

Intrahousehold Welfare in Rural Ethiopia*

Marcel Fafchamps

Bereket Kebede

Agnes R. Quisumbing

Oxford University

University of East Anglia

IFPRI

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Abstract

Using an unusually comprehensive dataset from rural Ethiopia, we look for systematic relationships between bargaining power and various dimensions of intrahousehold welfare. Our results confirm some of the results previously found in the literature. We find that the relative nutrition of spouses is associated with systematic differences in cognitive ability, independent source of income, and devolution of assets upon divorce. We also find that several dimensions of female empowerment benefit the nutrition and education level of children. However, other dimensions of intrahousehold welfare, such as health, leisure, and consumption of assignable goods, are not systematically associated with differences in bargaining power. We also find systematic differences in the nutritional and health status of spouses across villages, but these differences do not correlate well with anthropological accounts of female empowerment in rural Ethiopia. The lack of strong association between bargaining variables and many dimensions of intrahousehold welfare may be due to the fact that sur-

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veyed households are very poor and thus have little room for disagreement over consumption and leisure.

1. Introduction

To explain inequality within households, the theoretical literature has focused on two main ideas: the functioning of the marriage market; and bargaining within the household. In a marriage market perspective, prospective spouses negotiate up front the distribution of future gains from household formation (Becker 1981). Because of competition between potential spouses, those who bring more to a union are promised a higher future utility; if they did not, they would simply marry someone else. Some empirical evidence supports the view that spouses who bring more assets to a marriage have higher welfare (e.g. Fafchamps and Quisumbing 2007, Quisumbing 2003).

The bargaining framework, in contrast, implicitly assumes that spouses cannot, at the time of marriage, pre-commit to a future distribution of utility.¹ Who gets what must be negotiated ex post (e.g. McElroy and Horney 1981, Manser and Brown 1980). Intrahousehold inequality is thus predicted to depend on bargaining power, which in turn depends on threat points. Two main categories of threat points have been discussed in the literature: those based on the threat of divorce, and those based on non-cooperation within marriage (Lundberg and Pollak 1993). The first category of threat points is influenced by the level of income and welfare that a spouse can guarantee himself or herself upon divorce, and hence depends on rules regarding the distribution of assets upon divorce. The second category of threat points is affected by the level of welfare that spouses can achieve in a non-cooperative marriage. This level depends on rules regarding the management of household assets during marriage (e.g., management of household finances, independent sources of income). This theory predicts wives to be better off if they are more involved in household production and consumption decisions (McElroy 1990).

¹Even if prospective spouses cannot explicitly contract on the future distribution of household welfare, they may seek to influence future bargaining by signing a prenuptial agreement, thereby changing the disposition of assets upon divorce and hence bargaining power. This point has been noted, for instance, by Lundberg and Pollak (1993).

Some evidence has been found to support both views. Using time differences across US states regarding the introduction of new divorce legislation, Chiappori, Fortin and Lacroix (2002) for instance shows that intrahousehold inequality is affected by changes in rules regarding the devolution of assets upon divorce. Using evidence from the United Kingdom, Lundberg, Pollak and Wales (1997) in contrast show that a change in the disbursement of children allowance from husband to wife resulted in a reorganization of consumption expenditures towards goods thought to be preferred by women.² Pezzini (2005) provides similar evidence based on the introduction of the contraceptive pill and changes in the legal status of women in Europe. Other factors are also thought to affect intrahousehold bargaining, notably cognitive ability and domestic violence.

The above theories differ in the factors thought to influence allocation within the household. But because they can all be represented as shifting intrahousehold welfare weights, they have one point in common: as long as intrahousehold allocation is efficient, all dimensions of intrahousehold welfare should respond similarly to changes in welfare weights within the household. This is the so-called sharing rule result due to Chiappori (1997).

This paper tests these predictions using a purposefully collected data set that contains information on multiple dimensions of intrahousehold welfare as well as detailed data on factors influencing welfare weights. This is a main departure from the empirical literature that typically focuses on a narrow set of welfare indicators and bargaining variables at a time. To this effect, a specifically designed household survey was conducted by the authors. Data were gathered on a variety of welfare indicators: anthropometric measurements for adults and children; health indicators; consumption expenditures; education of children; and time budgets to determine the division of work and leisure within the household. Comprehensive information was also collected on possible determinants of welfare weights, such as assets and human capital at marriage, ex-

²Revisiting the same evidence, Hotchkiss (2005) finds different results and concludes that the data cannot reject either the income pooling or bargaining models.

pectations of disposition of assets upon divorce, and intrahousehold involvement in production and consumption decisions. To our knowledge, such a comprehensive analysis of intrahousehold welfare has never been attempted.

We find that intrahousehold allocation of welfare responds to determinants of welfare weights, but in different ways depending on the welfare indicator used. Furthermore, the effect of welfare determinants is not always that predicted by theory. The nutrition differential between spouses is related to the disposition of assets upon divorce – a point already made by Dercon and Krishnan (2000a) using similar data – but it is also associated with the cognitive ability differential between spouses. The health differential between spouses also depends positively on their relative cognitive ability, but it is negatively associated with land brought to marriage. None of the welfare determinants is found to affect total work time, albeit some have a significant effect on specific non-work activities. Involvement in household decisions is associated with better nutrition and health, but also with less leisure and personal time. No systematic relationship is found between welfare determinants and expenditures on specific consumption categories. We do, however, find that children are better fed and better educated in households in which women have more bargaining power, a finding that echoes similar findings reported in the literature. We end the paper with a discussion of possible reasons for these perplexing results.

2. Conceptual framework

To motivate our empirical strategy, we begin by summarizing the key insights from the marriage market and bargaining models. We begin with a simple version of the marriage market model, which was pioneered by Becker (1981). Consider N men and women with pre-marital endowments A_i^m and A_j^f , respectively.³ The endowment vector includes physical as well as human

³Here we abstract from possible strategic bequest considerations by the parents at the time of marriage. This issue is discussed, for instance, by Fafchamps and Quisumbing (2005a).

capital. The discounted future utility of being single is $V(A)$ with $V' > 0$. For instance, if β is the common discount factor and there is no accumulation, we can write:

$$V(A) = \frac{E[U(Y(A_i^m))]}{1 - \beta}$$

where $Y(A)$ is the income generated by endowment A and $U(\cdot)$ is an instantaneous utility function.⁴

The discounted expected utility each prospective groom i derives from marriage with potential bride j is written $W_i^m = W^m(A_j^m, A_i^f; \theta_{ij})$ where θ_{ij} is a sharing rule (Chiappori 1997). Similarly, for the prospective bride the expected discounted utility is $W_j^f = W^f(A_j^m, A_i^f; \theta_{ij})$. With a common discount factor and no accumulation, we can for instance write:

$$\begin{aligned} W^m(A_j^m, A_i^f; \theta_{ij}) &= \frac{E[U^m(\theta_{ij}Y(A_i^m, A_j^f))]}{1 - \beta} \\ W^f(A_j^m, A_i^f; \theta_{ij}) &= \frac{E[U^f((1 - \theta_{ij})Y(A_i^m, A_j^f))]}{1 - \beta} \end{aligned}$$

Cohabitation generates economies of scope so that, for each potential match, there exist a range of values $(\underline{\theta}_{ij}, \bar{\theta}_{ij})$ such that for all $\theta \in (\underline{\theta}_{ij}, \bar{\theta}_{ij})$, we have:

$$V_i^m < W_i^m \text{ and } V_j^f < W_j^f$$

that is, both spouses are better off being married with each other than remaining single.

Suppose that θ is contractible at the time of marriage, either directly or via some commitment device such as a prenuptial agreement, transfer of ownership of assets, or any other binding contract. Competition in the marriage market sets limits on the sharing rule any prospective

⁴The utility function may in general vary between men and women. Since this does not affect our argument, we ignore this complication in order to keep the notation simple.

spouse is willing to accept. Without going into the details of the matching process, we note that any stable equilibrium exhibits assortative matching: wealthy grooms marry wealthy brides, and vice versa. It follows that individual welfare is, in general, non-decreasing in pre-marital endowment of both spouses. Competition in the marriage market also implies that in equilibrium the sharing rule – and thus individual welfare W_i^m and W_j^f – depends on relative endowments. The reason is that, for a poor groom to convince a rich bride to marry him, he must guarantee her as least as much utility as she could obtain from marrying another available groom.

This immediately leads to a testable prediction: individual welfare should increase in assets brought to marriage. In particular, if we control for household income $Y(A_i^m, A_j^f)$, then individual assets A_i^m and A_j^f should affect W_i^m and W_j^f through their effect on the sharing rule θ .

The above approach assumes that the sharing rule is contractible at the time of marriage. If it is not, the sharing rule needs to be constantly renegotiated. Following McElroy (1990) and Chiappori et al. (2002), let us assume that the bargaining process over the sharing rule depends on a set of environmental factors F_{ij} which, for now, we leave undefined. Assuming efficient bargaining, welfare maximization by the household can be defined as the solution to a optimization problem of the form:

$$\max_{\theta} \alpha(F_{ij})U^m(\theta Y) + (1 - \alpha(F_{ij}))U^f((1 - \theta)Y) \text{ subject to } Y = Y(A_j^m, A_i^f) \quad (2.1)$$

where α is a welfare weight that depends on environmental factors F_{ij} .⁵ Without loss of generality, let us assume that $\alpha' > 0$. Maximizing (2.1) yields a negotiated sharing rule θ and hence

⁵ Altruistic preferences can be captured by (2.1) provided that husband and wife derive strictly more satisfaction from their own consumption than from their spouse's consumption. Of course, as the weight they give to their spouse's welfare approaches unity, testing the effect of environmental factors becomes highly problematic.

a division of welfare between spouses. The first order condition takes the form:

$$\alpha \frac{\partial U^m}{\partial Y} - (1 - \alpha) \frac{\partial U^f}{\partial Y} = 0$$

Totally differentiating with respect to α and θ yields:

$$\frac{d\theta}{d\alpha} = -\frac{\frac{\partial U^m}{\partial Y} + \frac{\partial U^f}{\partial Y}}{SOC} > 0$$

which, since the second order condition is negative at an interior optimum, shows that θ is increasing in α and hence in F_{ij} . Environmental factors that raise the husband's welfare weight thus raise his share of household consumption and hence his utility relative to that of his wife, and vice versa.

The literature has predominantly thought of α as the outcome of a bargaining game shaped by spouses' threat points. As pointed out in the introduction, two types of threats have been discussed: the threat of divorce and the threat of non-cooperation within marriage. McElroy and Horney (1981) and Manser and Brown (1980), for instance, propose an intrahousehold bargaining model in which bargaining power depends on the level of utility that spouses can credibly guarantee themselves upon marriage dissolution. In this context, bargaining power – and hence the intrahousehold distribution of welfare – depends on human capital and divorce law: what assets women receive upon divorce and what income they can obtain from these assets and their human capital determines how much welfare they can bargain for themselves during marriage.⁶ Bargaining power is also affected by entitlements such as alimony and child support

⁶As shown by Fafchamps and Quisumbing (2002), the devolution of assets upon divorce only loosely depends on the ownership of these assets prior to marriage or even during marriage. This is normal: many societies provide incentives for women to contribute to non-market household public goods (e.g., raising children, household chores) by making them partly residual claimants on the wealth accumulated by the couple. With this system, a wife who enables her husband to work hard by taking on many household chores is entitled to a share of the wealth he generates as a result.

payments (Lundberg et al. 1997) or the right to demand support from parents and relatives (Bloch and Rao 2002).

Lundberg and Pollak (1993), in contrast, argue that divorce is too strong a threat in most cases; non-cooperation within marriage is a more credible threat and can take a variety of forms (e.g., reduced contribution to household public goods, diversion of household funds, refusal to have sex). In this case, bargaining power depends on the details of household finances and internal organization: Do the spouses have separate finances, as for instance documented in Ghana by Goldstein (2000)? Who holds the household purse and oversees production and consumption decisions? Lundberg and Pollak (1993) call this the separate spheres hypothesis: husband and wife control separate spheres of household activity, and these shape their bargaining power during marriage.

Other bargaining variables have been discussed in the literature. Of interest is the possibility that spouses have different bargaining abilities. An intelligent spouse, for instance, is likely to negotiate a better outcome for himself or herself. It is also conceivable that an individual may use domestic violence to improve his or her bargaining position. Domestic violence is indeed common (e.g. Bloch and Rao 2002, Srinivasan and Bedi 2005), including in our study area (Fafchamps and Quisumbing 2002). To the extent that individuals appear to differ in their predisposition towards domestic violence, we can define another set of variables capturing what we shall call relative bargaining effectiveness B_i . We assume that θ depends on B_i .

The above ideas form the basis of our testing strategy. Let H_i^m and H_j^f be spouse-specific welfare indicators with:

$$\begin{aligned} H_i^m &= g^m(\theta_{ij}Y_{ij}) \\ H_j^f &= g^f((1 - \theta_{ij})Y_{ij}) \end{aligned}$$

From the earlier discussion, we expect θ_{ij} to depend on the spouses' share of assets brought to marriage, on their expected share of assets upon divorce D_i , on their involvement in household finances and decisions S_i , and on relative bargaining effectiveness. Variables D_i and S_i together form what we have earlier called environmental variables F_{ij} . By testing each set of variables separately we can ascertain which of the three dominant theories – if any – explains intrahousehold variation in welfare.

In some cases, we do not have an individual-specific measure of welfare but observe $H_i^m + H_j^f$ instead. This is the case for consumption expenditures, which are not recorded by individual. If husbands and wives have systematically different preferences over consumption, it may nevertheless be possible to test intrahousehold welfare allocation. To see why, suppose that husbands on average spend γ^m of their share of household consumption θY on good k while wives spend γ^f with $\gamma^m > \gamma^f$. Let E^k denote household consumption expenditure on good k . Suppose for a moment that expenditures are linear in income.⁷ We can write:

$$\begin{aligned} E^k &= \gamma^m \theta Y + \gamma^f (1 - \theta) Y \\ &= \gamma^f Y + (\gamma^m - \gamma^f) \theta Y \end{aligned} \tag{2.2}$$

Equation (2.2) can similarly be used to test the effect of A_i, D_i and S_i . Note that, in this case, the validity of the test rests on the maintained hypothesis that $\gamma^m \neq \gamma^f$. For the test to work, men and women must have *systematically* different preferences; it is not sufficient that tastes vary across individuals. This is a strong requirement, particularly in poor societies where the scope for consumption choice is limited. The test also requires that the data be sufficiently disaggregated to distinguish categories on which preferences differ by gender. In the

⁷In the econometric analysis, we assume instead that consumption shares are function of the log of income. The implication regarding bargaining variables is the same, however.

literature, it is often assumed, for instance, that men like alcohol more than women and thus that alcohol consumption can be assumed to have $\gamma^m \neq \gamma^f$ (Doss 1999). Gender-specific clothing has similarly been used as an individual-specific consumption category Browning, Bourguignon, Chiappori and Lechene (1994), in spite of the fact that spouses probably derive utility from how well dressed their partner is.

So far, our reasoning has been centered around private goods for which each person is competing for resources (e.g. Phipps and Burton 1998, Attanasio and Lechene 2002, Dekker and Hoogeveen 2002). Examples of private goods include food and leisure time. Couples also produce and consume household public goods such as housing, food preparation, and the like. From the point of view of the couple, children and their welfare are public, non-rival consumption goods. If women feel systematically more altruistic towards their children than men do, we expect child welfare to be higher in households where women have more bargaining power. The strongest intrahousehold effects that have been documented in the empirical literature indeed concern children (e.g. Sahn and Stifel 2002, Duflo 2003). It is therefore possible that women care more than men about children health, nutrition, and education. This again can be tested by regressing child welfare outcomes H_{ij}^c – such as health, education, and nutrition – on household income and on variables A_i , D_i and S_i .

3. The data

Having presented our conceptual framework, we now turn to the data. Intrahousehold equity is an issue anywhere, but it is particularly salient in poor countries where, as Haddad and Kanbur (1990) have shown, slight differences in the intrahousehold allocation of resources can have dramatic nutritional and health effects. Dercon and Krishnan (2000a) and Goldstein (2000) further show that the sharing of risk within the household is not perfect and, in the Ethiopian

case studied by Dercon and Krishnan, has repercussions on nutrition for the couple.

We revisit intrahousehold welfare using the same data from rural Ethiopia as Dercon and Krishnan, augmented by an additional survey round dedicated to intrahousehold issues. The choice of country is dictated by the fact that Ethiopia is a low-income, drought-prone economy with the third largest population on the African continent. The country remains a primarily agrarian economy where external options for women are severely restricted. Consequently the welfare of women depends critically on what happens within rural farming households. An additional attraction of Ethiopia as a study site is that it has extensive agro-ecological and ethnic diversity, with over 85 ethnic groups and allegiance to most major world and animist religions (e.g. Bevan and Pankhurst 1996, Fafchamps and Quisumbing 2002, Webb, von Braun and Yohannes 1992). While some work has been done on intrahousehold welfare in Asia and West Africa, little is known about in East Africa apart from the already cited work of Dercon and Krishnan.

For our analysis, we rely on four rounds of the Ethiopian Rural Household Survey (ERHS). The first three rounds took place in 1993-95. They were undertaken in collaboration between the Department of Economics of Addis Ababa University (AAU) and the Centre for the Study of African Economies (CSAE) of Oxford University. The fourth round took place in 1997 and resulted from a collaboration between AAU, CSAE and the International Food Policy Research Institute (IFPRI).

The ERHS covers approximately 1500 households in 15 villages across Ethiopia, capturing much of the diversity mentioned above. While sample households within villages are randomly selected, villages themselves are chosen so as to ensure that a great diversity of farming systems be represented. While the 15 sites included in the sample are not representative of rural Ethiopia

in a statistical sense,⁸ they include all main agro-ecological, ethnic, and religious groups.

The ERHS questionnaire is a very detailed LSMS-style questionnaire. In addition to the standard modules on consumption and income, it includes measurements of height and weight in each survey round, as well as detailed health questions. The 1997 questionnaire includes many of the same questions as previous rounds plus a special intrahousehold module specially designed to implement the test outlined in this paper. This module was pretested by the authors in February/March 1997 in four non-survey sites with a level of ethnic and religious diversity similar to the sample itself. Data collection took place between May and December 1997 under the direct supervision of one of the authors. Questionnaires were administered in several separate visits by enumerators residing in the survey villages for several months. Careful data cleaning and reconciliation across rounds were undertaken in 1998 and 1999 in collaboration with IFPRI staff. Further details regarding the 1997 survey round are discussed by Fafchamps and Quisumbing (2002) and Fafchamps and Quisumbing (2005a).

The 1997 survey collected extremely detailed information about all transfers of money and property at the time of marriage. We recorded precisely the origin of the transfer (e.g., groom, or groom's family) as well as their destination (e.g., groom's family, groom alone, bride and groom jointly, etc). Transfers between families are extremely small compared to transfers from the two families to the bride and groom (either separately or jointly). Marriage is primarily the creation of a new enterprise, i.e., a family farm, which must be endowed with sufficient land, equipment, and working capital to be viable. What the data say about transfers at marriage in Ethiopia is presented in detail in Fafchamps and Quisumbing (2005a, 2005b). Fafchamps and Quisumbing (2002) describe in detail how control and ownership of assets during marriage are determined in part by who brought assets to marriage, in part by who will receive them upon

⁸In particular, Oromo villages are underrepresented and nomadic areas are not included at all.

marriage dissolution, and in part by social norms regarding asset management during marriage.

Descriptive statistics are presented in Tables 1 and 2 for the main variables used in the analysis. We limit our analysis to monogamous couples. Table 1 presents information available for each spouse. The first part of the Table contains personal characteristics that were collected in each survey round. We observe on average a ten-year age difference between husband and wife. The Body Mass Index (BMI) is computed as weight in Kg divided by the square of height in meters. Average values of 20 are found for both husband and wife, with a standard deviation of 2.1-2.3; using cutoffs of 25 and 30 for overweight and obesity, respectively, being overweight or obese is not a serious issue in this population. Regarding health status, it is well known that subjective questions regarding illness (e.g., were you ill last week?) are subject to income bias. To avoid this bias, we rely instead on five factual questions regarding physical mobility and capacity to work.⁹ Answers to these questions are combined into mobility index taking values from 5 (good mobility) to 20 (severely restricted mobility). Variation in the value of the index is limited, however, as 85% of husbands and 78% of wives get a value of 5. As is well known, BMI and mobility are affected by pregnancy and, possibly, by breast-feeding. We see that wives were pregnant and breast-feeding in 9.5% and 37% of the observations, respectively.

The rest of Table 1 presents information collected only in round 4. We begin with time use in the 24 hours preceding the survey. Time is divided into two broad categories: work, including farm and market-related activities, participation in communal chores, and household chores; and leisure, divided into personal time (e.g., eating, washing, resting) and social time (e.g., wedding, church). We observe a sharp division of labor by gender, men focusing on farming and women focusing on household chores. In traditional ox-plow agriculture as practiced in Ethiopia,

⁹These questions were: can stand up after sitting down; sweep the floor; walk for 5 Km; carry 20 liters of water for 20 meters; hoe a field for a morning. Possible answers were: easily; with a little difficulty; with a lot of difficulty; or not at all. Summing all five answers yields an index varying between 5 and 20.

farm work requires significant physical strength, which probably explains why men are primarily responsible for it. This pattern has been observed elsewhere as well (e.g. Cleave 1974, Fafchamps and Quisumbing 2003). Market-related activities are divided more or less equally, while men tend to be more involved in communal chores. On average, men have more leisure than women. Both sexes divide their leisure time more or less in the same proportion between personal and social time, the latter accounting for 60% of leisure on average.

Next we present information regarding participation in production and consumption decisions. Decisions regarding what to plant and what to do with the proceeds of livestock sales are taken primarily if not exclusively by men. In contrast, women play a predominant role in deciding what to do with the proceeds from dairy sales. To capture involvement in consumption decisions, we construct an index as follows. For each of eight expenditure categories, we recorded whether expenditures are undertaken by the husband or the wife.¹⁰ Summing over all eight categories yields an index taking values from 0 to 8. The Table shows that husbands undertake most consumption expenditures and thus play a leading role in the management of household finances. We also report the proportion of households in which the wife is engaged in one of a variety of income earning activities.¹¹ It is often believed that women who earn an independent income have more say in household decisions. In our sample, one quarter of wives have an income earning activity.

Table 1 then presents information regarding asset ownership. Two sets of two variables are reported. The first set refers to current *individual* ownership of land and livestock. Survey results show that husbands nearly always consider that farm land is theirs. In contrast, most livestock is considered as held jointly by both spouses. Ownership, however, is not synonymous

¹⁰The eight categories are: cereals and grains; spices and oils; meat and fish; clothing for men; clothing for women; clothing for children; school fees; and medical expenses. If both spouses participate, they are both counted as one half for the purpose of constructing the index.

¹¹Such as preparing various foods and alcoholic beverages for sale, selling charcoal, firewood or dungcakes, and making handicrafts for sale.

with disposition upon divorce or death. Using data from Ethiopia, Fafchamps and Quisumbing (2002) indeed show that assets brought to marriage or owned during marriage are not a good predictor of disposition upon divorce. Respondents were asked how they expected household assets to be divided upon divorce. Results show that land is expected to go primarily to the husband. The husband average share – 75% – is smaller than his average ownership share. Husbands also expect to receive a little over half of the household’s livestock, with quite a bit of variation across households.

Bargaining variables are presented next. Two types of variables were collected. The first set seeks to differentiate individuals according to their ‘cognitive ability’; the second set comprises variables that may capture predisposition towards violence. We expect more intelligent individuals to be better at intrahousehold bargaining. The overwhelming majority of our sample is illiterate (66% of husbands and 86% of wives). Only 18% of husbands and 9% of wives have gone beyond primary school. In these circumstances, it is difficult if not impossible to administer cognitive ability questions that assume even basic numeracy. We therefore decided to use vocabulary as a measure of cognitive ability: presumably, more intelligent individuals can absorb and retain a richer vocabulary. In each household, husband and wife were asked to list as many names of trees and of childhood diseases as they could in their own language. Childhood diseases are included because we expect women to be more aware of phenomena that directly affect their children. The advantage of these questions is that formal schooling is not required to learn local taxonomies.¹² Anthropologists have indeed argued that traditional societies develop sophisticated taxonomies to describe their natural environment (Levi-Strauss 1962). Being able to name trees and children’s diseases can thus be seen as a measure of familiarity with one’s own rural culture.

¹²Responses to the tree and child disease questions are strongly correlated with the education variable, suggesting that they indeed capture some dimension of intelligence.

Results shown in Table 1 indicate that the average farmer can cite 12 tree names. There is a lot of variation in the data, however, with some respondents listing up to 78 tree names and one quarter of all husbands and one half of all wives listing only 6 or fewer tree names. This suggests that respondents are only moderately familiar with their own rural culture. The question regarding child diseases reveals that respondents have a very limited vocabulary to describe the health status of their child: on average, men and women can only list three child ‘diseases’ – typically, diarrhoea, fever, and coughing. In these conditions, it is not surprising that Ethiopia has one of the highest levels of child mortality in the world.

The next set of questions measures factors associated with predisposition to violence. Respondents were first asked whether they ever were involved in a fight; some 40% of men and 14% of women answered positively. Respondents were then asked whether they ever witnessed their father beating up their mother; 40-45% of them did, suggesting that the incidence of domestic violence is quite high in rural Ethiopia. We expect that individuals growing up in an environment characterized by domestic violence are more likely to find it acceptable – and hence more likely to resort to it.¹³ We did not ask respondents whether they resort to domestic violence because actual recourse to violence is endogenous to the bargaining process within the studied household – and hence could not be used as regressor.

Because answers to the ‘cognitive ability’ and violence questions are highly multicollinear, they cannot easily be used as separate regressors. We therefore resort to factor analysis to summarize their information content (see the appendix for details). The first factors of each analysis are used throughout as proxies for cognitive ability and predisposition to violence, respectively. Since the factor loadings are all positive, the factors have the desired interpretation.

¹³If we regress being in a fight on exposure to domestic violence, we indeed find a strong and highly significant positive relationship. This is also supported by recent evidence from Demographic and Health Surveys in ten countries: a family history of domestic violence increases the risk that women will be abused by their husbands or partners (Hindin, Kishor and Ansara 2008).

The next part of Table 1 focuses on assets and human capital brought to marriage. As already documented by Fafchamps and Quisumbing (2005b), in rural Ethiopia transfers of assets at the time of marriage go primarily to the newly created household. Gifts between the families of the bride and groom are very small in comparison. Most assets brought to marriage come from the husband and his family. In terms of value, land is the main asset brought to marriage.¹⁴ Husbands also tend to have more work experience at the time of marriage. In terms of family background, husbands are more likely to be born in the village; wives, in contrast, tend to come from neighboring villages, a sign of exogamy. Very few husbands and wives were born in an urban area. Respondents were asked to rank the prosperity level of their parents from 1 – very poor – to 5 – very rich. As expected, ‘average’ is the most common answer. Husbands and wives have two brothers and two sisters on average. We also see that 40% of husbands were no longer living with their parents at the time of marriage, compared to 25% of wives. This in part reflects the fact that one third of husbands and one fourth of wives were married before.

Table 2 presents variables only available at the level of the household. We begin with a number of child welfare measures. We first report the average height for age, weight for age, and weight for height Z-scores for children in each household. Figures indicate that Ethiopian children tend to be short for their age, a common feature of poor countries. Weight for age is slightly better, resulting in high average weight for height scores. Mobility questions were asked for children aged seven and above, from which we constructed a mobility index as before. The

¹⁴Land issues in Ethiopia are, like in most of Africa, fairly confused. Following the 1973 revolution, land ownership was nationalized and the allocation of usufruct rights to farmers was devolved to Peasant Associations (PA) in each village. The land reform led to the break up of large farms, especially those run by absentee landlords in the South. Beyond this, PAs often sought to follow traditional land inheritance practices, departing from them only to correct serious imbalances – e.g., helping young households without land. Even though land is state property, people can inherit and transfer the land allocated to them to their children; this was happening even in periods when more frequent distributions and re-distributions have taken place. Since the overthrow of the Mengistu regime in 1991, several efforts have been made to revamp the system, leading to the devolution of land issues to the regions. In the surveys farmers were asked how they acquired the land they cultivate. Most state they obtained their land through inheritance or gift from the family, and nearly all were willing to set a price on the land they ‘own’.

value of the index is slightly higher than that for parents, reflecting the fact that children are less capable of carrying heavy loads and undertaking heavy agricultural tasks. School attendance is very low: among all children aged 5 to 15, the average proportion attending school is only 12%. In all child welfare dimensions, there is substantial variation across households, as evidenced by high reported standard deviations.

The next part of the Table focuses on consumption expenditures. Consumption of self-produced food is included but housing, which is entirely self-provided, is not included. The prevalence of poverty in our sample population is immediately apparent from the high share of food in consumption. Non-food expenditures are dominated by clothing (23% of non-food), alcohol and tobacco (20%) and ceremonial expenses (15%) – mostly gifts at weddings and funerals.

Some household characteristics are presented at the bottom of the Table. Average household size is 6. The median farmer cultivates 1.4 hectares, with quite a bit of variation in landholdings across households.¹⁵ Ethiopian farmers own a variety of livestock. The average number of oxen, used for land preparation in much of the country, is 0.9. As is immediately apparent, the value of assets other than livestock is small.

4. Econometric analysis

We now turn to the econometric analysis. As we have seen in Section 2, the basic relationship we seek to investigate is of the form:

$$H_i^m = g^m(\theta_{ij}Y_{ij}) \tag{4.1}$$

¹⁵Some of the variation, however, is due to measurement error: Ethiopian farmers rely on a wide variety of local units to measure land. In spite of our best efforts, it is possible that enumeration error in recording land units has resulted in applying the wrong conversion factor.

We suspect that, as far as basic welfare indicators are concerned, the effect of income is concave.

We therefore assume that (4.1) can be approximated as:

$$\begin{aligned} H_i^m &= \omega_0^m + \omega \log(\theta_{ij} Y_{ij}) \\ &= \omega_0^m + \omega \log \theta_{ij} + \omega \log Y_{ij} \end{aligned} \quad (4.2)$$

We need to select a suitable functional form for θ_{ij} . If spouses have equal welfare weights when they have equal bargaining power, we can write:

$$\theta_{ij} = \frac{1}{2} e^{\gamma_1(B_i - B_j)} \quad (4.3)$$

where B_i and B_j are vectors of bargaining power variables for spouses i and j , respectively. We see that if $B_i = B_j$, $\theta_{ij} = 0.5$. It is also conceivable that social norms dictate that one gender be favored over the other. In that case, $\theta_{ij} \neq 0.5$ even when $B_i = B_j$. Social norms may vary from region to region, depending on religion, culture, etc. Equation (4.3) can thus be expanded to:

$$\theta_{ij} = \frac{1}{2} e^{\gamma_1(B_i - B_j + \eta_v(S_i - S_j))} \quad (4.4)$$

where S_i is a gender dummy, e.g., 0 if i is male and 1 if i is female. Parameter η_v captures the effect of a social norm specific to village v on the allocation of H between spouses.

Taking logs of (4.4) and inserting into (4.2), we obtain a regression model of the form:

$$H_i = \alpha_0 + \alpha_{1v} S_i + \alpha_2(B_i - B_j) + \omega \log Y_{ij} \quad (4.5)$$

where we have suppressed the male/female subscript.¹⁶ Parameter α_{1v} is a village-specific gender bias coefficient capturing the effect of social norms.

In the analysis that follows we estimate model (4.5) on pooled husband and wife data. We investigate the effect of four groups of bargaining variables: (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 received upon divorce, which capture exit option effects; and two factors proxying for cognitive ability and predisposition towards violence (see Appendix for details). The cognitive ability factor combines information from answers to five quiz questions.¹⁷ It also proxies for dimensions of human capital not adequately captured by the years of education variable, such as the quality of education received. The factor for predisposition to violence combines information from the two exposure to violence questions reported in Table 1.

We expect the effect of divorce expectations variables to vary with household wealth: if the household has no livestock, neither spouse expects to receive livestock upon divorce and hence neither derives any bargaining power from it. To capture this, divorce expectations variables reported in Table 1 are multiplied by the current land and livestock wealth of the household.

We have subjected our findings to considerable robustness analysis. To save space, we only present here our most comprehensive regression results. Given the relatively large number of regressors, the reader may worry that our results (or lack thereof) may be driven by multicollinearity. They do not. Similar qualitative results obtain with fewer controls. It also does not matter whether we include all four categories of bargaining variables or only some of them

¹⁶We have set $\alpha_0 = \omega_0 + \omega \log 0.5$, $\alpha_{1v} = 2\omega\gamma_1\eta_v$, and $\alpha_2 = \omega\gamma_1$.

¹⁷(1) Does the respondent know who the prime minister of Ethiopia is? (2) Has the respondent heard that man has walked on the moon? (3) An arithmetic quiz; (4) Number of names of tree species the respondent can list in his/her native language; (5) Number of names of child diseases the respondent can list.

at a time. The reader may further wonder whether involvement in household purchases and the female non-farm income dummy may be subject to endogeneity bias. Given some of our results below, this is a possibility we cannot rule out and that must be kept in mind when interpreting the results. We also estimated all regressions without the involvement in household purchase variable and without the female non-farm income dummy. Other results are basically unaffected.

Our first set of regression focuses on the Body Mass Index (BMI) and the physical mobility index of the husband and wife. In very poor populations such as the one we study, BMI is generally taken as a useful measure of nutritional status: few people are overweight and even fewer diet purely for reasons of external appearance.¹⁸ Mobility is a crude index of long-term health status: individuals who have been underfed or in poor health for a long time eventually find physical exercise difficult or impossible.

Because both BMI and mobility are long term welfare measures, we include controls other than current income Y_{ij} to minimize the risk of omitted variable bias. Household size is controlled for, as well as current wealth – represented by operated land, number of livestock heads, value of livestock, and value of other productive assets. Long-lasting welfare effects are captured by including land and livestock at marriage: presumably, households that started with more assets achieved higher welfare in the past and hence should have higher BMI and mobility today. We expect more intelligent couples to do better; to this effect, we include a proxy for the combined cognitive ability of the spouses. We also control for various individual specific effects that may affect BMI or mobility without necessarily reflecting bargaining power. In addition to a gender dummy, we control for age and age squared, education level, height, and whether the spouse is pregnant or breast-feeding.¹⁹ We expect pregnant women to be less mobile and to weigh more –

¹⁸Many rural Ethiopia eat vegetarian food much of the year for religious and economic reasons. This should not be construed as dieting in the Western sense, however.

¹⁹Education level is measured by an index going from 1 (no education) to 9 (college education). To minimize measurement error, we use average height as regressor, not individual measurements in each round.

and thus to have a higher BMI. We also expect older individuals to be less mobile. Finally, we also include $B_i + B_j$ as separate regressor in case it has a direct effect on H . With this addition, the estimated model (4.5) can be rewritten as:

$$\begin{aligned} H_i &= \alpha_0 + \alpha_{1v}S_i + \alpha_2(B_i - B_j) + \alpha_3(B_i + B_j) + \omega \log Y_{ij} + \beta Z_i \\ &= \alpha_0 + \alpha_{1v}S_i + 2\alpha_2B_i + (\alpha_3 - \alpha_2)(B_i + B_j) + \omega \log Y_{ij} + \beta Z_i \end{aligned}$$

where Z_i stands for the vector of controls listed above. Some $B_i + B_j$ naturally drop out of the regression.²⁰ Since we include the wife's age as well as the sum the husband's and wife's age, we implicitly control for the age difference between spouse. We also include survey round dummies and village fixed effects.

Results are presented in Table 3. To facilitate interpretation, we have multiplied the mobility index by minus one, so that the signs of coefficients are immediately comparable across the two regressions. Because the mobility index is censored, we use a tobit estimator. We also report joint significance tests for each group of bargaining variables.

We find that, as could be expected, higher consumption expenditures and more wealth are associated with higher BMI. In contrast, mobility does not appear to depend on income or wealth. As expected, pregnant women have a higher BMI but are less mobile. Older people are less mobile while better educated people are more mobile, possibly because they take better care of themselves. Taller individuals have a lower BMI but are more mobile, indicative of better health in general. By and large, these are standard results in poor rural economies, suggesting that the data are reasonably good.

Turning to bargaining variables, we obtain different results in the two regressions. In the BMI

²⁰The sum of involvement in household purchases drops out because, by construction, it is always equal to 8. Various dummies (female dummy, pregnant, breastfeeding, female non-farm income) drop out since they are female-specific and can only appear once.

regression, we find, as did Dercon and Krishnan using similar data, that disposition of assets upon divorce is systematically associated with nutrition. The effect, however, is ambiguous: land has a positive coefficient while livestock is negative. Earning an independent income is, for the wife, associated with better nutrition. So is the cognitive ability factor. The latter finding is consistent with the idea that a more intelligent spouse is capable of appropriating more household food resources. However, this finding does not carry through to the mobility regression, where it is not significant. In that regression, the only significant variable is whether the spouse is involved in household purchases. The direction of causality is unclear, however, since someone whose mobility is impaired would find it difficult to travel to market. Reestimating the regression without this variable leaves other coefficients basically unaffected.

The village-specific coefficients α_{1v} of the female dummy are interesting in their own right as they indicate the extent to which intrahousehold welfare may be influenced by location-specific social norms. According to Dercon and Krishnan, the available anthropological evidence suggests that there are strong differences between the North and the South of Ethiopia, with a lower divorce rate and worse nutritional status of widowed female heads in the South. For the Central Oromo region the anthropological evidence is mixed. Based on this evidence we expect less negative coefficients on the female dummy variable in Northern villages than in the South. This is not what we find. Coefficients for Northern and Southern villages are all negative, many of them significantly so. This indicates that, other things being equal, wives fare worse than husbands in terms of nutrition and mobility. Although coefficients vary quite a bit across villages, there is no evidence that they are more negative in the South than in the North. A couple of villages in the Central part of the country have a positive coefficient, but only one is significant. We also note that there is no village where wives are significantly worse off in terms of both nutrition and health. Whatever accounts for the pattern of α_{1v} across villages, it does

not seem to affect equally nutrition and health.

Could it be that our results are due to unobserved household heterogeneity? We do not observe the preferences of the various couples in our dataset. These preferences may affect their choices of nutritional and health status in a way that is persistent over time. To investigate this possibility, we reestimate the model with household fixed effects. Results are presented in Table 4. Identification of bargaining variables is achieved by comparing spouses within the same household. Results are only marginally stronger, with one bargaining variables significant at the 10% level or better. Independent income no longer is significant in the nutrition regression but the violence factor now is, suggesting that domestic violence (or the threat thereof) may play a role in the intrahousehold allocation of food. In the mobility regression land brought to marriage is now significant but has the wrong sign. Village-specific coefficients on the female dummy variable again show no clear North-South pattern, with substantial variation across villages within each region.

The evidence so far is that bargaining variables and village-specific social norms may be associated with differences in nutrition or health, but they do not affect nutrition and health in the same way and they do not always have the sign predicted by theory. What about other dimensions of welfare? If we broaden our search, perhaps a systematic pattern will begin to emerge.

We first look at the distribution of work and leisure between husband and wife. We regress the total amount of work and leisure of each spouse on household fixed effects and individual level variables. We conduct the same analysis for the two dimensions of leisure in our study population, namely, social time and personal time. Results are presented in Table 5. Since time use questions were only asked in round 4, household variables drop out of the estimation.²¹

²¹Less than 500 husbands answered the time use questionnaire, compared to more than 800 wives. Regression results presented in Table 5 are based on around 300 households for which information is available on both husband

Looking at the village-specific female dummy coefficients, we note that, in most surveyed villages, wives work harder and enjoy less personal time than husbands. There are some strong differences across villages, but no evidence of a strong North-South gradient. Older people work less and socialize more. We find that spouses who brought more land at marriage enjoy more leisure in the form of social time. Involvement in household purchases is seen to cut into people's personal time, resulting in less leisure. Individuals with a higher cognitive ability factor socialize more. Other bargaining variables are not significant.

Next we turn to consumption expenditures. We focus on consumption categories that are both excludable and, to some extent, attributable – namely, alcohol and clothing for men, women, boys and girls. In Ethiopia, it is reasonable to believe that men like alcohol and tobacco more than women. Following Browning et al. (1994), it is also possible that women like to purchase women's clothing more than their husbands. It is also conceivable that women care more about children and therefore prefer to spend more on children's clothing, whether for boys or girls.

Regression results are presented in Table 6. In all cases, the dependent variable is the share of total consumption expenditures spent on each of five categories. Since total expenditures enter in log form and since we control for prices via village dummies, the regression model is akin to an almost ideal demand system. Because of heavy censoring, the estimator is tobit.

We find alcohol and tobacco to have a high income elasticity. For clothing we cannot reject a unitary income elasticity – none of the total expenditure coefficients is significant. As anticipated, household size has a negative effect on adult clothing but a strong positive effect on children clothing: larger households have more children and thus spend more to clothe them. Households with more assets spend more on clothing – possibly a long-term income effect. All these findings

and wife. Since we cannot rule out selection effects, we only show household fixed effect results. Selection into this sample, of course, is accounted for by using household fixed effects.

are reasonable and broadly conform with expectations regarding the consumption behavior of poor rural households.

Turning to bargaining variables, we find little evidence of any systematic effect. The wife's involvement in household purchases reduces expenditures on men's clothing – a result consistent with intrahousehold bargaining power – but it also increases expenditures on boys while reducing those on girls. More importantly, it is associated with a significant *reduction* in the share of expenditures on women's clothing. While this result may be hard to reconcile with intrahousehold bargaining power, it is consistent with previous evidence that Ethiopian wives tend to invest preferentially in boys, who are responsible for providing old age support (Quisumbing and Maluccio 2003), and the possibility that women may voluntarily prioritize children's welfare over their own. Households in which the wife expects to receive more land upon divorce spend more on alcohol, contrary to theory. Consistent with theoretical predictions, livestock received upon divorce is associated with a larger expenditure share on women's clothing as well as boys'.

Our last set of regression results focuses on child welfare. Here the unit of observation is an individual child. We investigate two categories of child welfare indicators: nutritional status and school attendance. Child nutrition is measured via three widely used Z-scores: height for age, weight for age, and weight for height. The first index is thought to capture, in addition to genetic variation, the effect of long-term nutrition. In contrast, in a poor population such as this one, weight for age and weight for height are thought to capture short-term nutritional status.

Results are presented in Table 7. Because of censoring, tobit is used for school attendance – constrained to be between 0 and 1. Household income is found to have a significant effect on height-for-age and weight-for-age but none on school attendance. Children in households with more productive assets are systematically better nourished. School attendance is lower in

households with livestock wealth. This is unsurprising since, in Ethiopia, children are heavily involved in herding. Genetic factors also have an important effect on nutrition indicators, as indicated by the strong positive effects of husband and wife height. Other results are puzzling. The nutritional status of children is worse when the husband is better educated but better when both parents are predisposed towards violence. We also find that children in larger households are more likely to attend school.

Regarding bargaining variables, many are significant with the sign predicted by theory. Land and livestock brought to marriage by the bride are found to have a positive and often significant effect on child nutrition and education. Height-for-age and school attendance are higher for children whose mother has a source of non-farm income. We also see that women who expect more land or livestock upon divorce have better fed children.

Taken together, these findings suggest that empowered women tend to divert household resources towards their children rather than themselves. However, the results do not provide a clear-cut answer to the question of which type of bargaining variables matter – all three categories (assets brought to marriage, control over resources during marriage, and disposition of assets upon divorce) seem to matter to some extent.

5. Conclusion

We have investigated the effect of bargaining power on the intrahousehold allocation of welfare. Building on the theoretical and empirical literature, we devised a simple yet effective testing strategy. Based on this testing strategy – which was finalized before the data were collected – we developed an original questionnaire that painstakingly collected detailed information on many aspects of household bargaining that have been debated in the literature. Having collected all the necessary data, we tested the leading theories of intrahousehold bargaining on the nutrition and

mobility of husband and wife, their work and leisure time, household consumption patterns, and child nutrition and school attendance. To our knowledge, this is the first time that intrahousehold welfare has been investigated in such a comprehensive manner.

Contrary to theoretical predictions, the results do not indicate that bargaining variables are associated in a common, systematic way with all dimensions of intrahousehold welfare. For instance, some variables are associated with a welfare increase in one regression – e.g., involvement in household purchases in the BMI and mobility regression – and with a welfare decrease in another – e.g., less leisure. Assets brought to marriage by the wife do not have a strong effect on the relative welfare of husband and wife but tend to benefit child nutrition. Cognitive ability – proxied here by vocabulary in the vernacular language and by responses to quiz questions – appears to play a role in intrahousehold allocation, possibly because more intelligent people know how to take better care of themselves. We also find beneficial effects on child welfare. These findings, combined with the extremely low levels of education found in the survey, suggest that one possible avenue to raise intrahousehold welfare is to better inform rural dwellers, particularly regarding health and nutrition issues.

Following Dercon and Krishnan’s claim that differences in intrahousehold nutrition in Ethiopia can be traced to differences in bargaining power, we expected to find similar bargaining effects in other dimensions of welfare. For nutrition our results are not dissimilar to those of Dercon and Krishnan. But this relationship does not carry over to other dimensions of welfare, such as health, consumption of assignable goods, or leisure time. There does not appear to be a strong systematic association between bargaining variables and many dimensions of household welfare. We also fail to find a strong North-South gradient in female nutrition and health, contrary to what we would have anticipated from reading anthropological accounts of female empowerment in rural Ethiopia.

What accounts for these perplexing results? One possibility is measurement error. Although we cannot deny the presence of measurement error in our data, we have been personally involved in questionnaire design and data collection and we are convinced that the data used in this paper is of unusually high quality. Despite this, it is possible that some aspects of well-being are better measured than others, with child outcomes (anthropometry, schooling) and adult nutrition outcomes better measured than time allocation, particularly in a society where much time-keeping involves approximations. This may explain some of the more conclusive results with respect to adult nutrition and child outcomes relative to other, less well-measured, outcomes.

Another possibility is that, because of externalities, preferences are too similar across spouses, thereby making it impossible to identify the effect of bargaining variables: it is not in the interest of even the most despotic husband to deprive his wife to the point that she can no longer contribute to the household, particularly for households that are very poor.

To test this possibility, we interacted wealth with bargaining variables and tested whether the coefficient of bargaining variables is larger in non-poor households. However, possibly because all surveyed households are quite poor in absolute terms, our results (not reported here) provide no evidence that this is the case. Moreover, the stronger impact of women's bargaining power on child outcomes rather than their own is consistent with previous findings using this data set (Quisumbing and Maluccio 2003); in a society with high child mortality rates, where women typically outlive their husbands, and where women depend on their children, particularly sons, for old age support, investing in children's well-being may be an important strategy for insuring long-term well-being.

The results presented here should not be construed as the final word on intrahousehold welfare and bargaining power. More importantly, the finding that no single category of bargaining power affects all dimensions of intrahousehold welfare in a common, systematic way suggests

that different aspects of bargaining power may have differential effects on different welfare outcomes. This suggests that, for poor areas such as rural Ethiopia, bargaining power, issues of old age support, as well as absolute levels of poverty may be equally important in determining the welfare of individuals within households.

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Table 1. Descriptive statistics: individual data

Personal characteristics (all rounds)	Unit	Male			Female		
		Mean	Median	Std.dev.	Mean	Median	Std.dev.
Age	years	46.0	44.5	14.9	35.5	34.0	12.2
Height	cm	167.5	167.5	6.7	156.2	156.0	6.4
Education	index 1-9	2.1	1.0	1.7	1.4	1.0	1.2
Body mass index (BMI)	index	20.1	20.1	2.1	20.3	20.2	2.3
Mobility index (*)	index 5-20	5.8	5.0	2.5	5.8	5.0	2.1
Pregnant	yes=1	n.a.			9.5%		
Breastfeeding	yes=1	n.a.			37.1%		
Time spent on in last 24 hours:							
Total work, of which:	%	57.3%			65.9%		
Farm related activities	%	40.0%	40.7%	31.0%	11.4%	0.0%	17.0%
Market related activities	%	8.6%	0.0%	19.6%	8.0%	0.0%	14.5%
Communal activities	%	5.5%	0.0%	14.8%	1.3%	0.0%	6.3%
Household chores	%	3.3%	0.0%	7.9%	45.2%	44.8%	21.9%
Total leisure, of which:	%	42.0%			32.8%		
Personal time	%	16.7%	12.8%	16.2%	14.0%	11.1%	13.1%
Social activities	%	25.3%	20.0%	23.4%	18.8%	13.5%	19.8%
Miscellaneous	%	0.5%	0.0%	5.0%	1.1%	0.0%	5.3%
Participation in decisions							
Participate in decision on what to grow	yes=1	67%	100%	44%	1%	0%	9%
Keep the money from livestock sale	yes=1	44%	0%	48%	4%	0%	19%
Keep the money from sale of dairy prod.	yes=1	11%	0%	30%	34%	0%	45%
Involvement in hh purchases	index 0-8	5.7	6.0	2.0	1.4	0.5	1.8
Wife earns non-farm income	yes=1				26%		
Asset ownership							
Share of land individually owned	%	95%	100%	19%	5%	0%	19%
Share of livestock individually owned	%	26%	0%	42%	3%	0%	14%
Share of land on divorce	%	75%	100%	27%	23%	0%	26%
Share of livestock on divorce	%	56%	50%	28%	35%	50%	24%
Bargaining variables							
Number of trees listed	number	12	10	8	7	6	5
Number of child disease listed	number	3	3	2	3	3	2
Whether ever was in a fight	yes=1	40%			14%		
Saw father beat up mother	yes=1	45%			40%		
Assets and human capital at marriage							
Land brought to marriage	EBirr	1795	361	4368	84	0	802
Livestock brought to marriage	EBirr	1120	265	2131	281	0	1119
Other assets brought to marriage	EBirr	859	434	1620	12	0	121
Farming experience before marriage	years	11.3	10.0	10.0	3.7	1.0	5.7
Non-farm wage exper. before marriage	years	0.9	0.0	2.9	0.1	0.0	0.8
Non-farm self-employment exper. b.m.	years	0.9	0.0	3.0	0.3	0.0	1.6
Family background							
Born in this village	yes=1	72%			44%		
Born in this woreda	yes=1	14%			29%		
Born in this region	yes=1	6%			16%		
Born in other rural area	yes=1	7%			9%		
Born in urban area	yes=1	1%			2%		
Prosperity level of parents	index 1-5	2.9	3.0	0.8	3.0	3.0	0.8
Education level of father	years	0.1	0.0	0.3	0.1	0.0	0.3
No longer living with parents at marriage	yes=1	40%			25%		
Number of previous unions	number	0.6	0.0	1.1	0.4	0.0	0.9
Number of brothers	number	2.2	2.0	1.9	2.3	2.0	1.8
Number of sisters	number	2.1	2.0	1.8	2.2	2.0	1.6

Except for personal characteristics, all variables only collected in round 4.

(*) not available for round 1

Table 2. Descriptive statistics: household data

Child welfare	Unit	Mean	Median	Std.dev.
Mean height for age score	score	-2.1	-2.2	1.5
Mean weight for age score	score	-1.6	-1.7	1.1
Mean weight for height score	score	2.7	2.2	3.5
Average mobility index for children	index 5-20	6.8	6.0	2.4
Median mobility index for children	index 5-20	6.4	5.0	2.5
Share of school age children in school (*) %		12%	0%	26%
Consumption expenditures				
Total consumption expenditures	EBirr	659.5	385.6	2658.1
Food	%	75.0%	79.0%	0.19
Alcohol and tobacco	%	5.1%	0.0%	0.11
Clothing for men	%	1.9%	0.0%	0.04
Clothing for women	%	2.1%	0.0%	0.04
Clothing for boys	%	1.3%	0.0%	0.03
Clothing for girls	%	1.1%	0.0%	0.02
Health care	%	1.5%	0.0%	0.04
Education	%	0.3%	0.0%	0.02
Services	%	1.6%	0.8%	0.03
Household durables	%	2.0%	0.2%	0.06
Ceremonial expenses	%	3.7%	0.6%	0.08
Funeral society	%	0.7%	0.2%	0.02
Other	%	3.6%	2.4%	0.04
Household characteristics				
Household size	number	6.2	6.0	2.6
Operated land area	Ha	4.0	1.4	29.1
Number of livestock heads, of which:	number	8.1	5.0	10.6
Number of oxen	number	0.9	0.0	1.2
Number of cows	number	0.9	1.0	1.3
Value of livestock	EBirr	2116.4	1350.0	3645.5
Value of other assets	EBirr	250.7	119.5	603.5

(*) information available only for rounds 1 and 4

Table 3: BMI and mobility index of husband and wife

	BMI		Mobility index	
	OLS		Tobit	
	Coef.	t-stat	Coef. (a)	z-stat
Bargaining variables - individual level				
Land brought to marriage (log)	0.007	0.35	-0.003	0.19
Livestock brought to marriage (log)	-0.016	0.78	0.006	0.39
Involvement in household purchases (1-8)	0.003	0.19	0.041	3.60***
Wife earns non-farm income	0.230	1.72*	-0.080	0.93
Land upon divorce (log)	0.237	1.73*	0.130	1.39
Livestock upon divorce (log)	-0.049	2.23**	-0.016	1.05
First factor for violence	0.265	2.09**	-0.063	0.71
First factor for cognitive capacity	0.268	3.17***	0.059	0.98
Individual characteristics				
Female	-0.425	1.44	-0.109	0.60
Age	-0.025	1.54	0.030	2.82***
Age squared	0.000	3.00***	0.000	5.92***
Pregnant	1.784	10.68***	-0.679	4.65***
Breastfeeding	0.079	0.82	0.002	0.03
Mean height (cm)	-0.031	6.12***	0.013	3.46***
Education level	-0.008	0.25	0.070	2.54**
Household characteristics				
Household size (log)	0.223	2.66***	0.023	0.39
Total consumption expenditure (log)	0.097	2.27**	-0.016	0.53
Operated land (log)	0.021	0.18	0.056	0.71
No. of livestock heads (log)	0.176	2.88***	-0.056	1.24
Value of livestock (log)	-0.044	1.87*	0.022	1.30
Value of other productive assets (log)	0.126	4.29***	0.008	0.38
Sum of individual variables				
Total land brought to marriage (log)	-0.003	0.23	0.005	0.65
Total livestock brought to marriage (log)	0.006	0.52	-0.007	0.85
Sum of first factor for violence	-0.039	2.06**	0.014	1.03
Sum of first factor for cognitive capacity	-0.016	1.21	0.000	0.05
Sum of spouses' ages	-0.014	2.98***	-0.010	3.71***
Sum of spouses' education	0.001	0.13	-0.006	1.43
Survey round dummies				
Yes			Yes	
Peasant association dummies				
Yes			Yes	
Interactions of female with site dummies				
Haresaw (north)	0.368	1.14	0.188	1.00
Geblen (north)	0.000	.	0.215	1.10
Dinki (north)	0.484	1.43	-0.002	0.01
Debre Berhan (north)	-0.160	0.52	0.152	0.84
Yetmen (north)	0.785	2.10**	0.316	2.09**
Shumsheha (north)	0.715	2.32**	-0.449	1.43
Sirbana Godeti (central)	-0.588	1.59	0.216	1.10
Adele Keke (central)	0.131	0.38	0.178	0.96
Korodegaga (central)	1.195	3.24***	0.174	0.88
Terufe Kechemma (central)	1.674	4.57***	0.252	1.60
Imdibir (south)	0.649	1.77*	0.299	1.85*
Aze Deboa (south)	0.102	0.27	.	.
Adado (south)	0.617	1.75*	-0.368	1.20
Gara Godo (south)	-0.162	0.53	0.379	2.78***
Domaa (south)	0.236	0.70	0.056	0.26
Constant	24.946	28.04***	-1.521	2.36**
No. of observations, of which	5,239		4,083	
lower censored			15	
uncensored			744	
upper censored			3,324	
R-squared	0.180		0.123	
Joint significant tests				
	stat	p-value	stat	p-value
Assets brought to marriage	0.330	0.72	0.080	0.92
Participation in household decisions	1.510	0.22	6.830	0.00***
Disposition upon divorce	3.350	0.04	1.270	0.28

Note: Robust t statistics in parentheses for OLS

* significant at 10%; ** significant at 5%; *** significant at 1%

(a) unconditional marginal effects reported

Table 4: BMI and mobility index of husband and wife - with household fixed effect

	BMI		Mobility index	
	Coef.	t-stat	Coef.	t-stat
Bargaining variables - individual level				
Land brought to marriage (log)	0.007	0.43	-0.046	2.26**
Livestock brought to marriage (log)	0.012	0.66	0.005	0.25
Involvement in household purchases (1-8)	0.007	0.42	0.045	2.29**
Wife earns non-farm income	0.058	0.50	-0.151	1.02
Land upon divorce (log)	0.210	1.74*	0.100	0.70
Livestock upon divorce (log)	-0.077	3.70***	-0.020	0.78
First factor for violence	0.207	1.86*	-0.095	0.70
First factor for cognitive capacity	0.288	3.81***	0.220	2.37**
Individual characteristics				
Female	0.274	0.97	0.991	2.81***
Age	-0.082	4.05***	0.118	4.78***
Age squared	0.001	5.32***	-0.002	7.56***
Pregnant	1.264	9.19***	-0.556	3.01***
Breastfeeding	-0.113	1.20	0.035	0.30
Mean height (cm)	-0.028	4.09***	0.023	2.69***
Education level	-0.039	1.33	0.046	1.30
Household characteristics				
Household size (log)	-0.103	0.61	-0.048	0.21
Total consumption expenditure (log)	0.076	1.79*	-0.058	1.08
Operated land (log)	-0.262	1.96*	0.073	0.46
No. of livestock heads (log)	0.078	0.85	-0.043	0.38
Value of livestock (log)	0.005	0.17	-0.008	0.20
Value of other productive assets (log)	0.068	1.75*	0.017	0.37
Sum of spouses' ages	-0.176	1.49	0.325	2.24**
Survey round dummies				
	Yes		Yes	
Interactions of female with site dummies				
	Yes		Yes	
Haresaw (north)	-0.241	0.70	-0.781	1.87*
Geblen (north)	-0.604	1.75*	-0.612	1.47
Dinki (north)	-0.101	0.33	-0.996	2.46**
Debre Berhan (north)	-0.590	2.02**	-0.804	2.22**
Yetmen (north)	0.373	1.08	0.000	.
Shumsheha (north)	0.165	0.54	-0.968	2.60***
Sirbana Godeti (central)	-1.106	3.64***	-0.644	1.63
Adele Keke (central)	-0.426	1.44	-0.583	1.48
Korodegaga (central)	0.876	2.99***	-0.491	1.17
Terufe Kechema (central)	0.827	2.76***	-0.246	0.65
Imdibir (south)	0.000	.	-0.546	1.27
Aze Deboa (south)	-0.320	0.87	-0.937	2.08**
Adado (south)	0.173	0.59	-1.320	3.43***
Gara Godo (south)	-0.750	2.36**	-0.028	0.07
Domaa (south)	-0.249	0.83	-0.948	2.45**
Constant	39.711	4.20***	-39.243	3.11***
No of observations	5239		4083	
Number of households	791		791	
R-squared				
within	0.080		0.070	
between	0.030		0.230	
overall	0.020		0.100	
Joint significant tests				
	stat	p-value	stat	p-value
Assets brought to marriage	0.370	0.69	2.580	0.08
Participation in household decisions	0.220	0.80	3.100	0.05**
Disposition upon divorce	7.330	0.00***	0.460	0.63

Note: Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Work and leisure time for husband and wife - household fixed effects

Bargaining variables - individual level	Work time		Leisure time		Social time		Personal time	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Land brought to marriage (log)	-0.022	0.24	0.112	1.32	0.164	2.26**	-0.053	0.96
Livestock brought to marriage (log)	0.023	0.24	-0.036	0.40	-0.045	0.58	0.009	0.15
Involvement in household purchases (1-8)	0.071	0.84	-0.173	2.21**	-0.028	0.41	-0.145	2.82***
Wife earns non-farm income	-0.049	0.07	-0.577	0.90	-0.802	1.45	0.225	0.54
Land upon divorce (log)	-0.198	0.33	0.198	0.36	0.364	0.76	-0.165	0.46
Livestock upon divorce (log)	0.140	1.29	-0.141	1.42	-0.140	1.63	-0.001	0.02
First factor for violence	-0.633	1.05	0.199	0.36	0.117	0.24	0.082	0.23
First factor for intelligence of spouse	0.000	0.00	0.278	0.75	0.561	1.76*	-0.283	1.17
Individual characteristics								
Female	-0.289	0.15	1.859	1.02	0.665	0.42	1.194	1.00
Age	0.123	1.18	-0.114	1.18	-0.109	1.31	-0.005	0.08
Age squared	-0.001	1.68*	0.001	1.54	0.001	1.67*	0.000	0.15
Pregnant	1.655	1.48	-1.000	0.97	-0.489	0.55	-0.510	0.76
Breastfeeding	0.841	1.38	-0.546	0.97	-0.410	0.85	-0.136	0.37
Mean height (cm)	-0.054	1.49	0.035	1.05	0.039	1.37	-0.004	0.19
Education level	-0.002	0.01	0.214	1.50	0.033	0.26	0.182	1.95*
Interactions of female with site dummies								
Haresaw (north)	0.031	0.01	0.567	0.27	2.107	1.15	-1.540	1.10
Geblen (north)	2.703	1.19	-1.495	0.72	1.624	0.90	-3.119	2.29**
Dinki (north)	1.957	0.86	-1.051	0.50	1.901	1.06	-2.952	2.16**
Debre Berhan (north)	1.943	0.97	-0.839	0.45	1.288	0.81	-2.126	1.76*
Yetmen (north)	1.968	0.84	-2.646	1.23	-1.304	0.70	-1.343	0.95
Shumsheha (north)	1.276	0.61	-0.860	0.44	0.819	0.49	-1.679	1.33
Sirbana Godeti (central)	-1.696	0.78	1.910	0.95	3.264	1.88*	-1.354	1.03
Adele Keke (central)	3.258	1.49	-2.390	1.18	-1.198	0.69	-1.192	0.90
Korodegaga (central)	0.761	0.36	-0.395	0.20	1.542	0.92	-1.938	1.51
Terufe Kechemba (central)	2.601	1.23	-2.346	1.20	-0.147	0.09	-2.199	1.72*
Imdibir (south)	5.174	2.26**	-3.757	1.78*	-0.618	0.34	-3.139	2.27**
Aze Deboa (south)	0.000	.	0.000	.	0.000	.	0.000	.
Adado (south)	2.700	1.23	-1.710	0.84	0.056	0.03	-1.766	1.33
Gara Godo (south)	4.015	1.77*	-2.329	1.11	0.107	0.06	-2.436	1.78*
Domaa (south)	2.881	1.32	-2.055	1.02	0.563	0.32	-2.618	1.99**
Constant	12.851	1.90*	1.914	0.31	-1.589	0.30	3.503	0.86
No. of observations	1011		1011		1011		1011	
Number of households	718		718		718		718	
R-squared								
within	0.380		0.130		0.170		0.100	
between	0.044		0.001		0.003		0.010	
overall	0.122		0.005		0.010		0.000	
Joint significant tests								
Assets brought to marriage	test stat	p-value	test stat	p-value	test stat	p-value	test stat	p-value
Participation in household decisions	0.050	0.95	0.890	0.41	2.570	0.08*	0.460	0.63
Disposition upon divorce	0.350	0.70	2.910	0.06*	1.160	0.31	4.090	0.02**
	0.830	0.44	1.010	0.37	1.400	0.25	0.110	0.89

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Consumption expenditures

	Clothing for:				Alcohol & tobacco	
	Men	Women	Boys	Girls		
Bargaining variables - wife values	Coef/t-stat	Coef/t-stat	Coef/t-stat	Coef/t-stat	Coef/t-stat	
Land brought to marriage (log)	0.066 <i>-1.32</i>	0.05 <i>-0.87</i>	0.031 <i>-0.8</i>	0.037 <i>-1.08</i>	-0.075 <i>-0.57</i>	
Livestock brought to marriage (log)	0.048 <i>-1.15</i>	-0.019 <i>-0.39</i>	0.02 <i>-0.62</i>	-0.034 <i>-1.2</i>	-0.091 <i>-0.82</i>	
Involvement in household purchases (1-8)	-0.09 <i>-0.82</i>	-0.184 <i>-1.45</i>	0.155 <i>1.84*</i>	0.29 <i>3.64***</i>	0.337 <i>-1.13</i>	
Wife earns non-farm income	0.243 <i>-0.74</i>	-0.329 <i>-0.87</i>	-0.271 <i>-1.08</i>	0.43 <i>1.91*</i>	-1.069 <i>-1.24</i>	
Land upon divorce (log)	-0.301 <i>-1.11</i>	-0.026 <i>-0.08</i>	-0.007 <i>-0.03</i>	0.125 <i>-0.68</i>	1.505 <i>2.06**</i>	
Livestock upon divorce (log)	0.065 <i>-1.42</i>	0.107 <i>2.01**</i>	0.067 <i>1.92*</i>	0.018 <i>-0.57</i>	0.134 <i>-1.13</i>	
First factor for violence	-0.492 <i>2.04**</i>	-0.128 <i>-0.46</i>	-0.168 <i>-0.91</i>	-0.072 <i>-0.44</i>	-0.127 <i>-0.2</i>	
First factor for cognitive capacity	-0.055 <i>-0.34</i>	0.008 <i>-0.04</i>	0.063 <i>-0.5</i>	0.08 <i>-0.71</i>	0.496 <i>-1.14</i>	
Household & individual characteristics						
Household size (log)	-0.443 <i>2.87***</i>	-0.544 <i>3.04***</i>	1.282 <i>10.07***</i>	1.145 <i>10.04***</i>	-0.488 <i>-1.18</i>	
Total consumption expenditure (log)	0.014 <i>-0.17</i>	-0.032 <i>-0.35</i>	-0.038 <i>-0.63</i>	-0.024 <i>-0.43</i>	1.271 <i>6.10***</i>	
Operated land (log)	0.337 <i>1.95*</i>	0.36 <i>1.78*</i>	0.251 <i>1.86*</i>	0.124 <i>-1.03</i>	0.465 <i>-1</i>	
No. of livestock heads (log)	0.234 <i>1.90*</i>	0.237 <i>1.68*</i>	-0.005 <i>-0.05</i>	-0.004 <i>-0.05</i>	0.132 <i>-0.4</i>	
Value of livestock (log)	0.001 <i>-0.02</i>	-0.025 <i>-0.5</i>	0.02 <i>-0.6</i>	0.043 <i>-1.39</i>	-0.246 <i>2.20**</i>	
Value of other productive assets (log)	0.244 <i>4.43***</i>	0.142 <i>2.24**</i>	0.092 <i>2.17**</i>	0.079 <i>2.09**</i>	-0.199 <i>-1.39</i>	
Land at marriage (log)	0.005 <i>-0.28</i>	-0.015 <i>-0.8</i>	-0.021 <i>1.72*</i>	0.001 <i>-0.07</i>	0.05 <i>-1.17</i>	
Livestock at marriage (log)	-0.012 <i>-0.63</i>	-0.003 <i>-0.12</i>	-0.002 <i>-0.16</i>	0.031 <i>2.36**</i>	0.061 <i>-1.24</i>	
Education of wife	0.015 <i>-0.31</i>	0.061 <i>-1.07</i>	-0.023 <i>-0.59</i>	-0.087 <i>2.47**</i>	-0.223 <i>-1.63</i>	
Education of husband	0.079 <i>2.22**</i>	-0.032 <i>-0.77</i>	-0.034 <i>-1.22</i>	-0.031 <i>-1.26</i>	-0.154 <i>-1.63</i>	
Sum of first factor for violence	0.048 <i>-1.5</i>	0.029 <i>-0.77</i>	0.051 <i>2.08**</i>	0.015 <i>-0.67</i>	-0.025 <i>-0.29</i>	
Sum of first factor for cognitive capacity	0.007 <i>-0.29</i>	0.014 <i>-0.52</i>	-0.007 <i>-0.4</i>	0.025 <i>-1.6</i>	-0.088 <i>-1.44</i>	
Pregnant	-0.509 <i>-1.28</i>	0.021 <i>-0.05</i>	-0.226 <i>-0.73</i>	-0.27 <i>-0.98</i>	0.48 <i>-0.46</i>	
Breastfeeding	-0.192 <i>-0.73</i>	-0.509 <i>1.66*</i>	-0.146 <i>-0.72</i>	-0.407 <i>2.25**</i>	-0.571 <i>-0.82</i>	
Age of husband	-0.013 <i>1.75*</i>	-0.006 <i>-0.69</i>	-0.007 <i>-1.2</i>	-0.006 <i>-1.17</i>	-0.067 <i>3.25***</i>	
Age of wife	-0.009 <i>-0.87</i>	-0.028 <i>2.49**</i>	0.009 <i>-1.2</i>	0.002 <i>-0.28</i>	0.033 <i>-1.27</i>	
Survey round dummies	Yes	Yes	Yes	Yes	Yes	
Peasant association dummies	Yes	Yes	Yes	Yes	Yes	
Constant	-1.638 <i>2.37**</i>	1.913 <i>2.44**</i>	-3.665 <i>6.76***</i>	-3.789 <i>7.56***</i>	-6.243 <i>3.46***</i>	
No. of observations	2687	2687	2687	2687	2687	
Joint significant tests						
Asset brought to marriage	F-statistic	1.88	0.4	0.63	1.09	0.62
	<i>p-value</i>	<i>0.15</i>	<i>0.67</i>	<i>0.53</i>	<i>0.34</i>	<i>0.54</i>
Participation in household decision	F-statistic	0.61	1.42	2.29	8.23	1.47
	<i>p-value</i>	<i>0.54</i>	<i>0.24</i>	<i>0.1*</i>	<i>0.00****</i>	<i>0.23</i>
Disposition upon divorce	F-statistic	1.38	2.06	1.91	0.48	3.26
	<i>p-value</i>	<i>0.25</i>	<i>0.13</i>	<i>0.15</i>	<i>0.62</i>	<i>0.04**</i>

Estimator is tobit. Absolute value of t statistics in italics under their coefficient

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Child welfare

	Child anthropometrics:			School	
	HAZ	WAZ	WHZ	attendance	
	<i>Coeff/t-stat</i>	<i>Coeff/t-stat</i>	<i>Coeff/t-stat</i>	<i>Coeff/t-stat</i>	
Bargaining variables - wife values					
Land brought to marriage (log)	0.001	0.013	0.006	0.722	
	<i>-0.03</i>	<i>-0.62</i>	<i>-0.24</i>	<i>-0.98</i>	
Livestock brought to marriage (log)	0.098	0.044	-0.021	1.038	
	<i>4.34***</i>	<i>2.51**</i>	<i>-1.02</i>	<i>1.68*</i>	
Involvement in household purchases (1-8)	-0.04	-0.021	0.009	4.387	
	<i>2.23**</i>	<i>-1.49</i>	<i>-0.51</i>	<i>2.76***</i>	
Wife earns non-farm income	0.24	0.211	0.083	6.599	
	<i>-1.64</i>	<i>1.85*</i>	<i>-0.61</i>	<i>-1.51</i>	
Land upon divorce (log)	0.03	-0.153	-0.241	-1.174	
	<i>-0.21</i>	<i>-1.4</i>	<i>1.86*</i>	<i>-0.29</i>	
Livestock upon divorce (log)	0.006	0.023	0.041	0.071	
	<i>-0.23</i>	<i>-1.25</i>	<i>1.87*</i>	<i>-0.11</i>	
First factor for violence	-0.076	-0.132	-0.140	3.296	
	<i>-0.57</i>	<i>-1.28</i>	<i>-1.15</i>	<i>-0.92</i>	
First factor for cognitive capacity	0.008	-0.024	-0.046	-2.586	
	<i>-0.09</i>	<i>-0.36</i>	<i>-0.58</i>	<i>-1.07</i>	
Household characteristics					
Household size (log)	-0.074	0.032	0.079	6.742	
	<i>-0.68</i>	<i>-0.37</i>	<i>-0.79</i>	<i>2.67***</i>	
Total consumption expenditure (log)	0.096	0.07	-0.011	1.455	
	<i>2.41**</i>	<i>2.24**</i>	<i>-0.29</i>	<i>-1.21</i>	
Operated land (log)	-0.156	-0.056	0.097	0.127	
	<i>1.72*</i>	<i>-0.8</i>	<i>-1.16</i>	<i>-0.05</i>	
No. of livestock heads (log)	0.063	0.034	-0.001	1.045	
	<i>-0.98</i>	<i>-0.7</i>	<i>-0.02</i>	<i>-0.59</i>	
Value of livestock (log)	-0.019	-0.01	0.013	-1.098	
	<i>-0.81</i>	<i>-0.58</i>	<i>-0.62</i>	<i>1.72*</i>	
Value of other productive assets (log)	0.093	0.128	0.095	0.331	
	<i>3.26***</i>	<i>5.82***</i>	<i>3.63***</i>	<i>-0.43</i>	
Land at marriage (log)	-0.016	-0.007	0.004	0.010	
	<i>1.88*</i>	<i>-1.02</i>	<i>-0.45</i>	<i>-0.04</i>	
Livestock at marriage (log)	-0.011	-0.003	0.003	-0.202	
	<i>-1.14</i>	<i>-0.44</i>	<i>-0.36</i>	<i>-0.73</i>	
Sum of first factor for violence	0.05	0.122	0.133	-0.566	
	<i>-0.73</i>	<i>2.28**</i>	<i>2.07**</i>	<i>-1.18</i>	
Sum of first factor for cognitive capacity	0.031	0.008	-0.013	0.742	
	<i>-0.61</i>	<i>-0.2</i>	<i>-0.28</i>	<i>2.19**</i>	
Parental characteristics					
Education of wife	-0.031	-0.041	-0.049	0.278	
	<i>-1.64</i>	<i>2.80***</i>	<i>2.84***</i>	<i>-0.36</i>	
Education of husband	0.003	0.046	0.060	0.550	
	<i>-0.11</i>	<i>2.27**</i>	<i>2.48**</i>	<i>-1.02</i>	
Pregnant	-0.103	-0.11	-0.066	-10.748	
	<i>-0.85</i>	<i>-1.17</i>	<i>-0.6</i>	<i>1.88*</i>	
Breastfeeding	-0.053	0.071	0.181	-8.149	
	<i>-0.81</i>	<i>-1.39</i>	<i>2.97***</i>	<i>2.05**</i>	
Age of husband	0.001	-0.001	-0.001	0.151	
	<i>-0.21</i>	<i>-0.35</i>	<i>-0.4</i>	<i>-1.36</i>	
Age of wife	0.015	0.009	-0.002	-0.112	
	<i>2.86***</i>	<i>2.17**</i>	<i>-0.47</i>	<i>-0.79</i>	
Mean height of husband (cm)	0.022	0.017	0.005		
	<i>4.76***</i>	<i>4.57***</i>	<i>-1.2</i>		
Mean height of wife (cm)	0.031	0.012	-0.013		
	<i>5.78***</i>	<i>2.85***</i>	<i>2.59***</i>		
Child characteristics					
Female	0.226	0.189	0.126		
	<i>4.02***</i>	<i>4.34***</i>	<i>2.43**</i>		
Age	-0.057	-0.118	-0.275		
	<i>-1.63</i>	<i>4.31***</i>	<i>8.44***</i>		
Age squared	0.009	0.01	0.021		
	<i>2.69***</i>	<i>3.99***</i>	<i>7.06***</i>		
Survey round dummies					
	Yes	Yes	Yes		
Peasant association dummies					
	Yes	Yes	Yes		
Constant	-12.11	-7.11	1.205	-26.487	
	<i>11.16***</i>	<i>8.46***</i>	<i>-1.2</i>	<i>2.58**</i>	
No. of observations	4503	4552	4490	1089	
Joint significant tests					
Asset brought to marriage	F-statistic	9.66	3.64	0.52	2.26
	<i>p-value</i>	<i>0.00***</i>	<i>0.03**</i>	<i>0.59</i>	<i>0.10*</i>
Participation in household decision	F-statistic	3.82	2.83	0.32	4.91
	<i>p-value</i>	<i>0.02**</i>	<i>0.06**</i>	<i>0.73</i>	<i>0.01***</i>
Disposition upon divorce	F-statistic	0.06	1.47	2.91	0.04
	<i>p-value</i>	<i>0.94</i>	<i>0.23</i>	<i>0.05**</i>	<i>0.96</i>

Child anthropometrics: HAZ, WAZ and WHZ are height-for-age, weight-for-age and weight-for-height z-scores respectively

School attendance is the percentage of the household's children attending school

For child anthropometrics the estimator is OLS. For school attendance the estimator is tobit.

Absolute value of t statistics in italics under the coefficients

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix: Factor analyses for the violence and intelligence variables

Note: The violence factor is computed using information from two variables; (i) respondent has seen his/her father beat up mother and (ii) respondent was ever involved in a fight. The intelligence factor is computed from five variables capturing how informed spouses are: (i) do they know who the prime minister of Ethiopia is? (ii) have they heard that man has walked on the moon? (iii) answering an arithmetic quiz; (iv) number of names of tree species they can list in their native language; (v) number of names of child diseases they can list.

First factor for violence: Number of observations = 9900; Method: principal factors; Retained factors = 1; Unrotated; Number of parameters = 1

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	0.24562	0.40801	2.9509	2.9509
Factor2	-0.16239	.	-1.9509	1.0000

LR test: independent vs. saturated: $\chi^2(1) = 420.77$ Prob> $\chi^2 = 0.0000$

Factor loadings (pattern matrix) and unique variances

Variable	Factor 1	Uniqueness
Saw father beat mother	0.3504	0.8772
Involved in a fight	0.3504	0.8772

Scoring coefficients (method = regression)

Variable	Factor 1
Saw father bit mother	0.29107
Involved in a fight	0.29107

Factor analysis for intelligence: Number of observations = 10359; Method: principal factors; Retained factors = 2; Unrotated; Number of parameters = 9

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	0.97686	0.94021	1.6005	1.6005
Factor2	0.03666	0.13600	0.0601	1.6605
Factor3	-0.09934	0.01626	-0.1628	1.4978
Factor4	-0.11560	0.07261	-0.1894	1.3084
Factor5	-0.18821	.	-0.3084	1.0000

LR test: independent vs. saturated: $\chi^2(10) = 3885.72$ Prob> $\chi^2 = 0.0000$

Factor loadings (pattern matrix) and unique variances

Variable	Factor 1	Uniqueness
Knows the prime minister	0.5424	0.7036
Heard/knows about man on moon	0.5474	0.7000
Arithmetic question	0.3772	0.8496
Number of trees species	0.4186	0.8187
Number of child diseases	0.2557	0.9146

Scoring coefficients (method = regression)

Variable	Factor 1
Knows the prime minister	0.31121
Heard/knows about man on moon	0.31542
Arithmetic question	0.18909
Number of trees species	0.21683
Number of child diseases	0.12390