Child Welfare in Albania Using a Collective Approach*

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June 3, 2010

Abstract

The present article aims at contributing to the literature on children welfare evaluation by taking into account intra-household distribution of resources and, as a consequence, intra-household inequality. This task cannot be accomplished within the standard framework of unitary models of consumption, and equivalence scales help only partially, since their scope is different. To investigate what happens within the family's black box, a collective consumption model is estimated and the predicted sharing rule is used to draw some conclusions about the role played by intra-household inequality for children's welfare in Albania. The model is also used to look at the effects that different public policies can have on child welfare. The results show that taking into account intra-household inequality raises the Gini coefficient of children's welfare by nearly 10 percentage points and in-kind transfers are more effective than cash transfers in improving children's wellbeing.

Keywords Child welfare, intra-household inequality, collective models, sharing rule, Albania
JEL Classification D13 H31 I32 O15

*The authors thank Arnab K. Basu, Tindara Addabbo, Gianna Claudia Giannelli and Maria Sassi for their useful comments and suggestions.

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1 Introduction

It is common opinion that one of the main aim of a modern society is to take care of its more vulnerable members. Several categories of individuals fall into the definition of vulnerable persons: disabled, people suffering from chronic illness, jobless, and so on. Children are part of this list for several reasons, and even though they usually do not suffer from critical living conditions, the policy makers should always pay particular attention to child wellbeing, an investment for the future of their country. The aim of this article is to contribute to the literature on children's welfare evaluation by taking into account intra-household distribution of resources and, as a consequence, intra-household inequality.

This task cannot be accomplished within the standard framework of a unitary model of consumption: in these models the reference unit is the household, which is seen as a black-box within which consumption decisions and resource allocation processes are unknown and assumed to be taken according to the members' needs. For example, one may assume that the household head takes all the relevant decisions, including child consumption, and that this is optimal for the welfare of the household. Such an assumption is unsatisfactory for the purposes of this article, since it would imply that a sufficient measure of the welfare of household members is per-capita income.

Equivalence scales partially deal with this problem taking into account family composition, which implies assigning to each household member a weight according to which individual equivalent income can be computed (Sydenstricker and King, 1921; Pollak and Wales, 1981). However, the use of fixed equivalence scales, a common practice in the applied poverty and inequality literature, could lead to ignore important household characteristics and the associated behavioural parameters. These factors are particularly relevant in the developing world where cultural aspects and socio-economic conditions may strongly influence intra-household inequality. Moreover, as pointed out by Ebert and Moyes (2003, 2009), for the computation of the equivalence scales, only the cost of maintaining a child should be taken into account. In contrast with the cost of raising a child (Browning, 1992), Ebert and Moyes (2003, 2009) include only child's basic needs, such as, for example, food, clothing and housing.

The discussion about the use of a more or less restricted monetary value of child welfare to correct poverty and inequality measures is beyond the scope of this article. However, what seem to be clear is that in order to measure the welfare of a child, taking into account only his/her basic needs is not sufficient. As a consequence, a measure of children's wellbeing that accounts for the actual distribution of resources within the household is needed. This decision is crucial for evaluating child welfare, especially for poorer households and in developing countries, where the amount of resources is small and the welfare loss caused by an unfair intra-household distribution may be relatively large.

More than twenty-five years are gone since Sen introduced the issue of gender inequality within the household (Sen, 1983), and more than twenty since the development of intra-household bargaining and collective models, but still there seems to be no consensus on the necessity to use this kind of models for the empirical analysis of poverty and inequality. In a fifteen years old article, Alderman et al. (1995) claim that the collective models, introduced by Chiappori (1988, 1992), should be standard practice, while the use of unitary models should be limited to special cases where the collective may not be applicable. From the early nineties, several studies have recognized the importance of taking into account intra-household allocation of resources to properly assess poverty and inequality measures and to design effective policy measures, but only recently Bargain and Donni (2007) developed solid theoretical foundations for the ex-ante evaluation of the impact of public policies on child poverty within the collective framework[1].

[1]Their approach is particularly appealing for policy design, since it gives useful indications on the measure

This is even more relevant for developing countries where a correct categorical targeting of anti-poverty policies can be particularly important to effectively employ the scarce resources available to the public authorities (see, for example Haddad and Kanbur, 1992; Behrman, 1994; Phipps and Burton, 1996; Peluso and Trannoy, 2007; Bingley and Walker, 2007).

Several studies on child poverty in developing countries pay attention to intra-household resources allocation and child welfare (see, among others, Kanbur, 1991; Inchauste, 2001; Kebede, 2004; Sahn and Gerstle, 2004; Namoro and Roushdy, 2009). However very few studies on developing countries have estimated collective models. In fact, estimating collective labour supply models[2], can be difficult for several reasons: "standard" labour supply models are quite inadequate for developing countries, where the assumption of competitive labour market is by no way close to reality[3]. Recover, data requirements are usually quite high for these models and proper data may not be available in developing countries. Another problem is represented by the fact that collective labour supply models have not been initially developed for studying children's welfare, even though extensions that include children as public goods for parents exist.

To investigate what happens within the family's black box this study refers to the collective consumption model by Browning et al. (1994) as applied by Menon et al. (2008). This framework allows to shed some light on the household decisions about the distribution of resources. Keeping the assumption of Pareto efficiency, this approach assumes that the distribution of resources within the household is governed by a function of exogenous factors, the so called "sharing rule". The identification of this function helps looking inside the black box for two reasons: first, it allows to identify individual preferences, and hence individual welfare; second, while providing information on how decisions to allocate resources within the family, it allows for public interventions aiming at favouring a more equal intra-household distribution. In other words, the welfare of the household's members can be estimated directly rather than inferred from the household's relative position with per-capita or equivalent income. Thus it is particularly important in the poverty and inequality analysis among weak household's members.

Traditionally, the measurement of monetary child poverty has been criticized in favour of multidimensional indicators of children wellbeing. One of the main point against monetary child poverty is that it implicitly assumes that resources are allocated equally within the family and in the same way between the households. With the use of collective models this weakness became less; some members of the household may be relatively more or less poor than others.

In a public policy perspective, a comprehensive normative analysis of the implications of this class of models is still far from being complete. However, Ebert and Moyes (2009) moved the first steps in this direction and, following the pioneering article of Bourguignon (1999), which shows the importance of using collective models to analyze the cost of children, other authors followed the intuition of using collective models to analyze individual poverty and intra-household inequality (Cherchye et al., 2008; Jeremy and Shannon, 2007).

In line with this stream of literature this study tries to explore new perspectives allowed by collective models for child welfare analysis, following a theoretical approach similar to Menon et al. (2008). In particular the difference in the child welfare distribution with respect to a per-capita income approach is explored and the assumption whether receiving public transfers could induce a modification of the sharing rule is tested. To analyse in depth these questions a sample

that work best and in which conditions, however, it is not suitable for an ex-post analysis as the one proposed in this article. Nonetheless, the theory behind the two approaches is fully compatible and a comprehensive analysis is planned for a future work.

[2]These are the model proposed by Chiappori (1988) and several successive works.

[3]Discrete labour choice models could be a better solution, but a collective extension of these models have been proposed only by Beninger (2008) in an unpublished paper and in any case the problem of informal work is not assessed in these models.

of Albanian households with only children under five[4] drawn from the Albanian Living Standard Measurement Survey is investigated.

Albania is a particularly interesting setting where to study the welfare of children and its relation with household decision processes. This country has been largely affected by the transition to a market economy at the beginning of 1990 with the children becoming one of the most vulnerable groups suffering sever poverty and malnutrition problems. In spite the fact that Albania is the youngest country in Europe, with the highest percentage of people under eighteen (UNICEF, 2009), the social protection system does not favour children and young people in any form. In fact, the social protection system established during the communist era has been progressively deteriorated from the transition to a market economy. The traditional Albanian household acquired renewed relevance after the fall of the communist regime. At the end of the Second World War Albania still was a very traditional rural society with patriarchal family values, in mountain and rural areas the entire social and economic structure was governed by the *Kanun* of Lek Dukagjini, a set of traditional and unwritten laws, based on patriarchy and handed down from generation to generation since the Middle Ages. This set of laws gave males unquestioned authority within the household (see Gjonca et al., 2008). During the isolationist Communist regime the educational policies targeted on females changed the patriarchal household. However, the family maintained a central position in the society. With the regime's fall in the 1990s and the following rise of uncertainty, the country set back to a traditional family structure, even if large migration flows out of the country have added a new dimension to the phenomenon, especially in the rural areas (see Danaj et al., 2005; Gjonca et al., 2008). Major problems are suffered by the early childhood since the importance of children's preschool years is not widely understood in the country, especially in poor areas of the north (UNICEF, 2004). The supply of public child care services is very poor and no safety nets measures targeted to households with young children exist: at the moment, the family is still the only institution able to protect vulnerable children. In such a context it is important to look inside the household and study the relation between adulthood and childhood in terms of welfare allocation. When designing family policies, for instance, the possibility of identifying how resources are shared among household's members can be important to define eligibility rules, benefits schemes or to rank individuals in terms of equality.

Then, it has been shown that the impact of cash transfers on poverty among children depends on the response of the household (Alderman et al., 1995). On the other hand, there is a growing evidence that the identity of the recipient of a cash transfer does matter in terms of outcomes (Alderman et al., 1995; Duflo, 2000). Thus a social planner aiming to reduce child poverty through cash transfers should implement policy designs that ensure that cash transfers targeting poor children result in improvements in children's welfare, and/or investment in their human capital.

2 The theoretical framework

Unitary models of consumption are derived via maximization of household utility, which depends on consumed quantities of some market goods, subject to a budget constraint. Consumption of individuals is not modeled and income pooling is assumed. The collective model, firstly introduced by Chiappori (1988, 1992), extends the unitary framework to recover individual preferences introducing a function, the "sharing rule", which determines the proportion of household resources devoted to each household member.

[4]The study concentrates on these households to have a more homogeneous sample and to avoid possible identification issues.

As a consequence, in order to properly estimate a collective model, the crucial point regards the estimation of the sharing rule, and in particular its econometric identification. Available cross-sectional datasets are usually collected at the household level, hence, in general, it is not possible to recover individual preferences. In such a context, the sharing rule is not identified. However, the additional information needed to identify the sharing rule is not much and is usually available to the researchers. In practice, it is sufficient to observe private consumption of at least one market good (Bourguignon, 1999; Bourguignon et al., 2009; Chiappori and Ekeland, 2006, 2009)[5].

There are mainly three empirical approaches for the identification of the sharing rule. The first approach is proposed by Chiappori (1992) and several successive works, and consists in assuming that leisure time is an exclusive good that a member of the household consumes when not working. Observing leisure time of each member and evaluating it at some market (potential) wage, it is possible to identify the sharing rule by means of a labor supply model. This approach is by construction not feasible if one is looking for the sharing rule among adults ad children since children do not work and, more importantly, do not have any (potential) wage.

The second approach proposed by Browning et al. (2006) assumes that there is no change in preferences when passing from single to married. Using available information on singles one can estimate individual preferences. These preferences are applied directly to each member of the couple, recovering the sharing rule by "difference". Again this approach is not applicable to the case of children (not to mention that it is subject to a strong behavioral assumption).

The third approach for the identification of the sharing rule, consists in using available information on consumption of exclusive or assignable goods. If the survey records at least one expenditure category which can be exclusively assigned to just one member of the household, then it is possible to identify the sharing rule. This method shares its theoretical foundation with the first approach, but uses a different source of identification, individual consumption rather than leisure time, within a different framework, consumption demand rather than labor supply (Browning et al., 1994).

The choice of the proper approach depends on the available data and on the purposes of the analysis. In this article, since the focus is on measuring children's welfare, the third approach is the only applicable for the reasons explained above. The expenditure dataset used in this article provides information on several exclusive goods, child clothing, adult clothing, child shoes, adult shoes, education (assigned to children), alcohol and tobacco (assigned to adults).

To properly describe the theoretical model, it is important to distinguish between ordinary, assignable and an exclusive goods.

Definition. *A good is **ordinary** when private consumption of this good is not observed or deducible.*

This is the common case in household expenditure surveys. The good will be consumed by each member of the household, but it is impossible to know in which proportion. Examples are numerous, and include food, communications, recreation and so on.

Definition. *A good is **assignable** when it is consumed in observable proportions by each member of the household.*

For example, if there is information on how far is the working place of the adult member and of school for the child, travelling expenditure could be assigned proportionally to the adult and the child.

[5]If private consumption of one good is observed, and there are no externalities, for a given observed demand $x(\mathbf{p}, y)$ satisfying the Collective Slutsky property and such that the Jacobian $\partial x(\mathbf{p}, y)/\partial \mathbf{p}$ is invertible, then the sharing rule is identified.

Definition. *A good is **exclusive** when private consumption of a good is observed for an identifiable member of the household.*

This is the case of toys or schooling expenditures, which should be consumed only by children.

Assume that a household is composed by two members, an adult and a child. The vector of household consumption[6], denoted by $\mathbf{x}$, is composed of ordinary goods $\mathbf{o}$ and exclusive (or assignable) goods $\mathbf{e}^a$ and $\mathbf{e}^c$, and is additively separable, i.e. $\mathbf{x} = \mathbf{x}^a + \mathbf{x}^c$.[7] Individual consumption $\mathbf{x}^a$ and $\mathbf{x}^c$ is not observed, while expenditure on and prices of the exclusive goods ($\mathbf{e}^a$, $\mathbf{e}^c$, $\mathbf{p}^a$ and $\mathbf{p}^c$) are observed and exogenous.

For explanatory purposes, but without loss of generality, the vector $\mathbf{x}$ is assumed to be composed by one ordinary good o, with price normalized to 1, and two exclusive goods e^a and e^c, with prices p^a and p^c respectively. It is also assured that the household is not engaged in production[8] and that labour supply is fixed. As a consequence, household income is exogenous and assumed to be approximated by total expenditure of the household, denoted by y and equal to $\mathbf{p}'\mathbf{x}$, with $\mathbf{p} = \{1, p^a, p^c\}$ and $\mathbf{x} = \{o, e^a, e^c\}$. Hence, the available information set is $\{e^a, e^c, o; p^a, p^c; y\}$ and the individual decision problem is

$$\begin{aligned} &\max U^k(e^k, o) \\ &s.t. \quad p^k e^k + o \leq \phi^k(p^a, p^c, y) \\ &e^k \geq 0, o \geq 0, \quad k = a, c; \end{aligned} \tag{1}$$

where ϕ^k amount of resources devoted to member k, or, in other words, the sharing rule governing the intra-household allocation of resources.

In this framework, the sharing rule can be viewed as a sort of contracting tool through which household members decide how to distribute resources between them and represents the link between the household and individual level of the decision process. Once each member's resources are assigned he/she will maximize his/her utility subject to its own budget constraint. Thanks to this link, and provided that it is possible to properly estimate the sharing rule, individual preferences can be recovered, and hence individual welfare measures, from household data.

For the econometric identification of the sharing rule, a technique borrowed from Pollak and Wales (1981); Lewbel (1985); Bollino et al. (2000), commonly used to incorporate demographic variables, exogenous factors or household technologies into demand functions can be used.

In general, demographic functions interact with exogenous prices or income and and the magnitude of this interaction can be identified provided that there is sufficient information and variability in the data. The analogy stems from the use of an interaction term with income *a la* Barten (Barten, 1964) for the identification of the sharing rule, where the estimation problem is similar to that of estimating a regression containing unobservable independent variables.

In the next section the demand system is specified and a theoretical proof of the identification of the sharing rule is provided.

[6] If not differently specified, consumption goods or vectors refer to quantities. In general, superscripts indicate the household member, in the present study adult and child, subscripts indicate a specific good.

[7] In this study, public household goods, as housing, traveling costs and so on, are not taken into account. The reason is that the inclusion of such goods implies the adoption of a household production function, possibly with economies of scale which, in absence of the proper information in the data, would cause identification issues for the sharing rule.

[8] Rural Albanian households are likely to be engaged in household production (farm households). The collective consumption model could be estimated separately, if a bigger sample size was available, including household production for rural households.

3 Model specification and identification of the sharing rule

To derive the chosen specification of collective demand system a quadratic extension of the Almost Ideal Demand System (Deaton and Muellbauer, 1980) proposed by Banks et al. (1997) can be used as starting point.

Budget shares for a Quadratic Almost Ideal Demand System (QAIDS) are specified as

$$w_i(y, \mathbf{p}; \theta_i) = \alpha_i + \sum\nolimits_j \gamma_{ji} \ln p_j + \beta_i \left(\ln y - \ln a(\mathbf{p})\right) + \frac{\lambda_i}{b(\mathbf{p})} \left(\ln y - \ln a(\mathbf{p})\right)^2, \tag{2}$$

where $w_i(y, \mathbf{p}; \theta_i)$ is the good i budget share, $\theta_i = \{\alpha_i, \gamma_{ij}, \beta_i, \lambda_i\}$ are parameters, p_j is price of good j and y is total expenditure. $a(\mathbf{p})$ and $b(\mathbf{p})$ are two price indexes, defined as

$$\ln a(\mathbf{p}) = \alpha_0 + \sum\nolimits_i \alpha_i \ln p_i + \frac{1}{2} \sum\nolimits_i \sum\nolimits_j \gamma_{ij} \ln p_i \ln p_j \tag{3}$$

$$b(\mathbf{p}) = \prod\nolimits_i p_i^{\beta_i}. \tag{4}$$

When demographic modifications *a la* Gorman are introduced (Gorman, 1976), demographic characteristics interact multiplicatively with income in a theoretically plausible way (Lewbel, 1985; Perali, 2003). Budget shares are modified as follows

$$w_i(y, \mathbf{p}; \theta_i) \Rightarrow w_i(y, \mathbf{d}, \mathbf{p}; \theta_i) = w_i(t_i(y, \mathbf{d}), \mathbf{p}; \theta_i), \tag{5}$$

where $t_i(y, \mathbf{d})$ is the income translating function and $\mathbf{d}$ is a vector of demographic variables or household characteristics.

Applying this transformation to equation (2) the following demographically modified budget share equation is obtained

$$\begin{aligned} w_i(y, \mathbf{p}, \mathbf{d}; \theta_i) = \alpha_i + t_i(\mathbf{d}) + \sum\nolimits_j \gamma_{ji} \ln p_j + \beta_i \left(\ln y^* - \ln a(\mathbf{p})\right) \\ + \frac{\lambda_i}{b(\mathbf{p})} \left(\ln y^* - \ln a(\mathbf{p})\right)^2, \end{aligned} \tag{6}$$

where

$$t_i(\mathbf{d}) = \sum\nolimits_r \tau_{ir} d_r, \tag{7}$$

$$\ln y^* = \ln y - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i. \tag{8}$$

In order to comply with homogeneity properties of the demand system, this specification of the budget shares demand system is subject to a number of restrictions on the parameters. In particular, to satisfy linear homogeneity in $\mathbf{p}$ and Slutsky symmetry the following restrictions must hold

$$\sum\nolimits_i \alpha_i = 1; \quad \sum\nolimits_i \beta_i = 0; \quad \sum\nolimits_i \lambda_i = 0; \quad \sum\nolimits_i \gamma_{ij} = 0; \quad \sum\nolimits_j \gamma_{ij} = 0; \quad \gamma_{ij} = \gamma_{ji}, \tag{9}$$

while, as proven in Perali (2003), to ensure that the modified cost function maintains the homogeneity property, demographic parameters must satisfy

$$\sum\nolimits_i \tau_{ir} = 0. \tag{10}$$

To next step to obtain the collective QAIDS introducing the sharing rule. The maximization problem in (1) states that the sharing rule determines (the natural logarithm of) the amount

of resources that each household member receives. Being the decision process individual rather than centralized, each member decides how to allocate his share of total expenditure according to

$$w_i^k(y, \mathbf{d}, \mathbf{p}; \theta_\mathbf{i}) = \alpha_i^k + t_i^k(\mathbf{d}) + \sum\nolimits_j \gamma_{ji}^k \ln p_j + \beta_i^k \left(\ln y^{k*} - \ln a(\mathbf{p})\right) + \frac{\lambda_i^k}{b^k(\mathbf{p})} \left(\ln y^{k*} - \ln a(\mathbf{p})\right)^2; \quad k = a, c. \tag{11}$$

Note that, as stated before, the two individual demand equations can be summed to form the household demand equation. In this equation some individual parameters cannot be identified either because of collinearity, for example two constants in the same equations can not be identified, or because of data construction. For instance prices and demographic characteristics are recorded at household level and are likely to be same for all household members. Hence, summing up the demand equations for the adult and the child results in

$$\begin{aligned} w_i(y, \mathbf{d}, \mathbf{p}; \theta_\mathbf{i}) = {} & \alpha_i + t_i(\mathbf{d}) + \sum\nolimits_j \gamma_{ji} \ln p_j \\ & + \beta_i^a \left(\ln y^{a*} - \ln a(\mathbf{p})\right) + \frac{\lambda_i^a}{b^a(\mathbf{p})} \left(\ln y^{a*} - \ln a(\mathbf{p})\right)^2 \\ & + \beta_i^c \left(\ln y^{c*} - \ln a(\mathbf{p})\right) + \frac{\lambda_i^c}{b^c(\mathbf{p})} \left(\ln y^{c*} - \ln a(\mathbf{p})\right)^2. \end{aligned} \tag{12}$$

Household expenditure has been divided into the adult and the child expenditure. In particular, in equation (12), $\ln y^{a*}$ and $\ln y^{c*}$ are defined as

$$\begin{aligned} \ln y^{a*} &= \ln \phi^a(p^a, p^c; y; \mathbf{s}) - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i, \\ \ln y^{c*} &= \ln \phi^c(p^a, p^c; y; \mathbf{s}) - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i. \end{aligned} \tag{13}$$

where $\ln \phi^k(p^a, p^c; y; \mathbf{s})$ is the sharing rule of the k^{th} household member, p^a and p^c are the prices of the exclusive goods, and $\mathbf{s}$ is a set of household/environmental characteristics which is likely to influence the intra household resource distribution but not the overall household demand (the literature often refers to $\mathbf{s}$ as "distribution factors").

Note that in general the resource allocation decision process may be dependent on households or individual characteristics. In fact, households with comparable levels of income and prices may have different sharing rules, which may depend on several factors, as the social background, education of the adults and so on. To take into account this heterogeneity, the sharing rule is defined as a function of observed individual expenditure y^k, price of the exclusive goods p^a and p^c, and a vector of other exogenous characteristics $\mathbf{s}$, in analogy with Barten's scaling, so that a demographically scaled income is obtained, i.e.

$$\phi^k(p^a, p^c; y; \mathbf{s}) = y^k \cdot m^k(p^a, p^c; \mathbf{s}), \tag{14}$$

which in natural logarithms becomes

$$\ln \phi^k(p^a, p^c; y; \mathbf{s}) = \ln y^k + \ln m^k(p^a, p^c; \mathbf{s}). \tag{15}$$

In equation (15), $m^k(p^a, p^c; \mathbf{s})$ is an individual income scaling function, defined over individual prices and a set of distribution factors $\mathbf{s}$.

The identifying assumption in the model is that the portion of income of each member, y^k, can be recovered from observed expenditures on exclusive or assignable goods. In practice, observed

individual income y^k is determined on the basis of the ratio of the expenditure in exclusive goods, r^k. Assuming that adult's expenditure is defined as the expenditure on his exclusive good e^a plus half of expenditure in ordinary goods o, and the same holds for the child, this is equivalent to write

$$\ln y^k = r^k \ln y, \tag{16}$$

where r_i defined as

$$r^k = \frac{1}{y}\left(p^k e^k + \frac{1}{2}o\right). \tag{17}$$

From equations (15) and (17) it follows that the sharing rules can be written as function of household income, individual prices, distribution factors and the ratio of expenditure in exclusive goods, i.e.

$$\begin{aligned} \ln \phi^a(p^a, p^c; y; \mathbf{s}) &= r^a \ln y + \ln m^a(p^a, p^c; \mathbf{s}) \\ \ln \phi^c(p^a, p^c; y; \mathbf{s}) &= r^c \ln y + \ln m^c(p^a, p^c; \mathbf{s}). \end{aligned} \tag{18}$$

Since $\ln \phi^a(p^a, p^c; y; \mathbf{s}) + \ln \phi^c(p^a, p^c; y; \mathbf{s}) = \ln y$, by definition and $r^a \ln y + r^c \ln y = \ln y$ by construction, given equations (18), the following constraint must hold

$$\ln m^a(p^a, p^c; \mathbf{s}) = -\ln m^c(p^a, p^c; \mathbf{s}). \tag{19}$$

To save on notation, set $\ln m^a(p^a, p^c; \mathbf{s}) = \ln m(\cdot)$ and $\ln m^c(p^a, p^c\mathbf{s}) = -\ln m(\cdot)$. Substituting (18) into (13) produces

$$\ln y^{a*} = r^a \ln y + \ln m(\cdot) - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i \tag{20}$$

$$\ln y^{c*} = r^c \ln y - \ln m(\cdot) - \sum\nolimits_i t_i(\mathbf{d}) \ln p_i. \tag{21}$$

In analogy to function $t_i(\mathbf{d})$, function $m(\cdot)$ is identified provided that there is enough variation in distribution factors $\mathbf{s}$ and prices p^a and p^c, and as long as the distribution factors differ from the demographic variables $\mathbf{d}$. The proof is similar to proving that function $t_i(\mathbf{d})$ is identified (Gorman, 1976; Lewbel, 1985).

In the empirical specification the $m(\cdot)$ function is a Cobb-Douglas function, so that the logarithmic specification is linear, that is

$$\ln m(p^a, p^c; \mathbf{s}) = \phi_0 \ln p + \phi_1 \ln s_1 + \phi_2 \ln s_2 + ... \tag{22}$$

The resulting model is similar to that proposed by Menon et al. (2008) to analyse couples without children.

The following section describes the empirical strategy implemented to estimate the collective demand system (12).

4 The econometric specification

When studying systems of the demand equations, the problem of zero "expenditure" must be faced for those goods that are not purchased by a household. Coefficient estimates can be biased when only observed positive purchase data are used, hence it is necessary to apply the proper correction technique. There are several econometric methods to correct for zero expenditures

which differ in the assumptions related to the source of zeros. For example the tobit model (Maddala, 1983; Amemiya, 1985) captures the corner solutions for the utility maximization problem, which imply that the observation is zero just because the household decided to consume zero on the basis of disposable income, prices and its preferences. This could be the case for some goods, but for some other it is not. For example, semi-durable goods (as clothing) may not be purchased in the reference period simply because they give utility for more than one period and a household may need to buy them only once in, say, three months. This situation is called "infrequency of purchases", and cannot be properly captured by a tobit model.

The Double-Hurdle model (Yen, 1993), on the other side, assumes that zero expenditures are explained by a decision process that arises from unobserved latent variables which drive consumer choices. The model allows a separate estimation of participation -a technical expression to indicate the decision to buy a good- and expenditure parameters. This is the case of alcohol, which may be not consumed because of moral conviction or health problems, which are not observable in the survey. Again, this model is not suitable when considering semi-durable goods, as clothing.

An alternative to the double-hurdle model is the Heckman correction model, which assumes that zero expenditures are due to sample selection bias (Heckman, 1979) and are treated as a misspecification error. This purely statistical approach allows to obtain different estimates for participation and expenditure parameters, with the participation choice assumed to be dependent on partially different observable variables with respect to the consumption equation for identification.

In the original model, the first stage determines the participation probability using a probit regression, and in the second stage, a specification for the omitted variable can be used to correct, if present, the sample selection bias. The omitted variable is known as the inverse Mill's ratio, which is the ratio between density and cumulative probability function of the standard normal distribution of the probability to observe a positive consumption. In the empirical model a generalization of the Heckman correction model which overcomes the issues observed by Amemiya (1978, 1979) is used. In particular, the reference work of Shonkwiler and Yen (1999) is followed, which shows the inconsistency of the Heckman estimator and proposes a consistent two-stages estimator for a system of censored equations.

Following the authors, consider the following general limited dependent variables system of equations

$$
\begin{aligned}
& w_{it}^{*} = w(y, \mathbf{d}, \mathbf{p}; \theta_{\mathbf{i}}) + \epsilon_{it}, \quad c_{it}^{*} = z_{it}'\delta_i + \upsilon_{it}, \\
& c_{it} = \begin{cases} 1 & \text{if } c_{it}^{*} > 0 \\ 0 & \text{if } c_{it}^{*} \leq 0 \end{cases} \qquad w_{it} = c_{it} w_{it}^{*}, \\
& (i = 1, 2, ..., m; t = 1, 2, ..., T),
\end{aligned}
\tag{23}
$$

where i represents the i^{th} demand equation and t the t^{th} observation, w_{it} and c_{it} are the observed dependent variables, w_{it}^{*} and c_{it}^{*} are the latent variables, $w(y, \mathbf{d}, \mathbf{p}; \theta_{\mathbf{i}})$ is the demand function, z_{it} is vectors of exogenous variables, δ_i are parameters, and ϵ_{it} and υ_{it} are random errors. Without entering into details, system (23) can be written as

$$
w_{it} = \Psi(z_{it}'\delta_i) w(y, \mathbf{d}, \mathbf{p}; \theta_{\mathbf{i}}) + \eta_i \psi(z_{it}'\delta_i) + \xi_{it}, \tag{24}
$$

where $\Psi(z_{it}'\delta_i)$ and $\psi(z_{it}'\delta_i)$ are univariate standard normal cumulative distribution function and probability density function respectively. The system can be estimated by means of a two-step procedure, where δ_i are are estimated using a Maximum Likelihood probit estimator, and used to predict $\Psi(z_{it}'\delta_i)$ and $\psi(z_{it}'\delta_i)$. Successively, estimates of θ_i and η_i in the system

$$
w_{it} = \Psi(z_{it}'\hat{\delta}_i) w(y, \mathbf{d}, \mathbf{p}; \theta_{\mathbf{i}}) + \eta_i \psi(z_{it}'\hat{\delta}_i) + \xi_{it} \tag{25}
$$

are obtained by Full Information Maximum Likelihood.

Besides the zero expenditures problem, another problem arises, namely, the lack of information on prices and/or unit values. Since the survey records only expenditure information[9], the lack of information about quantities purchased precludes the possibility to derive household specific unit values. On the other hand, available price indexes have an aggregation level similar to that of the survey but are not sufficient to provide plausible elasticities. For this reason, the procedure, originally proposed by Lewbel (1989) to construct pseudo unit values is used. Without entering into details, the pseudo unit values is estimated by means of

$$\hat{p}_i = \left(\frac{1}{k_i^*} \prod_{j=1}^{n_i} w_{ij}^{-w_{ij}} \right) ex_i, \tag{26}$$

where ex_i is expenditure on the i-th good, w_{ij} is the subgroup budget share. Good i is a good of the demand system, which is the aggregation of j subgroup goods (for example food is the aggregation of vegetables, meat, ..., and so on). k_i^* is a scaling factor defined as

$$k_i^* = \prod_{j=1}^{n_i} k_{ij}^{-k_{ij}} \tag{27}$$

where $k_{ij} = mean(w_{ij})$ is the mean subgroup budget share.

5 Data and sample selection

The data used in this article are drawn from the World Bank Living Standard Measurement Survey collected in Albania in 2002[10]. These data contain information on household consumption, socio-economic conditions of the household and individual variables related to education, labour market and health. The original sample covers 3,599 households, but only households with children under-five are selected for the analysis. The sample consists of 511 households.

The decision to drop families with children older than five is due to several reasons. First, the focus is on the welfare of young children within the family and the support of public policies for early childhood. Since schooling is mandatory for children aged 6 and more, preschooling represents an in-kind public transfer relevant for child wellbeing[11] and very selective for transition countries[12]. Second, children under-five are not affected by the phenomenon of child labor which

[9] As described in the next section, this methodology is applied to the Albanian LSMS by the World Bank

[10] 2005 data are not used because it was not possible to reconstruct the consumption categories from the row data as needed. This is due to some intermediate datasets which are not included in the available data and cannot be reconstructed from the do files provided by the World Bank.

[11] Empirical studies focusing on developed countries have shown the importance of early childhood programs for skill formation. For example, Heckman and Masterov (2007) show that investing in early childhood programs is a kind of public investment not affected by the equity-efficiency trade off. The authors also focus on social benefits of preschool programs, especially for disadvantaged children. In developing countries, preschool attendance is typically considered important for monitoring children's health and nutrition status, especially in the case of poor children (see the empirical works of Behrman et al., 2004; Alderman et al., 2006). Preschool is like a multidimensional indicator, for example within the context of UNICEF's basic framework of survival, protection, development and participation, preschool attendance in developing countries is relevant for all the domains.

[12] Micklewright (1999) shows that enrolment rates in kindergarten, which is non-compulsory, have dropped sharply during the transition in the Caucasus, Central Asia, South-east Europe and the Western CIS while similar rates have fallen only slightly in Central Europe and the Baltic States. At the end of communist period in Albania preschool enrolment was about 60% (Danaj et al., 2005), in 1992 the rate reached the 34% (UNICEF, 2004) while during the recovery period children attending preschool programs still were only around 45-50% UNICEF (2004, 2009).

can influence children's bargaining power. Since the dataset used does not collect information on child labour, this would represent an unobservable factor for the present study. Third, the sharing rule is estimated for an equivalent household composed by one adult and one child controlling for household composition at the household level. However, the presence of children of very different age would severely affect both the estimate of the sharing rule and of the overall system of consumption demand of goods, posing an identification problem[13] for the sharing rule (Chiappori and Ekeland, 2009)[14].

The estimation of the demand system is conducted over six categories of goods: food, alcohol and tobacco, clothing, meat, housing and other goods[15]. Household-specific prices, or pseudo unit values, of these goods are assigned following the procedure described in the previous section.

As proved in Section 3, the identification of the sharing rule comes from two observed exclusive expenditures. In this dataset, both clothing and footwear are recorded for males, females and children. Moreover, it is sufficiently safe to assume that consumption of alcoholic beverages and tobacco is exclusive to the adults. Expenditure in education, moreover, is assumed to be exclusive to children -only expenditures strictly related to preschool are included. Finally, in order to take into account the number of family members, per-capita individual consumption is introduced among the explanatory variables. In this way, within each household, the individual expenditures equivalent to an hypothetical household composed by one adult and one child are computed.

The gender dimension, which has been neglected in the model because of the choice of an adult/child sharing rule[16], is recovered with a dummy variable indicating if females are more than males in the household, a dummy variable indicating the highest level of education of household's head, dummy variables for head's or spouse's chronic illness or disability, variables on family composition (number of children, number of adults and number of elderly), a variable indicating the presence of multiple couples within the household (enlarged families), a subjective declaration about a minimum income necessary to survive, a subjective declaration of socio-economic status, a dummy variable taking "1" if the house is bigger than 100 squared meters, a dummy owning a telephone and a dummy indicating if at least a member has emigrated abroad after the " pyramids crisis" in 1997[17].

The distribution factors $\mathbf{s}$ chosen to be in the sharing rule are: the price ratio of the two comparable exclusive goods (the price of adult clothing divided by the sum of adult clothing and children clothing), household declaring to belong to religious minorities (other than Muslim or Orthodox)[18] or not religious, chronically illness of the child, both partners employed ("bi-active couple"), age ratio defined as female age divided by the sum of partners' ages, education ratio defined as wife's years of schooling divided by the sum of the couple's years of schooling, *Ndihma Ekonomike* participation, and attending early-childhood programs delivered by the public sector (the variable takes "0" if no child attends preschool in the family, "1" if at least one child currently attends and "2" if all children attend preschool.). These last two variables are introduced to test

[13]For example it is not clear if children above twelve consume child or adult clothing and children between six and twelve attend mandatory school.

[14]We plan to deal with this problem in a future work, aiming at extending the collective model to take into account of resources distribution among males, females and children simultaneously.

[15]To avoid unnecessary complications only non durable goods are considered.

[16]Indeed, the research focusing on transfers between adults and children should not anyway neglect transfers between husbands and wives (Bourguignon, 1999).

[17]The big financial crisis was due to the follows. Pyramid's (or Ponzi) schemes had been operating since 1992 and in February 1997 they collapsed with a large share of the population's savings. The diffused rebellion, induced by the collusion between pyramid entrepreneurs and the government elected democratically in 1992, ended in a civil disorder and collapse of state power with the south of the country controlled by armed groups. This caused a huge economic recession and massive migrations flows.

[18]The two major religious groups of Albania.

the possibly different impacts of cash and in-kind transfers. In fact, *Ndihma Ekonomike* is a sort of minimum income cash program, while preschooling can be considered as the most important in-kind transfer from which a child is recipient. As regards the variables used in the first stage probit estimates of the zero correction estimator, $\mathbf{z}$, a larger set of variables than $\mathbf{d}$ is used. A description of this variables is omitted because it is self-explained in Table 1 which reports the estimates of the probit regressions used for the " zero correction".

6 Results

This section presents the results of the two-steps estimation of model (25). When zero expenditure are observed for one good in the data, the first step estimates the probability of observing a positive consumption with a probit model, while the second stage uses the predicted Mill's ratios to estimate the demand system with Full Information Maximum Likelihood, imposing a-priori parameters' restrictions.[19]

Table 3 presents the estimates of the collective QAIDS demand system[20]. Income and price parameters are significant, with some exceptions, as income parameter of housing expenditure for the adult and alcohol parameter for the child, which are all non significant[21]. Among demographic variables, the general evidence is towards small parameters values, even if many are still significantly different from zero. In particular the interaction of higher education of the household head with income has a positive influence on consumption of goods, even if more education does not involve more consumption of alcohol and of tobacco. The number of children in the family influences positively the household consumption of clothing and food, as expected, and to live in an enlarged family has a positive effect on the consumption of food. The consumption of alcohol and tobacco is influenced by having members emigrated abroad and by the number of adults in the family. "Other goods" is mostly composed by education and cultural expenditures which are influenced positively by the education of the household head and by the self-reported socio-economic status.

Table 4 shows income and price elasticities. Signs are consistent with consumption theory, with negative own price elasticities. The relevant exception is alcohol and tobacco price elasticities which are positive. These goods may suffer from different effects on the estimate of own price elasticities: first, alcohol and tobacco are not consumed by child but he/she could still influence household consumption in a way that may not be properly captured by the model. Second, Albania has a strong smoking tradition and a huge traditional consumption of made home *raki rrushi*[22] which may bias estimates. Third, alcohol and tobacco are addictive goods, thus their consumption may not be much affected by their market prices.

According to their size, clothing and housing are the most elastic good to price changes, while meat and food are the less elastic. As for income elasticities, which could estimated individually. For the adult, the most elastic good is clothing, while, as expected alcohol and tobacco have

[19]Symmetry and homogeneity are ensured by construction, with the Slutsky matrix having two individual income terms which sum up to the household income effect, because of the symmetry of the individual transfers shown in equation (19).

[20]The parameters of the sharing rule are estimated simultaneously with the demand system, but are report in a separate table. Instead, the estimates of the first stage probit regressions are not reported: they are available upon request.

[21]It is true that alcohol is not consumed by the child but the demand system is estimated at the household level, and it is possible that the presence of children may influence the overall demand, and not only trough the "sharing rule".

[22]Raki rrushi is the Albanian version of the Turkish *raki*. It is a spirit considered to be the national drink by Albanians. It is made using 100% pure grape (*rushi* is the Albanian word for grape and it is so pure that Albanians even use it to heal cuts and scrapes.)

the smallest elasticity. For the child, the larger elasticity belongs to "other goods", all expected results since this category contains also educational and recreational expenses. From a policy perspective, this is an important result since it means that more resources devoted to children in the household would end in investment in human capital. The less elastic good is alcohol and tobacco, which is around zero. Since the child is under five, it is clear that he/she does not consume this good, so the elasticity should be expected to be null.

To properly interpret the parameters of the sharing rule, it must remembered that $m^a(\cdot) = m(\cdot)$ and $m^c(\cdot) = -m(\cdot)$, hence the estimated parameters refer to the sharing rule of the adult, while the same parameters' values have the opposite effect on the sharing rule of the child. Estimate of the parameters of the sharing function are reported in Table 5. They show that the ratio between the prices of adult and child clothing influences positively the propensity to allocate resources in favour of adults. This suggests that subsiding child specific goods would not have a positive influence on children's welfare because this would increase the price ratio reducing the share of resources of the child. The age differential between female and male (age ratio) influences negatively child welfare: small differences in age between the partners may indicate a balanced couple with more caring for their son/daughter. Even if to receive a monetary support (*Ndihma Economike*) has no influence on child welfare, attending a preschool programs influences the distribution of resources within the family in favour of the child. This evidence seems to favour in-kind benefits rather than cash transfers for the welfare of children, at least from an intra-household perspective. The NE cash transfer has proven to be quite non-effective in alleviating poverty (Mangiavacchi and Verme, 2009) and in supporting child welfare in families with young children, despite the fact that it is the only family allowance program operated in the country. It is possible to conclude that it has an equal negative effect on adult and child being, it is no effective for the household welfare as a whole and for the vulnerable individuals within the household. To add further details to the analysis, figures 1 and 2, show the relative sharing rule, expressed as the ratio between the expenditure for child and total household expenditure ($\phi^c(\cdot)/y$). These pictures are drawn by means of non-parametric regressions of the sharing rule on total household expenditure.

Figure 1 shows that share of child/adult expenditure goes from 21% for poor households to 39% for higher income households. This difference between poor and rich families is mostly driven by urban households, in fact Figure 2 shows that urban children in the richest deciles have the highest share of resources. The socio-economic status influences positively the attitude toward children for households living in the cities. Instead, in rural areas the distribution of resources within the family is constant along the distribution of the household welfare. This could be driven by the scarce development of rural areas in Albania: even if the household is rich, there may not be much to do for children with that money because of the absence of toy-shops, recreational and cultural activity centers, fashion shops.

The estimated value of the "sharing rule" refer to an hypothetical equivalent household composed by two members: one adult and one child. In other words individual consumption of the adult and the child, the source of sharing rule identification, are rescaled to take account number of adults and children in the household. To say something more general about regarding children's welfare and the effects on intra-household inequality, it is necessary to recover the real individual expenditure of each child in the family, given the "sharing rule" that has been estimated.

In order to have proper measure of individual child welfare the following equation, which rescales back the "sharing rule" to obtain the true values of individual consumption taking into account the real household composition, since the "sharing rule" is estimated on an one adult/one child equivalent household:

$$S_c = \frac{\rho^c}{n_c\rho^c + n_a(1-\rho^c)}\, y \tag{28}$$

where ρ^c is the estimated child's relative "sharing rule", computed as ϕ^c/y, n_c and n_a are the number of children and of adults in the household. The resulting value is the actual share of total expenditure of each child and can be used to perform poverty and inequality analyses of child welfare. In other words this is a sort of household specific equivalence scale, where the scales not only depend on household composition and/or characteristics, but also on intra-household resource distribution.

The following analysis focused on child welfare, ignoring what happens to adults. Moreover the sample is compose only by children under five, hence the results are very specific to this group of study and cannot be generalized to all Albanian children. A more general analysis with gender differentiation and a proper modeling of children of different ages is planned in a future work.

Figure 3 shows the distribution of child welfare using the estimated share of children's consumption (continuous line) and the per-capita consumption measure (dashed line), computed assuming an equal distribution among household's members. The kernel density distribution reveals that child welfare is distributed more unequally if also intra-household allocation is considered and that the average level of child consumption is lower. The plotted Cumulative Distribution Functions of individual consumption shares and per-capita consumption show that taking into account intra-household inequality, child consumption is smaller both on average and along the whole distribution. Just to give a crude number, inequality in child consumption measured by the Gini index shifts from a 0.286 computed using per-capita consumption to a 0.382 computed using the "sharing rule". Intra-household inequality accounts for almost ten percentage points of the Gini index for children under five in Albania. The estimated "sharing rule" exploit the information on expenditure for children within the household. This procedure improves a simple per-capita index where an equal distribution of expenditure among household's members is assured.

Turning to policy issues, economists have traditionally been skeptical about in-kind income support policy measures, viewing cash transfers as superior in terms of recipients' utility, since unitary models assume that the resources within the household are allocated optimally according to individual needs. From the estimated "sharing rule" (Table 5), instead, shows that family allowances have no effects in the proportion of resources allocated to young children while preschool participation (an in-kind transfer) has a positive impact.

To explore further the effects of public transfers on children's welfare, figure 4 shows the children "sharing rule" ρ^c of two groups of families: one with no child attending preschool and the other with at least one child currently attending preschool. The "sharing rule" of attending children is nearly constant along the consumption distribution and close to 0.4. On the other hand, the "sharing rule" for non-attending children U shaped, where the lowest and highest income families seem to take more care for their children. The difference in the two "sharing rules" is significant along the whole income distribution, in line with the correspondent "sharing rule" parameter.

As to the effects on intra-household inequality of public cash transfers, Figure 5 shows that the poor household, well targeted and effectively in needs of a minimum income, do not show a significantly different behaviour whether they receive or not the benefit. Nonetheless, it seems that the share of aid that would go to the child is rather low, around 0.2. On the other hand, the "leakage" households (that is those households that are not poor but beneficiary) behave more egoistically toward their children with respect to similar households not receiving the benefit.

These results show once again the negative effects of bad targeting on the program's effectiveness if one considers behavioural responses.

These considerations on cash transfers are partial, both because the reference sample is not representative of the whole Albanian population and because the analysis is subject to further improvements manly to take into account gender inequality in the estimation of the demand system. However, the use of collective models for welfare analysis is superior simply because there are too many aspects that with an unitary approach cannot be taken into account.

7 Concluding remarks

This article applies the collective framework to the measurement of intra-household inequality to study child welfare in Albania. Albanian households have been deeply affected by the transition to a market economy from a regime that revolutionized the previous patriarchal tradition. The effect of the transition seems to be that of bringing back those traditional values, with a marginal role for women and negligence toward childhood, especially in rural area. At the same time, the household structure is changing deeply since migration has affected strongly family's equilibria. To open the family's black-box in this case is highly relevant to study individual welfare and evaluate the impact of public policies on the intra-household distribution of resources. The analysis is conducted on Albanian households with children under five, using consumption variables present in the Albanian Living Standard Measurement Survey.

Is has been shown that intra-household inequality measured on the share of expenditure plays an important role in determining child welfare. The Gini index for children increases when child welfare is computed using the "sharing rule" method versus the per-capita income method. It has also been tested whether receiving public transfers induces a modification of the "sharing rule" with respect to similar households who do not receive benefit from these transfers. A distinction has been made between cash transfers and in-kind transfers, the latter been represented by preschool attendance (which is paid by the government). In-kind transfers are likely to improve the condition of children within the household for all income level. On the other hand, means testing cash transfers do not seem to ameliorate the relative position of children within the household, while if cash transfers go to non poor families intra-household inequality between adults and children may worsen. This finding suggests that if properly conceived, in-kind transfers can be effective, both because well targeted and because they fulfil precise needs. Attending preschool for young children is on the contrary a way of increasing share of resources dedicated to children within the family and this finding suggests the goodness of this particular in-kind transfer.

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Table 1: Descriptive Statistics of the Variables Used in The Collective Model - Households with Children Under-Five

Variable names	Mean	Std. Dev.	Min	Max
Share of meat	0.148	0.082	0.000	0.541
Share of clothing	0.128	0.104	0.000	0.553
Share of housing	0.033	0.034	0.000	0.342
Share of alc. & tob.	0.018	0.026	0.000	0.155
Share of other goods	0.030	0.048	0.000	0.442
Share of food	0.643	0.131	0.273	0.946
Price of meat (log)	5.860	0.642	0.762	6.802
Price of clothing (log)	7.202	0.284	6.129	7.783
Price of housing (log)	5.794	0.234	4.534	6.393
Price of alc. & tob. (log)	5.873	0.162	5.447	6.343
Price of other goods (log)	6.041	0.543	4.427	7.134
Price of food (log)	2.883	1.371	-0.641	5.092
Total expenditure (log)	9.366	0.510	7.955	10.97
More females than males in the household	0.198	0.399	0.000	1.000
Household head has university or higher degree	0.096	0.295	0.000	1.000
Household head is in bad health	0.233	0.423	0.000	1.000
The spouse is in bad health	0.276	0.447	0.000	1.000
Number of children aged 5 or below	1.564	0.650	0.000	5.000
Number of adults	2.603	1.121	0.000	7.000
Number of elderly	0.480	0.500	0.000	1.000
Multiple couple within the household	0.343	0.475	0.000	1.000
Minimum income needed to make end needs (log)	10.443	0.565	5.992	12.899
Subjective socio economic status	3.640	1.656	1.000	9.000
Big house	0.143	0.350	0.000	1.000
Household has a telephone	1.746	0.436	1.000	2.000
Presence of emigrated	0.272	0.445	0.000	1.000
Female household head	0.139	0.346	0.000	1.000
Household head is young	0.378	0.485	0.000	1.000
Head have only primary or no education	0.583	0.494	0.000	1.000
Spouse is older than head	0.082	0.275	0.000	1.000
Bi-active couple	0.272	0.445	0.000	1.000
House is less than 40 square meters	0.166	0.373	0.000	1.000
House is at least 100 square meters	0.143	0.350	0.000	1.000
No preschools in the community	0.209	0.407	0.000	1.000
No ambulatory or hospital in the community	0.149	0.356	0.000	1.000
Price ratio	0.4960	0.055	0.345	0.711
Catholic or other non-orthodox religion	0.096	0.295	0.000	1.000
Child is ill	0.155	0.362	0.000	1.000
Age ratio of the spouses	0.410	0.155	0.000	0.632
Education ratio of the spouse	0.185	0.254	0.000	1.000
Receives NE benefit	0.194	0.396	0.000	1.000
Children attend preschool	0.252	0.568	0.000	2.000
Ratio of adult vs. child consumption (r_a)	0.512	0.076	0.155	0.815

Table 2: Probit Estimates for the Correction of the Zero Expenditure

Variable name	Meat	Clothing	Housing	Alc.& Tob.	Others
Constant	6.113	0.918	6.336***	-0.176	2.392***
Female household head	-0.350	-0.255	2.935***	-0.165	-0.203
More females than males (adults)	0.907	0.333	0.034	-0.189	0.156
Household head is young	-0.780	0.225	0.157	-0.191	-0.337
Head have only primary or no education	-0.078	-0.150	-0.474	-0.060	-0.466***
Head have university degree or more	2.352	-0.049	1.784***	-0.344	-0.213
Spouse is older than head	-0.001	-0.543*	3.034***	-0.160	-0.076
H. head has bad health conditions	0.065	0.171	0.139	0.143	-0.002
Number of children under 5 in the household	0.633	0.091	0.331*	-0.023	-0.066
Presence of elderly	-0.938	-0.096	-0.287	0.169	0.241
Bi-active couple	0.021	-0.352	0.063	0.416***	0.152
Economic status	0.353**	0.143*	0.246**	0.162***	0.032
House is less than 40 sq m	-0.053	-0.377	-0.069	0.044	-0.291
House is at least 100 sq m	0.063	0.079	-0.098	-0.164	2.719**
No preschools in the community	-0.540	0.912***	-0.268	-0.054	-0.466*
No ambulatory or hospital in the community	0.155	-0.476*	-0.368	-0.107	-0.254
Presence of a telephone inside dwelling	-2.518	0.197	-2.404***	-0.070	-0.114
Presence of emigrated	0.103	0.037	-0.468	-0.147	-0.113

Table 3: Parameters and Demographic Variables of the Collective Demand System

	Meat	Clothing	Housing	Alc/Tob	Others	Food
Parameters						
α_i	0.070	0.162	0.005	-0.022	0.089**	0.696***
	(0.067)	(0.110)	(0.032)	(0.061)	(0.040)	(0.120)
γ_{ji}	0.008	0.003	-0.001	-0.007**	0.000	-0.004
	(0.005)	(0.006)	(0.002)	(0.0032)	(0.002)	(0.006)
		-0.073***	0.013***	-0.009	0.007	0.059***
		(0.011)	(0.004)	(0.007)	(0.004)	(0.008)
			-0.024***	0.008	0.006**	-0.002
			(0.005)	(0.005)	(0.002)	(0.003)
				0.053***	-0.014***	-0.032***
				(0.010)	(0.004)	(0.006)
					-0.005*	0.007**
					(0.003)	(0.003)
						-0.028***
						(0.010)
β_i^a	0.014	0.031***	-0.002	-0.029***	-0.029***	0.014
	(0.010)	(0.010)	(0.003)	(0.006)	(0.006)	(0.013)
β_i^c	-0.003	0.049***	-0.001	-0.033***	0.017***	-0.029
	(0.008)	(0.018)	(0.004)	(0.005)	(0.006)	(0.024)
λ_i^a	-0.004**	0.005***	0.000	0.002**	0.005***	-0.009***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
λ_i^c	-0.004**	0.011***	0.002**	0.001	0.003***	-0.012***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)
η_i	-0.082	-0.232***	0.033	-0.027	-0.024	
	(0.063)	(0.055)	(0.026)	(0.018)	(0.016)	
Demographic variables						
Females more than males in hh	0.022*	-0.017	-0.005	0.010	-0.002	-0.010
	(0.012)	(0.018)	(0.004)	(0.008)	(0.005)	(0.018)
Head has univ. degree or higher	0.006	0.069***	0.023***	-0.006	0.017***	-0.109***
	(0.015)	(0.020)	(0.005)	(0.009)	(0.006)	(0.021)
Head is in bad health	-0.013	0.010	0.002	0.006	0.005	-0.010
	(0.010)	(0.014)	(0.003)	(0.005)	(0.004)	(0.014)
Spouse is in bad health	-0.033***	0.028 **	0.004	0.002	-0.005	0.005
	(0.009)	(0.013)	(0.003)	(0.006)	(0.004)	(0.014)
Number of children under 5	-0.001	-0.023***	-0.001	-0.002	0.003	0.024***
	(0.007)	(0.009)	(0.002)	(0.004)	(0.003)	(0.009)
Number of adults	0.007**	-0.012**	0.001	0.005**	-0.004**	0.004
	(0.004)	(0.006)	(0.001)	(0.002)	(0.002)	(0.006)
Number of elderly	0.026**	0.006	-0.003	0.002	-0.002	-0.029*
	(0.011)	(0.015)	(0.004)	(0.006)	(0.004)	(0.017)
Multiple couples within the hh	-0.019*	-0.030*	0.004	-0.001	-0.001	0.047***
	(0.011)	(0.017)	(0.004)	(0.006)	(0.005)	(0.017)
Subjective "basic needs" income	0.007	0.019**	-0.002	-0.003	-0.001	-0.019**
	(0.006)	(0.009)	(0.002)	(0.004)	(0.002)	(0.009)
Subjective socio-economic status	0.001	0.003	0.002*	-0.003	0.006***	-0.009**
	(0.003)	(0.004)	(0.001)	(0.002)	(0.001)	(0.004)
Dummy - house bigger than 100m	0.009	0.011	0.003	0.005	-0.002	-0.026*
	(0.009)	(0.013)	(0.003)	(0.006)	(0.004)	(0.014)
Dummy - having a telephone	-0.0064	0.0260*	0.0055	0.0014	-0.0053	-0.0212
	(0.011)	(0.014)	(0.004)	(0.007)	(0.004)	(0.016)
Dummy - hh member migrated	0.004	-0.018	-0.003	0.015***	0.001	0.000
	(0.008)	(0.011)	(0.003)	(0.005)	(0.003)	(0.012)

Table 4: Household's Income and Price Elasticities

	Meat	Clothing	Housing	Alcohol/Tobacco	Others	Food
Income (adult)	0.976	1.649	0.904	0.433	0.632	0.961
Income (children)	1.061	1.154	0.810	-0.008	1.621	1.016
Meat	-0.956	0.026	-0.003	-0.049	-0.006	-0.049
Clothing	-0.098	-1.934	0.125	-0.112	0.020	0.196
Housing	0.041	0.437	-1.805	0.291	0.225	0.096
Alcohol/Tobacco	0.063	-0.152	0.274	0.582	-0.269	0.076
Others	-0.085	0.433	0.512	-1.084	-1.415	0.386
Food	-0.002	0.101	-0.004	-0.054	0.011	-1.030

Table 5: Adult Sharing Rule Parameters in $m(\cdot)$

Ratio between adult and child exclusive goods	3.012***
	(1.164)
Dummy for "other than Muslim or Orthodox"	0.155
	(0.152)
Dummy for child chronic illness or disability	0.109
	(0.152)
Dummy for both parents employed	-0.090
	(0.145)
Ratio between spouse and head age	1.460***
	(0.548)
Ratio between spouse and head education	-0.108
	(0.191)
Dummy for *Ndhime Ekonomike* beneficiary	0.202
	(0.144)
Preschool ("2" if all the children attend, "1" if at least one,"0" if nobody)	-0.624***
	(0.106)

Figure 1: Semi-parametric plot of the Child "Sharing Rule" by Total Expenditure - Whole Sample

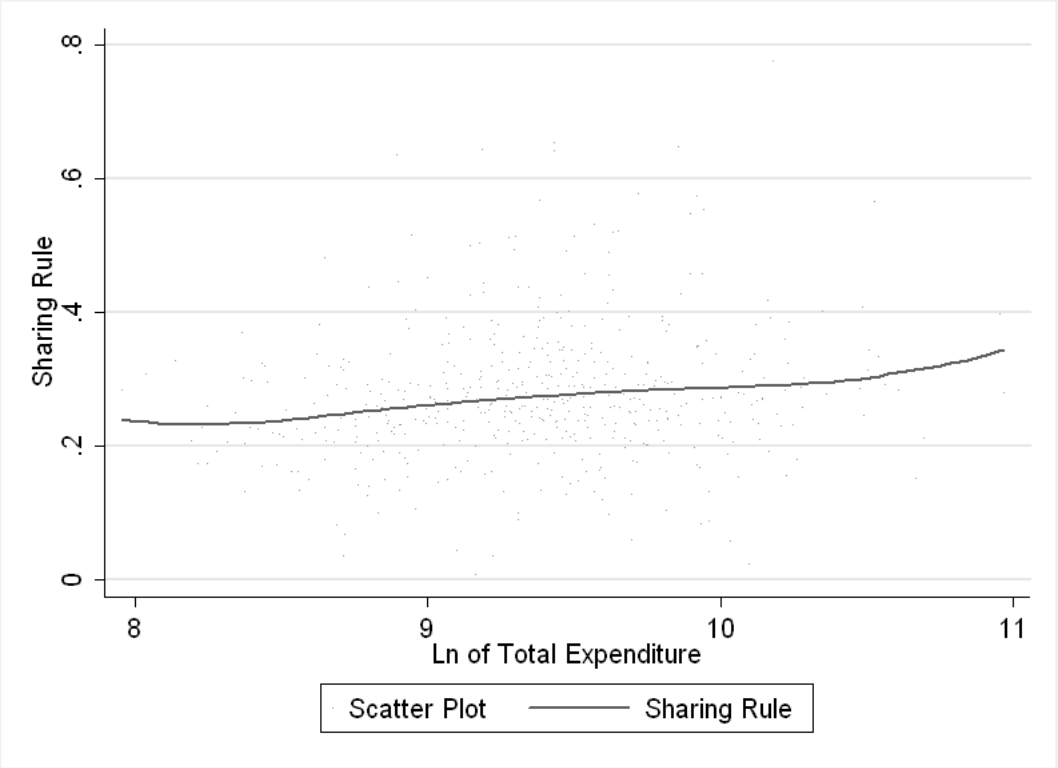

Figure 2: Semi-parametric plot of the Child "Sharing Rule" by Total Expenditure - Urban/Rural

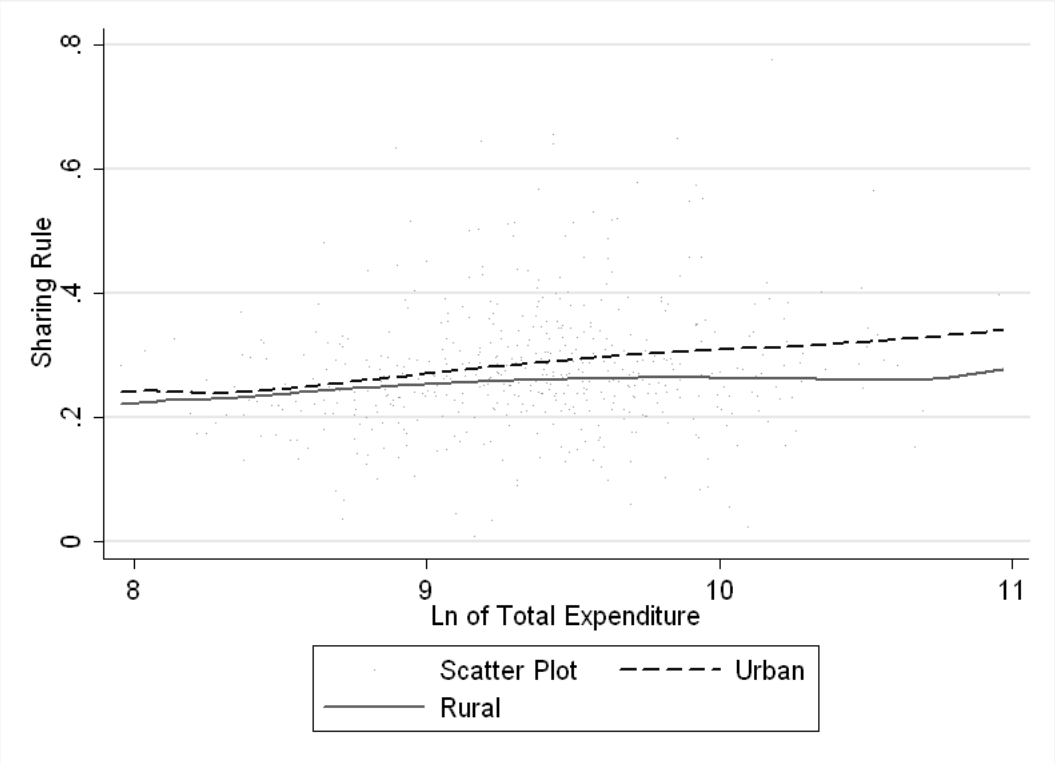

Figure 3: Individual Child Expenditure Distribution: "Sharing Rule" vs. Per-capita Consumption

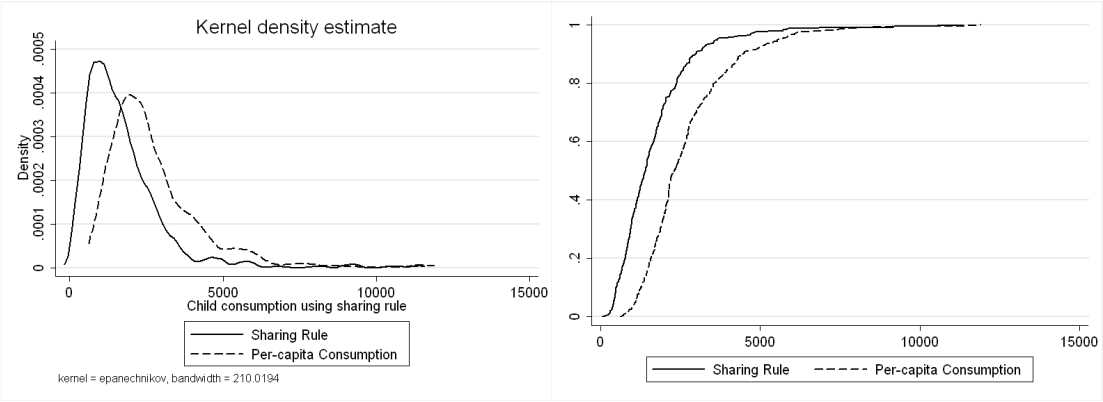

Figure 4: Semi-parametric plot of the Child "Sharing Rule" by Total Expenditure - Impact of Attending Preschool on the "Sharing Rule"

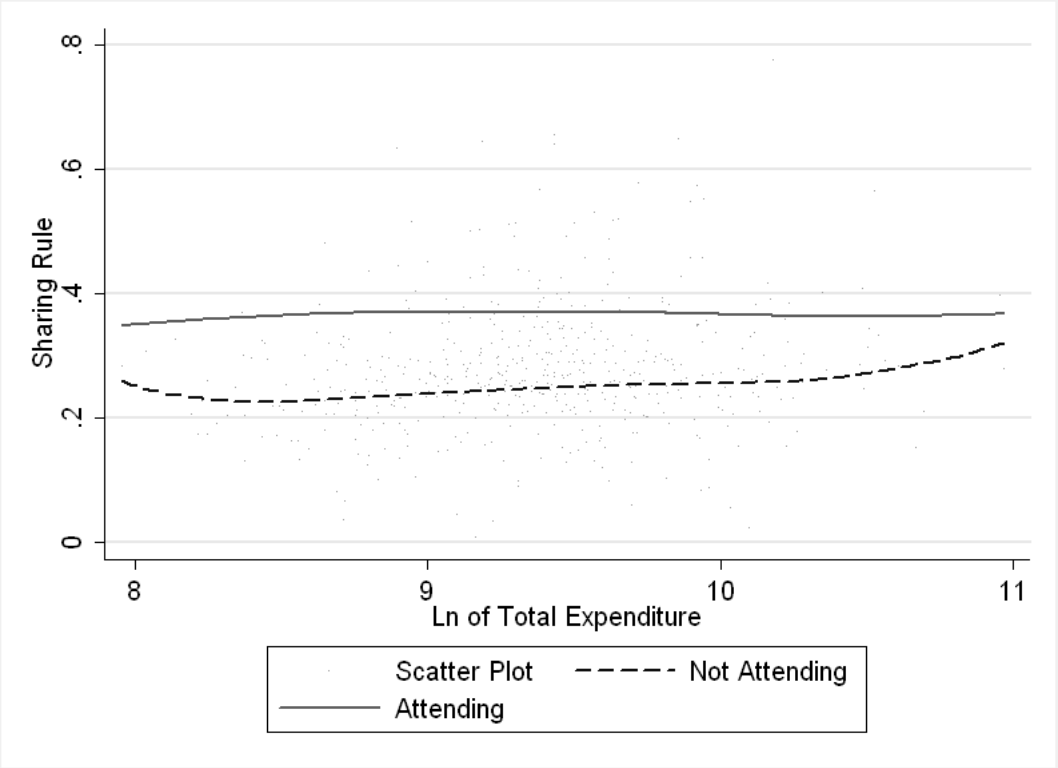

Figure 5: Semi-parametric plot of the Child "Sharing Rule" by Total Expenditure - Impact of *Ndihma Economike* on the "Sharing Rule"