006)	−0.017**(0.007)	0.047***(0.011)
Year 2003	0.000(0.007)	0.000(0.002)	−0.004(0.007)	0.000(0.006)	0.004(0.012)
Year 2004	−0.003(0.007)	−0.001(0.002)	0.001(0.006)	−0.004(0.007)	0.008(0.011)
			Sharing Rule		
	Price ratio		Edu Ratio		Age Ratio
	−1.455**(0.607)		0.393**(0.198)		1.332**(0.582)

Note: * denotes significant at 10% level, ** at 5% level, and *** at 1% level. Standard errors in parentheses.

Table 6: Parameters of the Participation Equations

	Alcohol	Recreation
Constant	−0.069(0.190)	0.749***(0.237)
December	0.072(0.103)	−0.027(0.134)
North-East	−0.685***(0.128)	0.580***(0.153)
North-West	−0.474***(0.124)	0.700***(0.146)
Center	−0.325**(0.133)	0.504***(0.155)
South (no Isles)	−0.292**(0.129)	0.147(0.140)
Rural	0.212**(0.089)	−0.209*(0.108)
Age	0.015***(0.003)	0.001(0.005)
Smoke	0.251***(0.065)	0.196**(0.089)
Husband dep. worker	0.008(0.070)	0.033(0.095)
Wife dep. worker	0.012(0.068)	0.077(0.090)

Note: * denotes significant at 10% level, ** at 5% level, and *** at 1% level. Standard errors in parentheses.

Table 7: Individual Income and Uncompensated Price Elasticities

Income Elasticities					
	Food	Alcohol	Clothing	Recreation	Other
Husband	0.858(0.039)	1.749(0.406)	0.677(0.154)	2.126(0.464)	0.920(0.057)
Wife	0.692(0.039)	0.204(0.276)	1.129(0.156)	2.357(0.530)	0.871(0.049)
Uncompensated Price Elasticities					
	Food	Alcohol	Clothing	Recreation	Other
Food	−1.354(0.037)	0.008(0.011)	0.047(0.033)	0.348(0.034)	0.402(0.033)
Alcohol	−0.047(0.215)	−1.259(0.263)	0.127(0.267)	−0.068(0.259)	0.294(0.214)
Clothing	−0.049(0.088)	0.025(0.032)	−0.750(0.115)	−0.044(0.173)	0.013(0.073)
Recreation	0.143(0.138)	−0.078(0.080)	−0.720(0.251)	−3.223(0.629)	0.396(0.133)
Other	0.335(0.047)	0.020(0.012)	0.036(0.039)	0.363(0.046)	−1.544(0.074)
Compensated Price Elasticities					
	Food	Alcohol	Clothing	Recreation	Other
Food	−0.856(0.063)	0.026(0.037)	0.310(0.058)	0.487(0.059)	0.905(0.058)
Alcohol	0.580(0.223)	−1.236(0.271)	0.459(0.276)	0.107(0.268)	0.928(0.223)
Clothing	0.531(0.141)	0.046(0.085)	−0.444(0.167)	0.118(0.225)	0.599(0.125)
Recreation	1.582(0.227)	−0.024(0.169)	0.042(0.340)	−2.821(0.718)	1.851(0.222)
Other	0.910(0.082)	0.041(0.047)	0.340(0.074)	0.524(0.080)	−0.962(0.109)

Note: Standard deviations in parentheses.

Table 8: Descriptive Statistics of the Sharing Rule by Drinking Status

		Heavy drinkers	Moderate drinkers	Non drinkers	Whole sample
Total expenditure	y	5.059 (0.495)	5.158 (0.483)	5.016 (0.496)	5.092 (0.494)
Sharing rule - husband	ϕ_1	2.866 (0.316)	2.840 (0.284)	2.756 (0.316)	2.809 (0.303)
Relative sharing rule	ϕ_1/y	0.567 (0.044)	0.551 (0.034)	0.550 (0.042)	0.552 (0.038)
Observations		169	871	688	1728
t-stat. (HD vs others)	on ϕ_1/y		4.5306	4.6467	4.2999

Note: Values are expressed in natural logarithms. Standard deviations in parentheses.

Appendix B: Figures

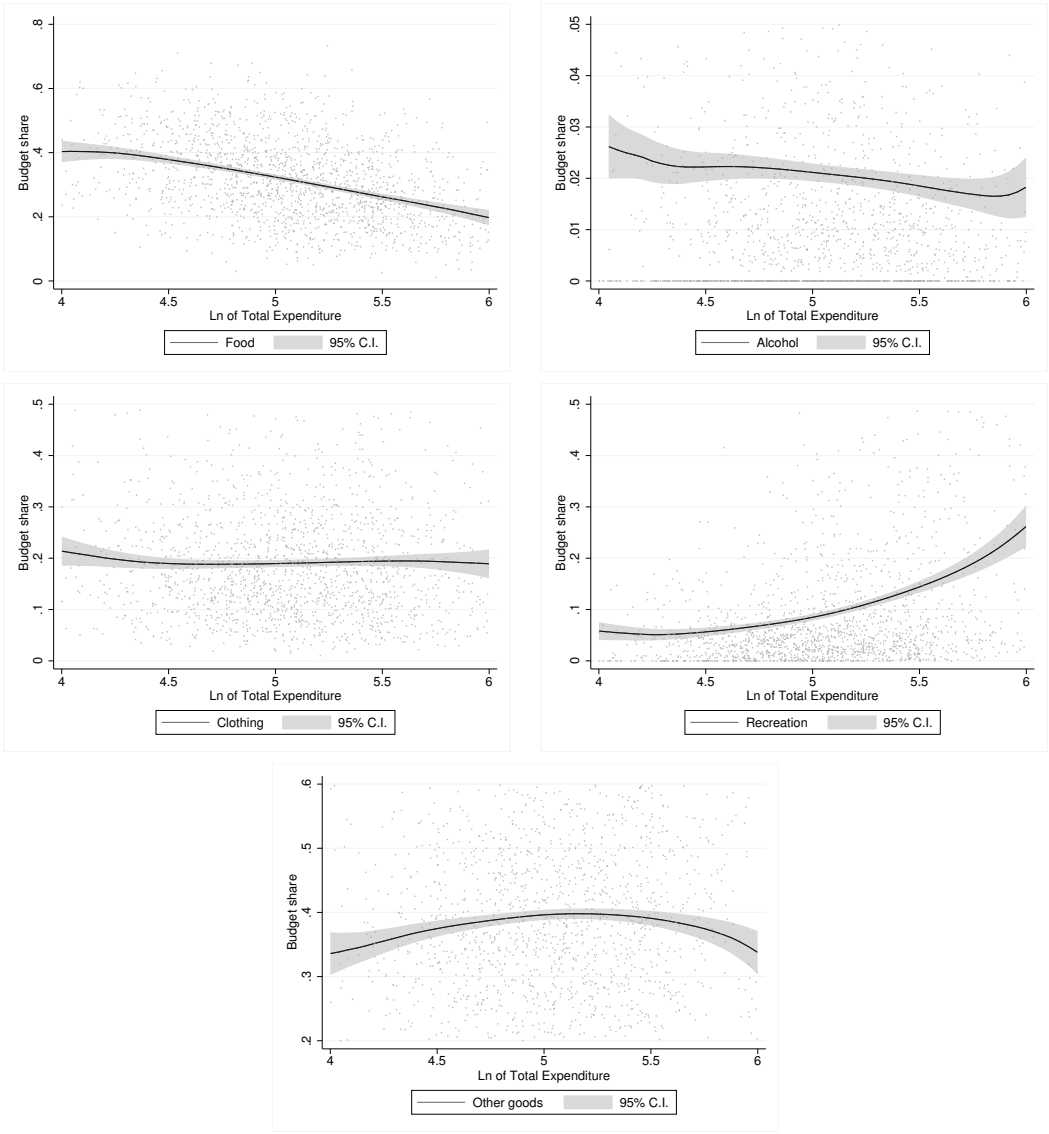

Figure 1: Engel Curves

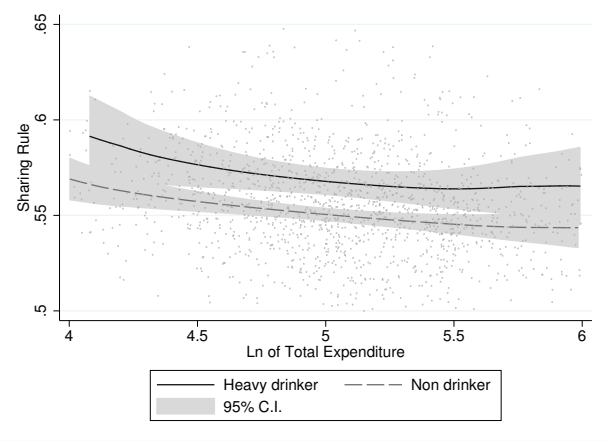

Figure 2: Sharing Rule by Alcohol Consumption

Figure 3: Sharing Rule by Gender of the Main Drinker

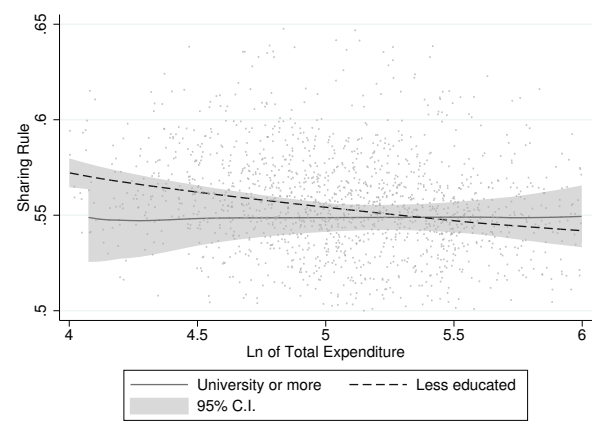

Figure 4: Sharing Rule by Years of Schooling

Figure 5: Sharing Rule by Age Difference

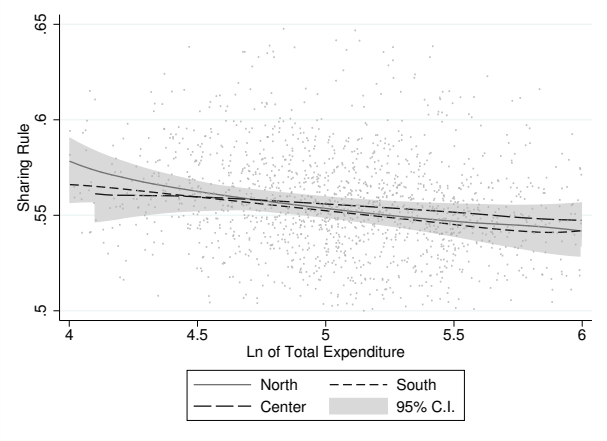

Figure 6: Sharing Rule by Macro-Regions