Intrahousehold Bargaining on Household Expenditure

Case of rural Ethiopia

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Summary

This thesis studies effect of women’s intrahousehold bargaining power on household expenditure, especially on child education and clothing in rural Ethiopia. To this end, a linear panel data model is applied to analyze the data on 1048 of the total 1385 households included in the Ethiopian household survey, for the last seven rounds covering the period between 1994 and 2009. Empirical analysis of the study is backed by a Nash cooperative bargaining model, in which couples maximize the product of their individual gains from marriage, subject to a pooled budget constraint. Solution of the model predicts that factors which increase outside options will positively affect household demand for private goods of the spouse, whose fallback position is improved.

The empirical results suggest that generally men have advantage over women in their intrahousehold bargaining position, as measured by the value of assets they bring in to marriage. Men bring more than eight times more assets, in value, than women. It is also observed that household expenditure on cloth is more or less uniformly distributed across the survey rounds, whereas household expenditure on education is generally higher in the last three rounds of the survey. Moreover, we see that women’s bargaining position, as measured by the value of assets they brought in to marriage, deflated by household income, has no significant effect on household expenditure on child education, but negatively affects household expenditure on child clothing. From the results, it possible to reach at the implications that: child education may be a household public good; unitary model may best explain household interactions\(^1\); and child cloth may be the husband’s private good.

In the robustness testing regressions, we see that the measure of women’s bargaining power has no significant effect on household expenditure on alcohol & tobacco and has negative effect on household expenditure on cosmetics. The unexpected signs and significance of the measure of bargaining power of women in the regression results could be due to the nature of the sample households, which are characterized by low levels of discretionary expenditure with too little to bargain over and household preference structures which could be different from what is traditionally expected.

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\(^1\) Detailed description of unitary model is provided in section 2.1
Preface

I would like to thank the Norwegian Center for International Cooperation in Education (SIU) and University of Oslo, for giving me the opportunity to study this master’s program under the quota scheme scholarship.

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1 Introduction

The understanding of the household as the basic decision making unit is not a recent phenomenon in economic literature. But focus on the dynamics that lead to those decisions and intrahousehold allocation of welfare is relatively a recent phenomenon.

Unitary model of the household, introduced in 1960s, treated the household as a united decision making unit, sharing the same preference across its members and pooling resources. Later on, this way of looking at household decision making came under scrutiny, with evidence from different countries suggesting that the household shouldn’t be thought as sharing the same preference and that the dynamics within the household greatly affect household resource allocation.

In recent studies of intrahousehold allocations, women’s ability to influence household decisions is found to affect key development outcomes. Interest has been particularly strong among economists working on developing countries, where even slight differences in the intrahousehold allocation of scarce resources can have dramatic consequences (Fafchamps and Quisumbing 2002). Women and men across all countries differ in their socioeconomic power position, with women typically at a disadvantage. For instance, according to United Nations (2015), in sub-Saharan Africa, only 34 per cent of married women aged 15 to 49 were employed in the past 12 months and paid in cash, and an additional 12 per cent were paid in cash and in-kind; the corresponding proportions for married men were 57 and 18 per cent, respectively. This is one example that illustrates the women’s marginalized economic position.

Ethiopian women are not exceptions in this regard from women in other sub-Saharan African countries. Most Ethiopian households have a patriarchal structure, where the man in the household makes most of the important decisions. In the study by Fafchamps and Quisumbing (2002), only 2.7% of monogamous households, with husband and wife living together, are headed by the female.

In light of this, there have been efforts to better involve women in household decisions. The emphasis on gender equality in the united nations sustainable development goals is one example. But, what kind of interventions may lead to increased decision making power has been a major point of discussion among social scientists.
The first difficulty in studying this problem is the fact that bargaining power of individuals in the household itself is not directly observable. Most researchers, especially in the field of economics, believe control over productive resources within the household to be important in determining intrahousehold decision making power. This may not be straightforward in every case, with social norms and values expected to play key role in intrahousehold dynamics in different societies. As in United Nations (2015), although women do contribute to the welfare of their household, either through paid or unpaid work, they often lack decision making power over the economic resources of the household. For instance, only 2 in 3 married women aged 15 to 49 participate in decision-making on major household purchases in developing countries. This is often the case in sub-Saharan Africa and Asia. In sub-Saharan Africa, for example, only about half of married women (54 per cent) have a say on major household purchases.

Among the key development outcomes expected to be linked with bargaining power of women is welfare outcome of children, especially their health and education. By studying the observed relationships between value of assets brought in to marriage by spouses and household expenditure on their children’s education and cloth, this study seeks to show implications of those relationships on the connection between intrahousehold bargaining power of women and household expenditure. Thus, this thesis will try to answer the following research questions in the context of rural households in Ethiopia.

- Does women’s intra household bargaining power affect household expenditure on child education?
- Does women’s bargaining power affect household expenditure on child cloth?
- Can value of assets brought in to marriage credibly measure intrahousehold bargaining positions?

A few studies were made analyzing the linkage between intrahousehold dynamics and child welfare outcomes in Ethiopia, largely relying on the 1997 round of the Ethiopian rural household survey (ERHS). A major point of departure of this study from previous studies that used the 1997 round of the ERHS, like the study by Fafchamps, Kebede et al. (2009), is that it includes previous rounds of the survey, introducing longer time variation and taking advantage of a panel dataset. By using the last seven rounds of the survey, this study covers the period between 1994 and 2009. Another contribution of this study, towards extending the existing...
literature comes from the use of a combination of assets brought in to marriage and household income to measure bargaining power.

There were some challenges in conducting this study. One of them has to do with the quality of the data. Except for the 1997 round of the ERHS, other rounds were not specifically formulated to study intrahousehold bargaining. Due to this, there were some difficulties with measurement across different variables, observations and rounds. These problems with the data quality may to a certain extent affect the outcomes of this study. Another challenge is related to lack of detailed information on preference structure of Ethiopian households. This has prevented this study from making strong assertions from the results.

The rest of this thesis is organized as follows: Chapter two gives an overview of existing literature on intrahousehold bargaining, followed by Chapter three, which provides theoretical background to the study, by presenting general outline of a two person Nash bargaining model and solving it for a quasi-linear utility function. Explanation of the empirical strategy, by describing the regression model and the variables included, is presented in chapter four, along with a detailed description of the dataset used. Chapter 5 presents descriptive analysis and the regression results (computed using STATA) along with their interpretation. Finally, Chapter 6 provides summary conclusions of the study.
2 Literature Review

2.1 Competing models of the household

Initial works on household theory relied largely on unitary household model, treating the household as a single decision making unit. But later on, in the new theoretical developments, three broad categories of models of household decision making emerged. These are; cooperative bargaining models, collective models and non-cooperative bargaining models. This section highlights the basic building blocks of these household models

Unitary model

Earlier household literature, including Samuelson (1956), insisted that the family can be assumed to act like it maximizes a group preference function. This maximization of a unique utility function is subject to a budget constraint that pools together all individual incomes. Solution of the maximization problem yields demand functions that depend only on prices and total income.

As in Laisney and Beninger (2002) and Rode (2011), one main implication of the assumption that the household maximizes a unique utility function, subject to a pooled budget constraint is that intrahousehold distribution of resources will play no role. A marginal increase in household income from one source will have the exact same effect as an increase in household income from any other source. Therefore, in a unitary model, household demand and labor supply are invariant to distribution of non-labor income within the household.

An empirical test of predictions of this model was made by Hoddinott and Haddad (1995), who tested the proposition that changes in gender specific control of income translates in to changes in expenditure patterns. To do so, they estimated an extension of the Working-Leser expenditure function, in which the share of expenditures on a good is a function of the logarithm of total per capita expenditures; the logarithm of household size; the proportions of different demographic groups (for example, sons of the head aged less than six); and dummy variables reflecting household location. Estimation of the model is made using generalized least squares procedure due to possible endogeneity of women’s share of income. The results show that wives’ share of cash income significantly affects the budget shares of a number of goods.
Specifically, it has a positive and significant effect on the budget share for food and a negative and significant effect on meals eaten out, children’s clothing, adult clothing, alcohol and cigarettes. The authors suggested that the negative effect on children’s clothing may be due to the possibility that some items are regarded as men’s responsibility.

A study by Sow, Gerrit et al. (2009) also indicated that the effect of income on expenditures is gender biased. In rural Senegal, one additional franc for men is more likely to be spent on clothes and health than an additional franc of women; and an additional franc for women is likely to raise schooling expenditures.

**Collective Model**

As opposed to unitary model, collective model acknowledges diversity in preferences within the household. In a collective model, the household maximizes a weighted sum of its members’ utilities subject to a pooled budget constraint. The weighting depends upon a vector of distribution factors (Rode 2011).

One important implication of collective model is that demand functions are affected by bargaining power of individual members of the household. Therefore, distribution factors which may include income of the husband and the wife enter the system of demand functions.

Another testable implication of the collective model is that relative effect of any two distributional factors is the same across all goods and is equal to the relative effect of the distribution factors on bargaining power of household members. In other words, distributional factors affect consumption only through their effects on relative bargaining power.

**Cooperative model**

Cooperative bargaining models use a game theoretic model of the household, in which bargaining power is a function the outside options of the two individuals bargaining. The individual’s outside option is the welfare he or she would receive if not a member of the household. The critical insight that these models offer is that policies that change the outside options of the individuals will affect their bargaining power within the household and thus affect outcomes (Doss 2011).
A distinguishing feature of cooperative bargaining models is the assumption that intrahousehold interactions lead to Pareto efficient outcome. Like collective models, cooperative models also take account of differences in preferences of the household members.

**Non-cooperative model**

In this model, each individual maximizes his/her own utility subject to individual budget constraint, taking into account decisions of other household members. The absence of a pooled budget constraint is a distinguishing feature of non-cooperative models and sets them apart from cooperative unitary models (Rode 2011). Unlike cooperative models, in this model, Pareto efficient outcome is not necessarily assured.

Sow, Gerrit et al. (2009) analyzed whether or not income is pooled by estimating Engel curves using data from rural households in Senegal. The authors show how additional income is spent by husbands and wives and described determinants of expenditure using individual and community characteristics. Engel curves were estimated with OLS for expenditures on different items and used likelihood test for each Engel curve to test the income pooling hypothesis. The results show that the income pooling hypothesis is rejected for expenditures related to health, clothing, tea and coffee. But, for food and schooling, it seems that income could be spent in a consensual way by the partners, respecting a sort of “sharing rule” between husband and wife.

Another study by Frankenberg and Thomas (2001) tested pooling of household income using a survey of 7000 households in Indonesia. About 20 percent of females who earned income reported that they set aside a portion of that income, which they could spend without consulting their spouse. The corresponding proportion for males was lower, at 16.3 percent. Much higher proportions of both women and men reported that they felt free to spend their income on household expenses: 53.3 and 43.3 percent, respectively. These results certainly suggest that there are households in which husbands and wives do not pool all their income.
2.2 Measures of bargaining power

A variety of indicators have been used to measure bargaining power within the household but the majority of studies have focused on economic variables like assets and income. The study by Fafchamps and Quisumbing (2002) justify the use of assets brought at marriage by arguing that they affect disposition of assets up on divorce. They made an ordered Probit regression analysis of disposition of assets up on divorce of currently married households on a variety of explanatory variables using the 1997 round of the Ethiopian Rural Household Survey (ERHS). Results show that land inherited or brought into marriage by one of the spouses affects the disposition of land and livestock upon divorce. Women expect to receive more land and commonly held livestock upon divorce if they brought in some land. Ownership of productive assets at the time of the survey also affects rules of disposition, implying that female heads of household expect to receive significantly more productive assets upon divorce than women in male-headed households.

The study also analyzed determinants of ownership and right to rent out land during marriage by using two-way-Probit estimates. The results show that land ownership and rental decisions depend critically on assets brought into marriage either at the time of marriage, or later through inheritance. Women who bring more assets into the household, either at the time of marriage or through inheritance, have more say in farming decisions.

Similarly, Reggio (2010) estimated bargaining power on explanatory variables like: mother’s relative education, mother’s relative cognitive capacity, mother’s background (given by grandparents’ education) and sex ratio in the community. The study used questions about which member of the household decides to sell/buy the house and who decides to sell/buy domestic appliances to measure bargaining power. The study found that relative ability and background have the expected effect on mother’s bargaining power. Mothers with relatively higher ability or with relatively more educated parents are more likely to make decisions regarding household assets.

Hoddinott and Haddad (1995), on the other hand, included percentage of household cash income accruing to wives of the male head (or widows where the male head is deceased) to measure bargaining power of women in Cote D’ivoire. The data they used, like most other household income and expenditure surveys in developing countries, does not explicitly specify how much income is controlled by individual household members. The authors tried to
overcome this problem by disaggregating income from sale of crops by gender, based on information on control of income from sale of different crops in different ethnic backgrounds and locations.

Other studies rather preferred to use multiple measures of bargaining power instead of relying on only one indicator. Fafchamps, Kebede et al. (2009) investigated effects of four groups of bargaining variables and other individual, household and village specific factors on different welfare variables in rural Ethiopia. Variables which are used to measure bargaining power of spouses were:

- (the log of) land and livestock brought to marriage, which capture marriage market effects;
- involvement in household purchases and whether the wife has a non-farm income, which capture participation in household finances;
- (the log of) expected land and livestock to be received upon divorce, which capture exit option effects; and
- Two factors proxying for cognitive ability and predisposition towards violence

To capture variations in divorce expectations with change in household wealth, divorce expectation variables are multiplied by current land and livestock wealth of the household.

Similarly, in Schmidt and Raykar (2012), bargaining power is represented by three variables that measure the mother’s involvement in decisions regarding child health care; daily household purchases; and major household purchases.

### 2.3 Bargaining and child welfare outcomes

The objects of intrahousehold bargaining covered in the existing literature include labor supply, household consumption and expenditure, intergenerational allocations, transfers and investments on health and education of children

The study by Fafchamps, Kebede et al. (2009) showed how bargaining variables affect different outcomes including child welfare measured by school attendance and anthropometric variables.
Regression of child welfare is made with OLS for child anthropometrics and with Tobit for school attendance on individual child observations.

The regression results do not indicate if bargaining variables are associated, in a common systematic way, with all dimensions of intrahousehold welfare. But looking specifically at child welfare outcomes, they found that assets brought in to marriage by the bride; the mother having a separate source of income; and divorce expectation by women, have positive effects.

The study by Schmidt and Raykar (2012) seek to examine whether greater household bargaining power by Bangladeshi women is related to an improvement in the health of their children. It used data provided by the 2007 Bangladesh Demographic and Health Survey (BDHS), focusing on 5,169 children under five years of age, for whom plausible anthropometric data were available. Since this paper conceptualized women’s bargaining power in relation to their spouse, only those children with both parents’ information available were analyzed.

OLS regression was used to estimate the model by also including child, mother, husband and household characteristics as control variables. The regression results suggest that there exists a positive correlation between decision-making power of mothers on large purchases and height-for-age ratio of their children. But the other two measures of bargaining power were found to be statistically insignificant in determining child outcomes. Fixed effect regression was also made with variation coming from 256 households in the sample with more than one mother present. With fixed effect regression, the magnitude of the coefficient on women making decisions about child health care grew substantially larger and became statistically significant at the 10% level, while the mother’s participation in large purchase decisions loses its significance.
3 Theoretical Framework

The forthcoming empirical analysis of this paper is inspired by Nash bargaining model. This section provides a detailed discussion of the predictions obtained from the model regarding the connection between intrahousehold bargaining power and household expenditure. The first part presents the general outline of a two-person Nash bargaining model with a general utility function as discussed by McElroy and Horney (1981). The second part solves the same model for a quasi-linear utility function.

3.1 General outline of a two-person Nash cooperative game

Let the household consist of two people, H and W, who if married jointly allocate resources according to a Nash cooperative game. The objects of choice in the allocation are $x = (x_0, x_{ph}, x_{pw}, x_{lh}, x_{lw})$. $x_{ph}$ and $x_{pw}$ are market goods while $x_{lh}$ and $x_{lw}$ are quantities of leisure consumed by the husband and the wife, respectively. $x_0$ is a household public good, in the sense that consumption by one of the household members does not reduce the amount available for the other. Market prices of the goods are exogenously given by $p = (p_0, p_{ph}, p_{pw}, p_{lh}, p_{lw})$.

If the two individuals were to behave separately (if they were single), each will maximize their individual utility functions $U_0^h(x_0, x_{ph}, x_{lh})$ and $U_0^w(x_0, x_{pw}, x_{lw})$, subject to their respective budget constraints. Therefore, the maximization problem of each individual will be of the form:

$$\text{Max } U_0^h(x_0, x_{ph}, x_{lh}) \text{ s.t } p_0 x_0 + p_{ph} x_{ph} = p_{lh}(T - x_{lh}) + I_h$$

$$\text{Max } U_0^w(x_0, x_{pw}, x_{lw}) \text{ s.t } p_0 x_0 + p_{pw} x_{pw} = p_{lw}(T - x_{lw}) + I_w$$

Where $I_h$ and $I_w$ are non-labour incomes and $T$ is total time available. Consequently, each person will have an indirect utility function $V_0^h(p_0, p_{ph}, p_{lh}, I_h; \alpha_h)$ and $V_0^w(p_0, p_{pw}, p_{lw}, I_w; \alpha_w)$. The indirect utility functions show the highest possible utility each individual can achieve by their own for certain levels of income, prices and $\alpha$. If H and W are...
married, $V_0^h$ and $V_0^w$ serve as threat points. Threat point is the level of utility that can be credibly generated in the case of non-cooperation.

$\alpha_h$ and $\alpha_w$ are extra-household environmental parameters (EEP). EEP can be any variable that shifts the maximum value of utility attainable by the individual outside of marriage. Changes in EEPs shift the threat points in the Nash bargain and are therefore parametric to the bargaining outcome. Examples of EEPs include: parents’ wealth; welfare payments for divorced parents; and symmetric differences in prices and non-wage incomes between married and unmarried states. H and W will be married only if the gain from marriage is positive for both parties. This means:

$$g^h = U^h - V_0^h > 0 \text{ and } g^w = U^w(x^w) - V_0^w > 0.$$  

Married couples maximize Nash-bargained utility function, which is the product of each individual’s gain from marriage, subject to full household income equaling household expenditure.

Max $N \equiv [U^h(x^h) - V_0^h(p_0, p_{ph}, p_{lh}, I_h: \alpha_h)][U^w(x^w) - V_0^w(p_0, p_{wh}, p_{lw}, I_w: \alpha_w)]$

s.t $p_0 x_0 + p_{ph} x_{ph} + p_{pw} x_{pw} = p_{lh}(T - x_{lh}) + p_{lw}(T - x_{lw}) + I_h + I_w$

The Lagrangian function will be of the form:

$$L = [U^h(x^h) - V_0^h(p_0, p_{ph}, p_{lh}, I_h: \alpha_h)][U^w(x^w) - V_0^w(p_0, p_{wh}, p_{lw}, I_w: \alpha_w)] - \lambda \left[ p_0 x_0 + p_{ph} x_{ph} + p_{pw} x_{pw} - (p_{lh}(T - x_{lh}) + p_{lw}(T - x_{lw}) + I_h + I_w) \right]$$

The first order conditions obtained by partially differentiating the Lagrangian function with respect to $x_i$ are of the form:

$$N_i \equiv U^h_i(x^h) - V_0^h + U^w_i(x^w) - V_0^w = \lambda P$$

Solution of the above maximization problem is a system of demand equations $X_i = h_i(P, I_h, I_w; \alpha_h, \alpha_w)$ with $i = 0, ph, lh, pw$ and $lw$. Partially differentiating the first order conditions and budget restrictions with respect to $\alpha_h$ and $\alpha_w$ and solving for $\frac{\partial x}{\partial \alpha_h}$ and $\frac{\partial x}{\partial \alpha_w}$, the authors derived the relationship between EEPs and household demand to be:
\[ \frac{\partial x}{\partial \alpha_h} = SG^{-1}U^w_i \frac{\partial V^h_0}{\partial \alpha_h}, \text{ and} \]
\[ \frac{\partial x}{\partial \alpha_w} = SG^{-1}U^h_i \frac{\partial V^w_0}{\partial \alpha_w}, \]

where $SG^{-1}$ is Nash generalization of the substitution matrix. $U^w_i$ and $U^h_i$ are matrices of first derivatives of the husband and the wife’s utility functions with respect to the goods.

From the above expressions, it is not straightforward to determine the direction of relationship between the EEPs and household demand without having a specific utility function. The following section employs a specific utility function to show the directions of relationship more clearly.

### 3.2 The model: A two-person Nash cooperative game (a quasi-linear utility function)

This section presents solution of a two person Nash bargaining model with preferences of the two household members given by a quasi-linear utility function. Each person derives utility from consumption of two goods $x_0$ and $x_i$ (where $i$ refers to the husband(h) or the wife(w)). $x_0$ is a household public good consumed by both individuals, while $x_h$ and $x_w$ are private goods consumed by husband and the wife respectively. Utility functions of the husband and the wife are given by the following quasi-linear functions.

\[ U^h(x_0, x_h) = \beta \log(x_0) + (1 - \beta)x_h \]
\[ U^w(x_0, x_w) = \alpha \log(x_0) + (1 - \alpha)x_w \]

$\beta$ and $\alpha$ are weights attached to utility derived from the household public good by the husband and the wife respectively.

There are two possible states, cooperation and non-cooperation. In the case of non-cooperation, each individual maximizes his/her individual utility function subject to his/her individual budget constraint. In the case of cooperation, the household will maximize a Nash bargained utility function, subject to a pooled budget constraint.
Each household member earns an income of $I_i$ irrespective of his/her state and get additional income of $rG_i$ in the non-cooperative state. $rG_i$ captures the extra-household environmental parameters (EEP) discussed in the previous section.

**Case 1: non-cooperative outcome**

Maximization problem of the husband will be of the form:

$$\text{Max : } U^h(x_0, x_h) = \beta \log(x_0) + (1 - \beta)x_h \quad \text{where } 0 < \beta < 1$$

Subject to: $p_0x_0 + p_hx_h = rG_h + I_h$

$$x_0 \geq 0$$

$$x_h \geq 0$$

Kuhn-Tucker conditions

$$\frac{\beta}{x_0} - \lambda p_0 \leq 0 \quad (1.1)$$

$$x_0 \geq 0 \quad (1.2)$$

$$x_0 \left(\frac{\beta}{x_0} - \lambda p_0\right) = 0 \quad (1.3)$$

$$(1 - \beta) - \lambda p_h \leq 0 \quad (1.4)$$

$$x_h \geq 0 \quad (1.5)$$

$$x_h \left((1 - \beta) - \lambda p_h\right) = 0 \quad (1.6)$$

$$\lambda (rG_h + I_h - p_0x_0 - p_hx_h) = 0 \quad (1.7)$$

Where $\lambda$ is the lagrangian multiplier. From condition (1.3), $x_0 = 0$ or $\lambda = \frac{\beta}{p_0x_0}$. But, $x_0 = 0$ violates condition (1.1). Therefore $x_0 > 0$ and $x_0 = \frac{\beta}{\lambda p_0}$, with a binding budget constraint.
From condition (1.6), \( x_h = 0 \) or \( \lambda = \frac{(1-\beta)}{p_h} \). If \( x_h = 0 \), from the budget constraint, \( x_0 = \frac{rG_h + l_h}{p_0} \) and if \( x_h > 0 \), \( x_0 = \frac{\beta}{(1-\beta)} \frac{p_h}{p_0} \) and \( x_h = \frac{rG_h + l_h}{p_h} - \frac{\beta}{(1-\beta)} \). Therefore, the possible set of solutions are:

\[
(x_0, x_h) = \begin{cases} 
\left( \frac{\beta}{(1-\beta)} \frac{p_h}{p_0}, \frac{rG_h + l_h}{p_h} - \frac{\beta}{(1-\beta)} \right), & \text{if } rG_h + l_h > \frac{\beta}{(1-\beta)} \frac{p_h}{p_0} \\
(x_0, x_h) = \left( \frac{rG_h + l_h}{p_h}, 0 \right), & \text{otherwise}
\end{cases}
\]

For the first set of solutions, where \( x_h \) is strictly positive, indirect utility function is given as:

\[
V^h_0 = \beta \log \left( \frac{\beta}{(1-\beta)} \frac{p_h}{p_0} \right) + \frac{(1-\beta)(rG_h + l_h)}{p_h} - \beta \text{ with } \frac{\partial V^h_0}{\partial G_h} = \frac{(1-\beta)r}{p_h}
\]

Similarly, maximization problem of the wife is given by:

Max: \( U^w(x_0, x_w) = \alpha \log(x_0) + (1-\alpha) x_w \) where \( 0 < \alpha < 1 \)

Subject to: \( p_0 x_0 + p_w x_w = rG_w + I_w \)

\( x_0 \geq 0 \)

\( x_w \geq 0 \)

Similar to the husband, the wife’s possible set of solutions are:

\[
(x_0, x_w) = \begin{cases} 
\left( \frac{\alpha}{(1-\alpha)} \frac{p_w}{p_0}, \frac{rG_w + I_w}{p_w} - \frac{\alpha}{(1-\alpha)} \right), & \text{if } rG_w + I_w > \frac{\alpha}{(1-\alpha)} \frac{p_w}{p_0} \\
(x_0, x_w) = \left( \frac{rG_w + I_w}{p_w}, 0 \right), & \text{otherwise}
\end{cases}
\]

For the first set of solutions, where \( x_w \) is strictly positive, indirect utility function is given as

\[
V^w_0 = \alpha \log \left( \frac{\alpha}{(1-\alpha)} \frac{p_w}{p_0} \right) + \frac{(1-\alpha)(rG_w + I_w)}{p_w} - \alpha \text{ with } \frac{\partial V^w_0}{\partial G_w} = \frac{(1-\alpha)r}{p_w}
\]
Case 2: cooperative outcome (marriage)

The household maximizes a Nash bargained utility function of the form

\[ N \equiv [\beta \log(x_0) + (1 - \beta)x_h - V_0^h][\alpha \log(x_0) + (1 - \alpha)x_w - V_0^w] \]

Subject to, a pooled budget constraint \( p_0x_0 + p_wx_w + p_hx_h = I \) and

\[ x_0 \geq 0 \]
\[ x_h \geq 0 \]
\[ x_w \geq 0 \]

Where \( I = I_h + I_w \)

From the K-T conditions, \( x_0 \) has to be strictly greater than zero. If both \( x_h \) and \( x_w \) are equal to zero, we will have \( x_0 = \frac{I}{p_0} \). Clearly, in this case, the threat points of the household members will have no effect on the amount of any of the goods consumed. Since the main objective of this study is to see how bargaining power affects consumption of household bundles (can be private or public), we disregard the cases where any of the private goods are zero and focus on the cases where both \( x_h \) and \( x_w \) are strictly positive. With this restriction, we have the following first order conditions.

\[ \frac{\beta(\alpha \log(x_0)+(1-\alpha)x_w-V_0^w)}{x_0} + \frac{\alpha(\beta \log(x_0)+(1-\beta)x_h-V_0^h)}{x_0} = \lambda p_0 \] (2.1)

\[ (1 - \beta)(\alpha \log(x_0) + (1 - \alpha)x_w - V_0^w) = \lambda p_h \] (2.2)

\[ (1 - \alpha)(\beta \log(x_0) + (1 - \beta)x_h - V_0^h) = \lambda p_w \] (2.3)

\[ x_h = \frac{l-p_0x_0-p_wx_w}{p_h} \] (2.4)

From the above conditions, it is not difficult to show that \( x_0, x_h \) and \( x_w \) will have the following solutions.

\[ x_0 = \frac{\beta}{(1 - \beta)} \frac{p_h}{p_0} + \frac{\alpha}{(1 - \alpha)} \frac{p_w}{p_0} \]
\[
x_w = \frac{\beta (1 - \alpha) p_h - \alpha (1 - \beta) p_w \log \left( \frac{\beta}{(1 - \alpha) p_h} + \frac{\alpha}{(1 - \beta) p_h} \right) - \frac{p_h}{(1 - \beta) p_w} v^h + \frac{p_w}{(1 - \alpha) p_h} v^w + l - \frac{\beta}{(1 - \beta) p_h} - \frac{\alpha}{(1 - \alpha) p_w}}{2 p_w}
\]

\[
x_h = \frac{\alpha (1 - \beta) p_w - \beta (1 - \alpha) p_h \log \left( \frac{\beta}{(1 - \beta) p_h} + \frac{\alpha}{(1 - \alpha) p_h} \right) + \frac{p_h}{(1 - \beta) p_w} v^h - \frac{p_w}{(1 - \alpha) p_h} v^w + l - \frac{\beta}{(1 - \beta) p_h} - \frac{\alpha}{(1 - \alpha) p_w}}{2 p_h}
\]

**Comparative statics**

From the above solutions of the two-person Nash bargaining model, where preferences are modeled by a quasi-linear utility function, we can see that the amount of the household public good consumed does not depend on income and the treat points of any of the spouses. On the other hand, both income and threat points affect amount of private goods consumed in the household. With the partial derivatives \( \frac{\partial x_h}{\partial V_0} \) and \( \frac{\partial x_w}{\partial V_0} \) given by \( \frac{1}{2p_h} \) and \( \frac{1}{2p_w} \) respectively, it is clear to see that the effect of income is positive on both private goods. Identity of the source of income doesn’t matter on the amounts of any of the goods consumed within the household. This means, a marginal increase in household income from one source has the exact same effect as an increase in household income from any other source. This is due to income pooling assumption, which is a common feature of all cooperative models.

Looking at effects of outside options of the spouses on household demand for private goods, we have the following partial derivatives with respect to treat points:

\[
\frac{\partial x_h}{\partial V_0} = \frac{1}{2(1 - \beta)} > 0
\]

\[
\frac{\partial x_w}{\partial V_0} = \frac{1}{2(1 - \alpha)} > 0
\]

\[
\frac{\partial x_h}{\partial V_0^h} = \frac{-1}{2(1 - \beta) p_w} < 0
\]

\[
\frac{\partial x_w}{\partial V_0^w} = \frac{-1}{2(1 - \alpha) p_h} < 0
\]

We can see that threat point of one of the spouses positively affects household consumption of own private good while negatively affecting household consumption of their spouse’s private goods.
The signs of the partial derivatives with respect to EEPs and the treat points are exactly the same. The amount of assets an individual could get in the case of non-cooperation positively affects household consumption of own private goods while negatively affecting household consumption of the other spouse’s private goods. The partial derivatives are given as follows.

\[
\frac{\partial x_w}{\partial V_w} = \frac{\partial x_w}{\partial V^w_w} \frac{\partial V^w_w}{\partial G_w} = \frac{1}{2(1-\alpha)} \frac{(1-\alpha)r}{p_w} = \frac{r}{2p_w} > 0
\]

\[
\frac{\partial x_h}{\partial V_h} = \frac{\partial x_h}{\partial V^h_h} \frac{\partial V^h_h}{\partial G_h} = \frac{1}{2(1-\beta)} \frac{(1-\beta)r}{p_h} = \frac{r}{2p_h} > 0
\]

\[
\frac{\partial x_w}{\partial V_h} = \frac{\partial x_w}{\partial V^h_h} \frac{\partial V^h_h}{\partial G_w} = -\frac{1}{2(1-\beta)} \frac{p_h (1-\beta)r}{p_w} = \frac{-r}{2p_w} < 0
\]

\[
\frac{\partial x_h}{\partial V_w} = \frac{\partial x_h}{\partial V^w_w} \frac{\partial V^w_w}{\partial G_w} = -\frac{1}{2(1-\alpha)} \frac{p_w (1-\alpha)r}{p_h} = \frac{-r}{2p_h} < 0
\]

The general take from this theoretical exercise is that in a setting where there is clear information on preferences of individuals interacting within the household and where there is clear distinction between private goods of each household member and household public goods, household demand for private goods is affected by outside options of the household members. Household members with better outside options tip intrahousehold interactions in their own favor. In the coming sections of this thesis we will see if this prediction of the theoretical model is empirically supported in the case of rural households in Ethiopia.

For the sake of robustness, predictions of same model are discussed, using alternative specification of preferences with a Cobb-Douglas utility function, in the appendix.
4 The Data and Empirical Strategy

4.1 The data: Ethiopian Rural Household Survey (ERHS)

This study heavily relies on the last seven rounds of the Ethiopian Rural Household Survey\(^2\). This section provides description of the dataset as presented in Dercon and Hoddinott (2011).

The Ethiopian Rural Household Survey (ERHS) is a unique longitudinal household data set covering households in a number of villages in rural Ethiopia. These surveys have been supervised by the Economics Department of Addis Ababa University (Economics/AAU), the Centre for the Study of African Economies (CSAE), University of Oxford and the International Food Policy Research Institute (IFPRI).

Data collection started in 1989, when a team visited 6 farming villages in Central and Southern Ethiopia. The survey was conducted in seven Peasant Associations located in the regions Amhara, Oromiya and the Southern Nations Nationalities and People Region (SNNPR). The study collected consumption, asset and income data on about 450 households in order to study the response of households to food crises.

In 1994, the survey was expanded to cover 15 villages across the country giving a sample of 1477 households. An additional round was conducted in late 1994, with further rounds in 1995, 1997, 1999, 2004 and 2009.

Selection of villages is not random but has taken account of diversity of farming systems in the country. Within each village, random sampling was used, stratified by female headed and non-female headed households, including an attempt to re-randomize the 1989 study villages, via extra sampling from new entrants, splits and newly formed households.

Topics addressed in the survey include household characteristics, agriculture and livestock information, food consumption, health, women’s activities, as well as community level data on electricity and water, sewage and toilet facilities, health services, education, NGO activity, migration, wages, and production and marketing. The questionnaire used in the 1997 round

---

includes the original core modules, supplemented with new modules specifically designed to address intrahousehold allocation issues. The new modules collect information on: the parental background and marriage histories of each spouse; the circumstances surrounding the marriage (for example, type of marriage contract, involvement in the choice of a spouse); the pre-marital human and physical capital of each spouses (for example, age, education, experience); indicators of predisposition to domestic violence (for example, alcohol consumption, exposure to domestic violence among parents); simple numeracy questions; gender-specific information on control and ownership of land and livestock; expectations regarding the disposition of assets upon divorce and death; and individual agricultural labor and time use data. A variety of assets brought to the marriage were recorded, as well as all transfers made at the time of marriage.

4.2 Empirical strategy

Linear panel data model

The relationship that is going to be modeled can be presented as a linear static panel data model of the form:

\[ Y_{it} = x'_{it}\beta + Z'_{i}Y + v_{it} \]

The subscripts \( i \) and \( t \) represent household id and time respectively. \( Y_{it} \) is the dependent variable; \( x'_{it} \) is a set of time varying explanatory variables; \( Z_i \) is a set of time invariant explanatory variables; \( \beta \) and \( Y \) are vectors of coefficients to be estimated and \( v_{it} \) is an error term that follows a one factor error components structure

\[ v_{it} = \alpha_i + u_{it} \]

With the following assumptions:

\[ E(u_{it}|X, Z, \alpha) = 0: \text{Strict exogeneity} \]

\[ E(u_{it}u'_{it}|X, Z, \alpha) = \sigma_u^2 I_T: \text{No heteroscedasticity and serial correlation} \]

where \( \alpha_i \) represents unobserved household heterogeneity.
The choice of the model estimation method (fixed effect vs random effect) will depend on results from Hausman test, that basically tests the null hypothesis that the unobserved time invariant individual effect \( \alpha_i \) is not correlated with any of the regressors. That is:

\[
\text{Ho: } E(\alpha_i | X, Z) = 0, \text{ both RE and FE estimators are consistent but the random effect estimator is more efficient}
\]

\[
\text{H}_1: E(\alpha_i | X, Z) \neq 0, \text{ only FE estimator is consistent.}
\]

If the null hypothesis is rejected, fixed effect estimates will be selected. Otherwise we will rely on random effect estimates.

Two separate models will be estimated to see effects of regressors on two dependent variables: household expenditure on education of children \((Educex)\) and household expenditure on cloth and fabric of children \((ClothEx)\).

**Measuring bargaining power**

Bargaining power of the wife is captured by the variable \( \text{BarF} \), which is computed by deflating value of assets brought in to marriage by the female spouse, by household income in every round. According to (Quisumbing and Maluccio 1999) assets at marriage are attractive indicators of bargaining power for several reasons. From the economist’s perspective, assets brought to marriage are exogenous to decisions made within marriage, even if they are endogenous due to marriage market selection. Second, in many cultures, marriage is one of two key occasions when assets are transferred during an individual’s lifetime (the other is death). Third, assets transferred at marriage may have a symbolic meaning over and above their economic value. Similarly, Doss (2011) argued that using assets brought in to marriage instead of current holding of assets can be a better way to measure bargaining power, because it correlates with bargaining power but not with other determinants of women’s welfare that the researcher cannot observe.

Value of assets brought in to marriage is recorded only in the 1997 round of the EHRS and does not vary over time. But, when it is divided by household income in the different rounds of the survey, we get a time varying variable. The justification for doing so is that assets become more important in years when household income is low. But in seasons when the household income is high, assets might not be as important. Therefore, the treat point of the household member
will be higher in lean seasons than high seasons for the same value of assets brought in to marriage.

**Control variables**

Besides the wife’s bargaining power, other variables are included in the regression as control variables. Bargaining power of the male spouse (BarF), as measured by values of assets brought in to marriage by the husband, deflated by household income in every round; Household income adjusted for inflation (Income); Household non-food expenditure adjusted for inflation (NonfoodEx); Age of the wife (AgeF) and the number of children in different age groups (age1, age2, age3 and age4) and time dummy ($R_t$).

Number of children is introduced as a control because the amount of spending a household makes on children, whether education or clothing, clearly depends on the number of children in the household. But different age groups of children require different levels of expenditure. For example, education expenditure is expected to be lower for children who are not old enough to go to school. This effect cannot be captured by the total number of children in the household. To take account of this effect, instead of taking the total number of children, we take number of children in four different age groups. The age groups are: first age group (from age 0 to 6) (age1); second age group (from age 6 to age 12) (age2); third age group (from age 12 to age 18) (age3) and fourth age group (above age 18) (age4).

The husband’s bargaining power is included to control for relative bargaining power. Household income is calculated by adding income from crop harvest and sale of livestock products and services. Since the households being studied are rural households, the two sources of income are believed to adequately represent household income even though there might be other sources of income. Household non-food expenditure (NonfoodEx) helps to account for income from other sources than crop and livestock. Another advantage of including household non-food expenditure to measure household wealth is that income is likely to be misreported by respondents due to its sensitive nature, whereas expenditure is largely perceived to be less prone to misreporting. The variable is computed by adding household expenditure on non-food items except on children’s education and cloth. Age of the husband is excluded from the regression due to perfect collinearity with age of the wife over time.
The models to be estimated will have the above form, with coefficients $\beta_1$ and $\delta_1$ measuring effect of the wife’s bargaining power on household expenditure on children’s education and cloth, respectively. The coefficients on income and non-food expenditure are expected to have positive signs in both models. The number of children in all categories are expected to have positive sign in the cloth model while the number of children in the first age category, which contains children not old enough to go to school, is not expected to have a positive coefficient in the education model. The coefficients on the measures of bargaining power and age of the female spouse are not straightforward to predict because they are dependent up on the preferences of the spouses. We will have to see the estimates and then we will deduce about preferences of the spouses and the measures of intrahousehold bargaining power.

**Testing for robustness**

One main challenge in trying to asses if a given variable effectively proxies bargaining power is that we usually don’t have direct information on what outcomes individuals chose if they had higher bargaining power. To test if the variable BarF and BarM are robust in being used as proxies for intrahousehold bargaining power of spouses, we run two regression models on two items, using the same set of regressors as the main models. These items are: household expenditure on alcohol & tobacco and on cosmetics. With alcohol & tobacco traditionally considered as the “man’s good” and cosmetics as the “woman’s good”, it is expected that a higher bargaining position of women in the household leads to increased household expenditure on cosmetics and reduced household expenditure on alcohol and tobacco. On the other hand, improved bargaining position of men is expected to have a positive effect on household expenditure for alcohol and tobacco and a negative effect on household expenditure on cosmetics. A regression result that depicts this picture will contribute to the robustness of the measures of bargaining power (BarF and BarM).
5  Empirical Results

5.1 Descriptive analysis

The 1997 round of the ERHS collected information on marriage and intrahousehold allocations for 1385 households with married couples in addition to the core modules used in the previous rounds of the survey. In this context “married couples” means a man and a woman with any kind of union which can be formal or informal; monogamous or polygamous. Marital status of these households is tracked back up to the first of the two surveys in 1994 and forward up to the last survey. Out of these 1385 households, the union existed in all rounds only for 1084 of them. Out of those 1084 households, 1048 of them had at least one child in any of the survey rounds. These households which were married throughout the 7 surveys and reported to have at least a child in any of the rounds constitute the sample of this study.

We start by having a look at how the husband and the wife contribute to the startup capital of the household in the form of assets they bring in to the marriage. These assets include assets already owned by the groom and the bride before marriage and assets they received upon marriage from parents in the form of inheritance or from peasant associations (in the case of land). In the survey only land received up on marriage is recorded in value. Other land is recorded in area. To compute value of total land brought in to marriage, I first computed median value of land received per hectare for each peasant associations and used those values to compute value of land already owned. The following figure shows total value of assets (land and livestock) brought in to marriage by the husband and the wife.
There is a visible gender disparity in value of assets brought in to marriage, with the groom bringing in the majority of assets. On average, value of assets brought in by the groom at the time of marriage is more than eight times that of the bride. Average value of assets brought in to marriage by the bride is 240 ETB\(^3\), whereas the value of assets brought in to marriage by the groom is 2033 ETB.\(^4\)

It is also possible to see clear differences in composition of the assets brought in by each spouse. Land constitutes the majority of the value of assets brought in to marriage by the groom (1184 ETB) while for the bride livestock has more value (200 ETB). According to Fafchamps and Quisumbing (2002), this is partly because of inheritance patterns in rural Ethiopia, with parents mostly giving land for their sons and livestock for their daughters. The following figure shows composition of assets brought in to marriage by gender of the spouse.

---

\(^3\) Stands for Ethiopian Birr, which is the national currency of Ethiopia.

\(^4\) T-test results of the null hypothesis Ho:mean(assetsG - assetB) and 3 alternative hypotheses with respective p values are : Ha: mean(assetsG - assetB)<0 with Pr(T < t) = 1.0000 ; Ha: mean(assetsG - assetB)=0 with Pr(T < t) = 0.0000 ; Ha: mean(assetsG - assetB)>0 Pr(T < t) = 0.0000
Figure 2: Composition of assets brought in to marriage by gender of the spouse.

These differences in contribution of each spouse to the startup assets at the time of marriage translate in to similar patterns in our measure of bargaining power of each spouse. From table 1 looking at the measures of bargaining power of the male and female spouse (BarM and BarF), which are computed by dividing value of assets brought in to marriage by each spouse by household income in every round, we can see that the husband’s measure of bargaining power is way more than the wife’s\(^5\). Mean value of BarM is 319.6 while mean value of BarF is 35.28.

Another variable which shows higher mean value for the husband is age. On average the husband is six years older than the wife. This is to be expected with child marriage being common in rural Ethiopia.

Moving on from gender specific variables, we have household income and expenditure figures. On average the households earned around 1382 ETB a year from sale of crops and livestock products and services. We also have non-food expenditure which measures how much households have spent, within four months before each round of the survey was conducted, on non-food items excluding expenditures on children’s education and clothing. On average the households have spent around 670 ETB on those nonfood items. Majority of the variation in both variables comes from within household over time than between households. The following table shows summary of key variables for these households.

\(^5\) T-test results of the null hypothesis Ho:mean(BarM-BarF) and 3 alternative hypotheses with respective p values are:  
Ha: mean(BarM-BarF)<0 with Pr(T < t) = 1.0000 ; Ha: mean(BarM-BarF)=0 with Pr(T < t) = 0.0000 ; Ha: mean(BarM-BarF)>0 Pr(T < t) = 0.0000
<table>
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<tr>
<th>VARIABLES</th>
<th>obs</th>
<th>mean</th>
<th>Standard deviation</th>
<th>min</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Between</td>
<td>within</td>
<td>overall</td>
<td></td>
</tr>
<tr>
<td>Household income (income)</td>
<td>6,446</td>
<td>1,522</td>
<td>5,685</td>
<td>14,131</td>
<td>15,359</td>
</tr>
<tr>
<td>Number of children below age of 6 (age1)</td>
<td>6,446</td>
<td>0.928</td>
<td>0.774</td>
<td>0.683</td>
<td>1.021</td>
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<td>Number of children between age of 6 and 12 (age2)</td>
<td>6,446</td>
<td>1.146</td>
<td>0.806</td>
<td>0.759</td>
<td>1.093</td>
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<td>Number of children between age of 12 and 18 (age3)</td>
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<td>0.962</td>
<td>0.710</td>
<td>0.702</td>
<td>0.990</td>
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<tr>
<td>Number of children above age of 18 (age4)</td>
<td>6,446</td>
<td>0.956</td>
<td>1.032</td>
<td>0.843</td>
<td>1.323</td>
</tr>
<tr>
<td>Household expenditure on children’s education (EducEx)</td>
<td>6,446</td>
<td>20.27</td>
<td>61.29</td>
<td>118.7</td>
<td>130.9</td>
</tr>
<tr>
<td>Household expenditure on children’s cloth (ClothEx)</td>
<td>6,446</td>
<td>121.5</td>
<td>140.4</td>
<td>189.6</td>
<td>235.4</td>
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<td>Household non-food expenditure (NonfoodEx)</td>
<td>6,446</td>
<td>670.3</td>
<td>731.7</td>
<td>1,175</td>
<td>1,377</td>
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<td>Age of the husband (AgeM)</td>
<td>5,173</td>
<td>48.61</td>
<td>14.43</td>
<td>5.020</td>
<td>14.83</td>
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<tr>
<td>Age of the wife (AgeF)</td>
<td>6,284</td>
<td>40.37</td>
<td>13.38</td>
<td>4.985</td>
<td>13.37</td>
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<td>Measure of wife’s bargaining power (BarF)</td>
<td>6,446</td>
<td>35.28</td>
<td>218.6</td>
<td>194.5</td>
<td>280.5</td>
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<tr>
<td>Measure of the husband’s bargaining power (BarM)</td>
<td>6,446</td>
<td>319.6</td>
<td>2,279</td>
<td>2,768</td>
<td>3,643</td>
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</table>
Another variable of interest is household expenditure on children’s education and cloth. On average parents spent 20 ETB on children’s education and 122 ETB on children’s cloth within four months before each survey was conducted. The low level of education expenditure can be due low school enrolment, specially in early rounds of the survey and due to the fact that education is provided freely by the government. The following box plots show distribution of expenditure on children’s education and cloth over the seven survey rounds.

Figure 3: Distributions of household expenditure on children’s education and cloth across different survey rounds.

Expenditure on cloth is more or less uniformly distributed across different rounds. But, expenditure on children’s education shows a significant increase in the last three rounds as compared to the first four. And finally we have number of children in the household in different age groups. On average, there is one child in each age group in the household.
5.2 Regression results

This section presents outputs from econometric analysis of household expenditure on children’s education and cloth on a set of explanatory variables, with household nonfood expenditure included to control for household income not covered by income from sources other than crops and livestock and number of children divided between different age groups to account for varying levels of household spending as age of the children increases. Table 2 presents fixed effects estimates of household expenditure on children’s education starting from a small set of regressors in model 1 to model 4, which includes all regressors.

Selection of estimation method is based on hausman’s test. The test rejected the null hypothesis that there is no systematic difference between the fixed and random effect estimates, which implies the random effect estimates will be biased. This led us to pick the fixed effect estimates against the random effect. Time fixed effects are included in the regressions to account for systematic differences in household spending over time.

Measure of bargaining power of both the wife and the husband, non-food expenditure and number of children in the first three age groups appear to be statistically insignificant. On the other hand, age of the wife, income and number of children in the fourth age group are positive and significant.

Households spend 4.2 ETB more for every additional child older than 18. Households with older wives spend more (2.3 ETB for every year). As expected, higher household income is associated with higher spending on children’s education.
Table 2: Fixed-effects estimates of household expenditure on children’s education

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<th>(3)</th>
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<tr>
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<td>-0.000847</td>
<td>-0.000843</td>
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<tr>
<td></td>
<td>(0.00145)</td>
<td>(0.00145)</td>
<td>(0.00145)</td>
<td>(0.00154)</td>
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<td>(0.000347)</td>
<td>(0.000346)</td>
<td>(0.000346)</td>
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<td>AgeF</td>
<td>2.421***</td>
<td>2.422***</td>
<td>2.421***</td>
<td>2.266***</td>
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<td></td>
<td>(0.402)</td>
<td>(0.402)</td>
<td>(0.401)</td>
<td>(0.422)</td>
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<td>income</td>
<td>8.47e-05***</td>
<td>8.45e-05***</td>
<td>8.16e-05***</td>
<td>8.16e-05***</td>
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<tr>
<td></td>
<td>(2.90e-05)</td>
<td>(2.80e-05)</td>
<td>(2.91e-05)</td>
<td>(2.91e-05)</td>
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<td></td>
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<td>(0.000846)</td>
<td>(0.000836)</td>
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</tr>
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<td>age4</td>
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Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 3 presents fixed effect estimates for household expenditure on children’s cloth. Housman’s test again rejects the null hypothesis of no systematic differences in fixed and random effect estimates, validating use of fixed effect model. Unlike Educex model, in this model the coefficient on the measure of bargaining power of the wife is negative and statistically significant at 5% level of significance. This means, an increase in the measure of the wife’s bargaining power by one unit reduces household expenditure on their children’s clothing by 0.0133 ETB. Number of children in all age groups have positive and statistically significant coefficients, with the effect being highest for the number of children between 12 and 18 years of age (age3). With each additional child in this age group a household spends 30.5 ETB more on cloth and fabric. The effect of number of children on expenditure on cloth is almost the same for the second and the fourth age group (17 ETB for every additional child). For the first age group, the effect of each additional child is around 8 ETB. As expected, household wealth, as measured by income and non-food expenditure, is positively associated with household expenditure on children’s cloth.
Table 3: Fixed-effects estimates of household expenditure on children’s cloth and fabric

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Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
We see contrasting coefficients of the variables income and non-food expenditure in the two models. Income has statistically significant but very close to zero effect, while non-food expenditure has statistically insignificant effect on household expenditure on education. On the other hand, both variables have positive and significant effect on household expenditure on children’s cloth and fabric. The main reason for weakness of household wealth in determining household expenditure on children’s education may be associated with the fact that government provides free education up to 12th grade. In this case household wealth may not be the main driving force for household spending on children’s education. The story is completely different when it comes to household expenditure on children’s cloth. In this case richer households spend more on cloth for children.

The regression results predict the effect of the wife’s bargaining power to be: negative on household expenditure on cloth; and statistically insignificant on household expenditure on education. Both results are contrary to the predictions made by the theory and most of the existing literature. These unexpected signs and insignificance of the measure of bargaining power forces us to examine the premises of our analysis.

**Children’s Education, a household public good?**

As clearly depicted in the solution of a two person Nash bargaining model, in chapter three of this thesis, bargaining power of the spouses does not have any effect on the amount of household public goods consumed. Our expectation that bargaining power should positively affect expenditure on children’s education and cloth is based on the premise that the wife and the husband have diverging preferences regarding children’s education and cloth, or at least, the wife has stronger preferences on those items than the husband. One reason for the unexpected results may be if this does not represent actual preferences. If there is no difference, in preferences, between the husband and the wife regarding the items, which is true in the case of household public goods, bargaining power of either of the spouses will have no effect on the amount of the items consumed. This can be one explanation to insignificant coefficients of measures of bargaining power of both spouses in the EducEx regression.
Unitary model?

Another implication of insignificant coefficients of the measures of bargaining power in the EducEx model pauses a question on the validity of bargaining model in explaining household decision making in rural Ethiopia. Inability of the identity of source of household funds to explain household decision making regarding household expenditures is in line with the predictions made by unitary model of the household.

Children’s cloth, the husband’s private good?

In the model for household expenditure on children’s cloth, we see that the measure of the wife’s bargaining power is negatively and signifincently associated with household expenditure on children’s cloth. This challenges the idea that household items for children are more preferred by the wife. As predicted by the theory, bargaining power of the wife negatively affects household consumption of the husband’s private goods and the result for this model goes in the same line. The study by Hoddinott and Haddad (1995) found similar result in cote d’Ivoire and argued that this may be due to the fact that children’s clothing is regarded as the man’s responsibility.

Too little to bargain over

As discussed by Quisumbing and Maluccio (1999), Consistent with the relative poverty of Ethiopia, households spend on average three-quarters of their budget on food; much smaller percentages are spent on the other expenditure categories. This has at least two important implications: 1) many households report zero expenditures for non-food items 2) the amount of "discretionary" spending beyond food is often rather small, possibly limiting the space over which bargaining might take place.

Robustness of the measure of bargaining power

We rely on value of assets brought in to marriage by each spouse deflated by household income to measure bargaining power of the spouse. The unexpected sign and insignificance of the coefficients in both models lead us to test our measure of bargaining power. To do so we need to find an item that we are more certain about the preference structure of the household.
Alcohol & tobacco on one hand and cosmetics on the other represent items which are traditionally considered to be the husband’s and the wife’s private goods, respectively. For instance, Golan and Lay (2008) regarded alcohol and tobacco as one of the “male goods”, asserting that higher intrahousehold bargaining position by the husband leads to increased household consumption of the items. Fixed effect models are estimated on both items on the same set of regressors as the previous two models to clarify on the reasons of unexpected results in the education and cloth models. Table 4 and 5 present fixed effect estimates on household expenditure on alcohol & tobacco and cosmetics, respectively.

Table 4: Fixed-effects estimates of household expenditure on alcohol and tobacco

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### Table 5: Fixed effects estimates of household expenditure on cosmetics

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Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In the AlcEx model, we see that household wealth as measured by income and number of children older than 18 years of age have positive and significant effects on household expenditure on alcohol & tobacco, while age of the wife has negative and significant effect. In the CosmEx model, on the other hand, age of the wife along with number of children older than 18 years of age have a positive effect on household expenditure on cosmetics.

In the AlcEx model, measures of bargaining power of neither of the spouses are statistically significant up to 10% level of significance. Coefficients of the measure of bargaining power in the CosmEx model seem more interesting. We see that the measure of the wife’s bargaining power is negative and significant while the measure of the husband’s bargaining power is positive and significant. If cosmetic products are the woman’s good then the estimates don’t make much sense and we certainly have to look for another measure of intrahousehold...
bargaining power. Another way to look at it is that the measure of bargaining power is still valid but cosmetics are not the women’s good. This can be interpreted as: weaker bargaining positions of the wife leads her to use more cosmetics products while she uses less of the products, if her bargaining position is stronger. On the other hand as the husband’s bargaining power increases, the wife uses more cosmetics products.

This leaves the geneal results of this study to be incolusive on the source of the inconsistent results. This is mainly due luck of clear information on preferences of spouses regarding household items in the context of the study population. Further studeis on effects of intrahousehold bargaining on items with known preference structures or use of other alternative measure of bargaining power may healp clarify the issue.

**Seniority as a measure of bargaining power?**

Another interesting patern from our regression analysis is that age of the wife is statistically significant in all models, with the exception of the ClothEx model. The sign of the coefficients is positive in models for goods which are assumed to be of the wife’s interest, such as education and cosmetics. On the other hand the estimated coefficient for age of the wife is negative in the model for the items which are not assumed to be of the wife’s preference (i.e alcohol and tobacco). Seniority of the wife by one year increases household expenditure on children’s education by 2.488 ETB and on cosmetics by 1.357 ETB, while decreasing household expenditure on alcohol and tobacco by around 1 ETB. These all are signs that we expected a measure of intrahousehold bargaining power would have on the items under consideration. Given the importance that the Ethiopian rural society attaches to seniority in age, it wouldn’t be far-fetched to consider siniority of the spuses to measure intrahousehold bargaining power.
6 Conclusion

This study analyzed whether or not intrahousehold bargaining power of women has a positive effect on household spending on children’s education and cloth. The study used value of assets brought into marriage by the spouses divided by household income, to measure their bargaining positions within the household. The study used the last seven rounds of the Ethiopian rural household survey, conducted between 1994 and 2009, thereby applying a linear panel data model.

The descriptive statistics show that household expenditure on children’s cloth to be more or less uniformly distributed across different rounds of the survey, while expenditure on children’s education is considerably higher in the last three rounds. There is a large gap between the groom’s and the bride’s contributions to startup asset of households. On average the groom brings assets which are eight times greater, in value, than that of the bride’s. Land constitutes majority of the value of assets brought in by the groom, while livestock constitutes majority of the bride’s value of assets.

The study used a two person Nash cooperative game, which predicts factors that increase outside options will positively affect household demand for private goods of the spouse whose fallback position is improved, to inspire the empirical discussions.

The fixed effects estimates show that the measure of bargaining power of the wife has no effect on household expenditure on child education, while negatively affecting household expenditure on child cloth. These results have some implications that deviate from what is discussed in majority of the intrahousehold literature. These implications include: children’s clothing may be more preferred by the husband; children’s education may be a household public good; unitary model may be more appropriate in explaining intrahousehold interactions on certain items.

In the test for robustness of the measure of bargaining power, two separate regression models were run on household expenditure on items which are traditionally thought to be of the man’s and the woman’s preference. Value of assets brought in to marriage by the wife deflated by household income is found to have no effect on household expenditure on alcohol & tobacco (the man’s item) and a negative effect on cosmetics (the woman’s item).
A study population dominated by poor households with too little to bargain over and preference of individuals within the household that might deviate from what is traditionally perceived, can be factors contributing to mixed effects of intrahousehold bargaining positions of spouses on household expenditures in rural Ethiopia. The study suggests further studies on preference structure of Ethiopian households and using alternative measures of intrahousehold bargaining power. Age of the wife, which is found to have plausible effects on the items under consideration, can be considered as a potential measure of bargaining power.
Bibliography


Appendix

I. A two person Nash cooperative game (a Cobb-Douglas utility function)

This part tries to solve the same problem of a Nash cooperative game solved for a quasi-linear utility function in chapter three, in an exactly the same setting except for the utility function, which is replaced by a Cobb-Douglas function.

The utility functions of the spouses will take the following form:

\[
U^h(x_0, x_h) = x_0^\beta x_h^{1-\beta}
\]

\[
U^w(x_0, x_w) = x_0^\alpha x_w^{1-\alpha}
\]

Where \(0 < \beta < 1\) and \(0 < \alpha < 1\)

Case 1: non-cooperative outcome

Maximization problem of the husband is to

Maximize: \(U^h(x_0, x_h) = x_0^\beta x_h^{1-\beta}\)

subject to: \(p_0x_0 + p_hx_h = rG_h + I_h\)

It’s easy to show that optimal values of \(x_0\) and \(x_h\) are

\[
x_0 = \frac{\beta(rG_h + I_h)}{p_0}
\]

\[
x_h = \frac{(1 - \beta)(rG_h + I_h)}{p_h}
\]

The indirect utility function, which is also the treat point of the husband will be:

\[
V_o^h = \left(\frac{\beta(rG_h + I_h)}{p_0}\right)^\beta \left(\frac{(1 - \beta)(rG_h + I_h)}{p_h}\right)^{1-\beta}
\]

Maximization problem of the wife is to:
Maximize: \( U^w(x_0, x_w) = x_0^\alpha x_w^{1-\alpha} \)

subject to: \( p_0 x_0 + p_w x_w = r G_w + I_w \)

Optimal values of \( x_0 \) and \( x_w \) are:

\[
x_0 = \frac{\alpha (r G_w + I_w)}{p_0}
\]

\[
x_w = \frac{(1 - \alpha) (r G_w + I_w)}{p_w}
\]

The indirect utility function, which is also the treat point of the wife will be:

\[
V_0^h = \left( \frac{\alpha (r G_w + I_w)}{p_0} \right)^\alpha \left( \frac{(1 - \alpha) (r G_w + I_w)}{p_w} \right)^{1-\alpha}
\]

Case 2: cooperative outcome

The household maximizes the following Nash bargained utility function:

\[
N \equiv [x_0^\beta x_h^{1-\beta} - V_0^h] [x_0^\alpha x_w^{1-\alpha} - V_0^w]
\]

Subject to a pooled budget constraint \( p_0 x_0 + p_h x_h + p_w x_w = I \)

Where \( I = I_h + I_w \). The Lagrangian function will be:

\[
L = [x_0^\beta x_h^{1-\beta} - V_0^h] [x_0^\alpha x_w^{1-\alpha} - V_0^w] - \lambda (I - p_0 x_0 + p_h x_h + p_w x_w)
\]

With first order conditions

\[
\frac{\partial L}{\partial x_0} = \left[ \beta x_0^\beta x_h^{1-\beta} \right] [x_0^\alpha x_w^{1-\alpha} - V_0^w] + \left[ x_0^\beta x_h^{1-\beta} - V_0^h \right] [\alpha x_0^\alpha x_w^{1-\alpha}] = p_0 \lambda \tag{1}
\]

\[
\frac{\partial L}{\partial x_h} = [(1 - \beta) x_0^\beta x_h^{1-\beta}] [x_0^\alpha x_w^{1-\alpha} - V_0^w] = p_h \lambda \tag{2}
\]

\[
\frac{\partial L}{\partial x_w} = [(1 - \alpha) x_0^\alpha x_w^{1-\alpha}] [x_0^\beta x_h^{1-\beta} - V_0^h] = p_w \lambda \tag{3}
\]

Using the conditions 2 and 3 in condition 1 and solving for \( x_0 \) yields:
Using (2) and (3), we get:

\[
\frac{p_h}{p_0} \left[ x_0^\beta x_h^{1-\beta} - x_0^\alpha x_w^{1-\alpha} - v_0^w \right] = \frac{p_w}{p_0} \left[ x_0^\alpha x_w^{1-\alpha} - x_0^\beta x_h^{1-\beta} - v_0^h \right]
\]

(5)

Combining (4) and the budget constraint, it is possible to get an expression for \( x_0 \) in terms of \( x_w \), income, prices and parameters \( \alpha \) & \( \beta \):

\[
x_0 = \frac{\beta}{1-\beta} \frac{p_h}{p_0} I - \frac{p_w}{p_0(1-\beta)} (\alpha - \beta) x_w
\]

(6)

If we set \( \alpha = \beta \), from equation 6 we see that the amount of public good consumed in the household depends on its price and income. The treat points of any of the household members will have no effect. This is similar to property of the model with quasi-linear preferences. In addition, if we normalize prices to 1, we get a simpler expression for equation (5) in the form of:

\[
x_0^\alpha (x_w - x_h) = x_0^\alpha V_0^w - x_0^\alpha V_0^h
\]

Due to the non-linearity of the problem it is not easy to find a simple solution to \( x_w \) and \( x_h \), but it is possible to speculate about effects of changes in treat points using comparative statics. For example, if treat point of the wife (\( v_0^w \)) increases, keeping other things constant, the right hand side increases. Therefore, the left hand side has also to increase to keep the equality. We know that \( x_0 \) does not depend on the treat points, therefore the change has to come in the form of an increase \( x_w - x_h \). This means either \( x_w \) increases or \( x_h \) has to decrease or both. This is also in line with the results from solutions of the model with quasilinear utility function in chapter three.
II. Random effect estimates

Random effect estimates of household expenditure on child education

<table>
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<tr>
<th>VARIABLES</th>
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<th>(3) Educex</th>
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Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The difference from the fixed effects model for EducEx is that the number of children in the second and third age group and household non-food expenditure appear to be significant while age of the wife loses its significance.
Random effect estimates of household expenditure on child cloth and fabric

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Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this model, the sign and significance of all variables appear to be exactly the same as the fixed effect estimates.