Intra Household Labour Supply, Agricultural Shocks and Women's Bargaining Power

Bilisuma B, Dito[1]

Abstract

Using a unique household panel data from the Ethiopian Rural Household Survey complimented by qualitative information drawn from focus group discussions from Rural Ethiopia, this paper examines how different dimensions of women's bargaining power affect women's non-farm labour supply. It also investigates whether there is a differential response in men's and women's non-farm labor supply to important agricultural shocks. It further examines how different dimensions of women's bargaining power shape women's non-farm labour supply responses to agricultural shocks. The paper provides evidence that women's non-farm labour supply is a consequence of bargaining and that a woman's bargaining power reduces her participation in off-farm self-employment whereas it increases participation in off-farm wage work. It also provides evidence that negative agricultural shocks increase women's participation in off-farm self-employment with no significant impact on wage work. This implies that households resort to women's labor to self-employed work as an important adjustment mechanism in the presence of negative agricultural shocks. The findings also suggest that bargaining power helps to reverse the impact that negative shocks have on a woman's participation in off-farm self employment, i.e. women deemed to have higher bargaining power tend to participate less in off-farm self-employment during economic hardships.

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[1] PhD Fellow at International Institute of Social Studies, Erasmus University Rotterdam, dito@iss.nl

Contents

1. Introduction

Until recently, studies that examine the impact as well as coping mechanisms of shocks focused on a household rather than on individuals within a household. The development of new theories on intra household resource allocation behaviour has contributed to the increased interest in examining the intra household impact of shocks in developing countries. These studies have shown that shocks do not have the same impacts on different individuals within the same household and that risk pooling behaviour within a household is rather an exception (Goldstein, 1999) and (Doss, 2001). Further evidence confirms that shocks affect, for instance, male and female cultivated plots differently[2] (Duflo and Udry, 2004). They also affect the nutritional status of household members in a different way and that; generally women bear more of the brunt compared to men (Dercon and Krishnan, 2000 and Hoddinot, 2006). As a result, the aggregation of adjustments following shocks within a household can lead to a biased view of how risk is shared within a household.

More particularly, evidence suggests that in the presence of imperfect financial markets, agricultural households particularly resort, among many other instruments, to non-farm work to smooth consumption (Rosenzweig and Stark, 1989; Kochar, 1999; Fafchamps, 1999). There is slight evidence; however, regarding the impact shocks have on non-farm labour supply at an individual level. Two recent studies by Beegle (2005) for Tanzania and Quisumbing and Yisehac (2004) for Ethiopia [3] show that shocks affect time allocation of men and women differently. It is critical to understand how shocks affect individuals' allocation of time for two reasons. It provides insights in to the mechanisms that households use to smooth consumption (Beegle, 2005). Also, it sheds light on how shocks affect the time burden of individuals within a household, an aspect of individual's welfare which has received little attention from the existing literature.

These differences in individuals' well being as well as their responses to shocks are due to imbalances of power relations within a household. This is confirmed by studies that show how decisions on the allocation of household resources to food, women's and children's clothing and schooling, children's and women's health depend on differences in bargaining power between men and women (Quisumbing and Maluccio, 1999; Doss, 1997; Dercon and Krishna, 2000; Beegles *et al.,* 2000). More particularly, studies indicate that the allocation of labour-time depends also on the bargaining power of individual members rather than relative individual marginal productivities across different tasks (Doss, 1997; Friedberg and Webb, 2005; Gupta, 2006; Bittman *et al.,* 2003). For example, evidences show that women with more bargaining power prefer to increase their own consumption of leisure or time in nonmarket activities (Schultz, 1990) for Thailand**.** Moreover, other studies have emphasized that an increase in women's bargaining power through factors that enhance their exit options such as divorce laws and abortion rights are found to increase women's participation in work outside their homes (Stevenson, 2007 and Oreffice, 2007).

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[2] While shocks that affect plots cultivated by women alter food expenditure, shocks that affect plots cultivated by men rather impact expenditure on education and clothing. Women and men in West Africa not only farm separate plots but are also specialized on different crops.

[3] A study by Beegle (2005) which investigates the impact of health shocks on intra household labour allocation in Tanzania suggests that indeed shocks affect men and women's labour supply differently, in particular with respect to the time spent in chore activities, farming and non-farm activities. Quisumbing and Yisehac (2004) find that women's labour supply to food-for-work-programs responds positively whenever households face positive rainfall shocks[3] while men provide more labour on the field.

Three specific gaps in the existing literature are noted. One, whether the focus is on consumption decisions, labor supply or children's health and education, the existing literature does not often take into account that a specific measure of bargaining power does usually also only reflect power relations along a specific dimension. Yet, bargaining power has many dimensions and hence should be measured accordingly.[4] The distinction between measures of bargaining power is critical since failure to understand the exact content of each may lead to wrong conclusions regarding women's decision making power.

Secondly, it is only rarely considered in the literature that women's bargaining power may be of different importance in daily and recurrent situations relative to exceptional and rare cases. In traditional societies daily life often follows fixed norms and rules which leave not much space for any negotiation. In contrast exceptional events, such as crop failures for example, may lead to situations where decisions outside the usual norm have to be taken. Thus, shocks bring about more issues to be bargained over that would not have otherwise occurred making individuals' relative power position more relevant in allocating resources.

Last but not least, there is almost no empirical evidence on how shocks affect women conditional on their bargaining position within the household given the evidence that shocks affect women disproportionately compared to other household members (Duflo and Udry, 2004; Doss, 2001; Dercon and Krishnan, 2000; Goldstein, 1999).

Therefore, the objective of this paper is threefold: First, this paper examines how different dimensions of bargaining power affect women's non-farm labour supply; second, how women's non-farm labour supply responds to agricultural shocks; third how different dimensions of women's bargaining power shape the labour supply response to agricultural shocks. To my knowledge, this paper is the first to investigate how women's bargaining power shapes the allocation of labour in the context of agricultural shocks.

We study these questions for Ethiopia, where agricultural shocks are frequent in a context where the majority of the population (85 percent) work in the agricultural sector. An innovative approach of this study is it brings together qualitative information drawn from focus group discussions I conducted to identify factors that affect women's bargaining power and answer the aforementioned research questions using six rounds of household panel data from rural Ethiopia.

The results of the study suggest that a woman's non-farm labour supply is a consequence of bargaining and a woman's bargaining power reduces her participation in off-farm self-employment whereas it increases participation in wage work.[5] The finding that high bargaining power increases participation in dependant wage work while it reduces

[4] For example, a woman who has brothers could have a higher bargaining power as this signals that she has someone who can protect her interests as brothers can challenge and confront husbands whereas own earned income improves a woman's outcomes by simply making cash available at hand without having so much impact on existing gender relations within a household. This finds support from studies which show that women hide a subset of their earned income from men (Agarwal, 1997).

[5] Ppatriarchal constraints limit women's participation in income generating activities outside their homes. This occurs because of men's fear of subordination as this challenges their bread winning role (Kabeer, 2008). More particularly such resistance occurs due to the fact that patriarchal norms characterize men whose wives participate in income generating activities as lazy and entirely negligent of their families (Goldin, 1994). With the increase in a woman's bargaining power, these constraints are often challenged or eased which is expected to result in an increase in women's participation in income generating activities.

participation in off-farm self-employment could be linked to women's as well as society's perceptions on different types of non-farm income generating activities. Where work is considered more fulfilling and desirable, women tend to use their bargaining power to increase their participation while bargaining power serves as tool to reduce their participation in undesirable work.

The results of the study also suggest that agricultural shocks lead to differential non-farm labour supply responses by men and women. In particular, I find that women tend to increase their supply to off-farm self-employment in response to negative agricultural shocks, implying that female labour serves as one of the mechanisms households use to smooth consumption.

Further findings of this study reveal that women use their bargaining power more intensely during economic hardships. More particularly, the study demonstrates that bargaining power helps to reverse the impact that negative shocks have on a woman's participation in off-farm self employment, i.e. women with higher bargaining power tend to participate less in off-farm self-employment during economic hardships.

The paper is organized as follows. The second section briefly discusses the theoretical background underlying this study and provides a theoretical framework to be used in the empirical part of this paper. Section three describes the data and provides the descriptive statistics and the hypothesis. Section 4 proposes the empirical strategy. Section five reports the findings and section six concludes.

2. Theoretical Framework

2.1. Theoretical Perspectives

Standard theories of labor supply assume that labor supply increases with the wage rate, which in turn depends on the person's level of education, experience and other skills (Varian, 1992). However, some of these theories also argue, plausibly, that there might be a point where further increases in the wage rate lead to lower labor supply due to the associated income effect which overcompensates the substitution effect between leisure and labor. Leisure becomes the more expensive the higher the wage rate (the opportunity cost of time). But if leisure is a normal good, its consumption increases in income (Blundell and MacCurdy, 1999).

Provided this income effect is relevant, one can also argue that not only earned but also unearned income affects an individual's labor supply. For example, an increase in husband's earnings may reduce a wife's labor supply through the income effect. This would for instance happen if the household behaved as one unit, which maximizes a household utility function conditional on pooled household income (Becker, 1965). In this case the distribution of non-labor income across family members plays no role for the labor supply of each household member, only total non labor income matters. Moreover, the model depicts that the compensated cross wage effects are symmetrical, i.e. the response of a woman's labor supply to the change in wage rate of a man is the same as the response of a man's labor supply to a change in wage rate of a woman.

In contrast, collective household models explicitly take into account that a household is composed of members with different preferences. Chiappori (1995), for instance, argues that individuals choose their own consumption and labor supply given their own budget

constraint after allocation of non-labor income among members according to a predetermined sharing rule.[6] Assuming that members are self interested, changes in household non-labor income or labor income of another household member would, for a given household member, only have an income effect on this member's labor supply if the sharing rule is such that this member directly benefits from the higher income. Obviously, the implication of the collective model is different from the unitary household model. Whereas the unitary household model assumes that total non-labor income leads to changes in labor supply of all members through the income effect, the collective model implies that the change in labor supply of one member remains constant as long as a member does not explicitly get a part of the additional income.

On the other hand, the Nash bargaining framework by McElroy (1981) argues that household members, say husband and wife, solve a *joint* allocation problem to maximize the gains from marriage and that not only factors such as labor and non-labor income affect household allocation decisions but also 'Extra Environmental Parameters' (EPPs), because these affects the individual threat points (utilities in the unmarried state) and therefore determine the respective bargaining (or decision) power of both partners.

The marriage and remarriage market conditions, religion and productivity outside marriage, labor market laws and institutions are considered as some of the factors that may play a role in shifting the threat points of individuals. If relative threat points determine individuals' labor supply, then women with relatively better traits compared to their husbands tend to supply less labor outside their homes[7] (Grossbard-Shechtman and Neuman, 1988). This would happen if wives' material needs were satisfied through a larger transfer of the husbands' income or joint household income, and, hence, women could reduce their participation in the labor market. Becker (1973), for instance, argues that any trait of the wife or husband associated with a higher wife's share of household income implies an increased demand for leisure and therefore a lower probability that she participates in the labor force.

A specific case is described by the "conjugal contract model" by Carter and Katz (1992) that emphasizes in particular the different implications of private and public goods. This model argues that the wage rate per se is not the most important factor determining women's labor supply outside the household. Given that women produce mostly public goods when they work inside the household but earn cash income that can be spent on private goods when working outside the household, women may even for low market wages decide to work outside the household. This is because the relevant shadow value of cash is much higher as the value of public goods. Thus, the model argues, that women tend to supply more labor outside their homes (and hence reduce their time in the production of public goods) to increase their consumption of private goods. The model implies that if the conjugal contract ensures that women receive income transfers from their husbands, the time devoted to household public goods increases while participation in the labor market declines.

2.2. Nature of Household Decision Making in Rural Ethiopia

In order to choose the appropriate theoretical framework for this study, I discuss now the nature of household decision making in the context of Ethiopia more particularly preference

[6] Chiappori (1995) argues that the sharing rule may depend on culture, tradition and marriage market conditions. The rule is such that decisions lead always to a Pareto optimal outcome.

[7] This is known as the argument of compensating differentials (Grossbard-Shechtman and Neuman, 1988).

heterogeneity between men and women, the existence of clearly distinct spheres of decision making and whether intra-household resource allocation results in Pareto optimality or not.

There is some evidence for Ethiopia strongly suggesting that preferences within households and especially between men and women differ. This has for instance been shown by Quisumbing and Maluccio (2000) who explore spending patterns on goods and services. They show that more assets in the hands of wives increase the food budget share while more assets in the hands of men increase the share spent on alcohol and tobacco. However, this divergence in spending patterns between men and women does not necessarily reflect differences in values, since in the context of Ethiopia it could also just reflect that different goods fall under different responsibilities (Guyer, 1998). Bevan and Pankhurst (1996), for instance, found evidence for this behavior in Ethiopian households. They report that women wish to use dung as fuel for cooking while men want to use it as fertilizer to boost farm productivity.

Ethiopian households are also characterized by the presence of separate spheres that are determined along gender lines. This is particularly evident in the production of goods and services. Women, in many parts of the country, are mainly responsible for reproductive work, i.e. food preparation, collecting wood and water, and child care, which men are not expected to engage in. Men, on the other hand, are largely responsible for agricultural work. However, women are expected to participate in tasks related to harvesting and weeding.

The presence of separate spheres in production has had its own implication on who controls household incomes. Given that agriculture provides the main source of income and that men are largely responsible for agricultural related tasks, most of the income obtained from this source falls under their control. Husbands in Ethiopia are responsible for household decision making over most spheres such as expenditures on food, clothing, school fee and medical expenses including what to grow in the fields (Bevan and Pankhurst, 1996; Ellis and WoldeHanna, 2005). Based on information from the ERHS data, 72 percent of households do not have separate finances and 60 percent claimed that the head of the household is the one that administers household finance. The fact that Ethiopian households have joint finances is not an indication that income is pooled at the household level but it is rather an indication that a large proportion of household income comes from one source and that it is predominantly controlled by men.

Men also have the right to sell and keep the return from assets sales such as livestock and not only those assets that are only owned by the men or jointly owned but also including those exclusively owned by wives (Fafchamps and Quisumbing, 2001; Ellis and WoldeHanna, 2005). Anthropological studies also indicate that men play an important role in allocating labor of family members. Bevan and Pankhurst (1996) in their village studies stated that coordinating agricultural work, giving proper instructions (job descriptions to family members) and supervising their execution are among the responsibilities of men in rural Ethiopia.

There are, however, areas where women can participate in decision making. For instance, women decide on how to spend income obtained from the sale of agricultural products that they are allowed to sell in small quantities. They also control income from the sale of hens, eggs, as well as dairy products whose processing is done by them and keeping the proceeds from this source is considered as an incentive (Fafchamps and Quisumbing, 2001; Ellis and WoldeHanna, 2005). Women also decide on how to spend smaller incomes earned through

off-farm work. However, husbands give instructions on how to spend it, especially when a relatively high income is earned (Bevan and Pankhurst, 1996). According to field work in Ethiopia[8], women as a result hide part of their incomes to avoid this problem.

Contrary to the prediction by cooperative models, evidences suggest that resource allocation behavior in rural Ethiopia does not necessarily result in Pareto optimal outcome. For instance, Seebens and Sauer (2006) found allocative inefficiencies in Ethiopian households with a highly asymmetric power distribution. The cause of this inefficiency can be attributed to the lack of incentives for individuals to participate efficiently in the production process.

2.3. Choice of Theoretical Model

The presence of preference heterogeneity, separate spheres and control of incomes along gender lines and the possible absence of Pareto optimal resource allocation is indicative of the importance of gender based norms, and divisions of labor and conflicts in the allocation of resources in rural Ethiopia. As such, it can be argued that Ethiopian households neither operate in a cooperative nor in a purely non-cooperative fashion. Therefore, it seems reasonable to view households in rural Ethiopia as characterized by separate, gendered spheres of decision making where household members exchange goods, incomes, services among themselves in accordance with a 'conjugal contract' (Whitehead, 1981).

We find a semi-cooperative framework in the spirit of the conjugal contract model developed by Carter and Katz (1997) more relevant to describe the reality in rural Ethiopia where patriarchy plays an important role in the allocation of resources including the allocation of members' labor time. The model characterizes a household composed of individuals with independent preferences. Resource allocation decisions occur in various ways of interdependence which occurs mainly through production of household public goods. The model also allows the inclusion of socially constructed patriarchy that determines individual's bargaining power over the terms of the conjugal contract through their effect not only on individual's exit options but also on individual's voices within a household.

We find the concept of 'Extra Household Environmental Parameters' (EEPs) borrowed from McElroy and Horney's (1981) Nash Bargaining framework also quite relevant in the context of Ethiopia as it allows to incorporate factors, particularly norm related ones, that affect individuals threat points hence bargaining. But the impact of EEPS on individuals' threat points should be viewed in a semi cooperative environment rather than in a pure cooperative setup depicted by the Nash bargaining Framework. This is because though the framework considers presence of preference heterogeneity, it assumes that these preferences are satisfied through a non-individualized income which seems to be unrealistic in the case of Ethiopia where women and men have separate sources of income. Moreover, in the context of Ethiopia these threat points are dependent on the decision sphere in question.

Based on these theoretical considerations, I hypothesize that labor allocation decision are subject to negotiation within a household.

Moreover, I predict that, given the presence of preference heterogeneity coupled with men's control over income, shocks that adversely affect household incomes result in changes in resource allocation decisions that go against the interests of women. In line with this

[8] I conducted a focus group discussion in Ethiopia in 2009 to understand factors that affect bargaining power. The detail of this is discussed in section 3.3.

hypothesis, Dercon and Krishna (2002), for example, found for rural Ethiopia that shocks adversely affect women's nutritional status. Similarly, Kebede (2003) documented the adverse impact of price and income fluctuations on expenditures on women's goods. Finally, we believe that labor allocation in rural Ethiopia may not be Pareto optimal not only because individual's labor allocation is based on norm associated gender division of labor rather than marginal productivity rules but also because the presence of unequal control of household income creates lack of incentives for those who do not control income.

3. Data and Descriptive Statistics

This study relies on data from an Ethiopian household survey and information drawn from Focus Group Discussions (FGD), which I conducted in Ethiopia in 2009.

3.1. The Ethiopian Rural Household Survey

The household survey data comes from the Ethiopian Rural Household Survey (ERHS) collected by the Department of Economics of Addis Ababa University, Oxford University and the International Food Policy Research Institute. These data are panel data, i.e. the same households were interviewed in repeated times. A detailed discussion on the sampling strategy is found in Dercon et al., 2008. The first round was conducted in 1989 with the objective to understand the response to the food crisis which affected Ethiopia from 1984 to 1985. This round covered 450 households and asked questions regarding consumption, assets and income. The sampling of that survey was done in such a way that among all villages that were affected by the famines and drought, six villages were randomly selected. These villages are located in four of the eleven regions in the country. Households were then proportionally and randomly selected after stratification by gender of the household head.

The second round[9] was conducted in 1994 with nine additional villages to fully represent the different agricultural systems in the country with the exception of pastoralist areas.[10] The additional villages were randomly selected based on a stratification of the main agro ecological zones and subzones.[11] As in the previous survey, in these villages 1477 households were randomly selected after the households had been stratified into female and male headed households. Subsequent rounds of data in late 1994, 1995, 1997, 1999 and 2004 were undertaken based on the same sampling frame. Sample sizes in each village were chosen so as to approximate a self-weighting sample when considered in terms of the farming system where each person (approximately) represents the same number of persons found in the main farming systems as of 1994 (Dercon *et al.,* 2008). The questionnaires used in these different rounds were almost fully harmonized. Only marginal changes were introduced from year to year, mainly to improve the quality of the data collected or to add further questions or year-specific modules. The survey design and tracking procedures ensured that there is now a large set of panel households that can be followed over the entire period from 1994 to 2004. However, interpretation of results has to take into account that the data is not

[9] This will be referred as the first round hereafter.

[10] Pastoral areas were excluded because of difficulties in finding and resurveying mobile households over long periods of time (Dercon and Hoddinot, 2004).

[11] The farming systems are categorized in to the plow-based cereals farming systems of the Northern and Central Highlands, the mixed plow/hoe cereals farming systems, and the farming systems based around *enset* (a root crop also called false banana) grown in southern parts of the country.

(and was not intended to be) nationally representative since pastoralist and urban areas are not included.

In this paper, we rely on a sub-sample, comprising only couples, i.e. married men and women living in the same household and followed over the period 1994 to 2004. Hence, in total our data set covers 12,108 person-year observations (see Table A.1), i.e. 2018 married individuals on average in each year over the six year panel period. Given that some couples dropped out of the sample (14.5 percent of households and 13.2 percent of individuals)[12] and new couples entered the sample, the panel data set is unbalanced.

The ERHS consists of core modules that provide detailed information on household demographics, assets, and agricultural income. It also provides information on ownership of land and livestock and crop production and it includes modules that provide information on consumption, health, and women's activities.

More particularly, the survey provides information on the number of days individuals spent on dependant off-farm wage work and off-farm self-employment. Self-employment is reported in categorized activities such as collecting and selling firewood, making traditional hair, making and selling local drinks and so on. Dependant wage work covers activities such as participation in a food-for-work program, manual work, skilled work, farm work, and so on.

However, in most parts of our analysis we use only the information on individuals' participation instead of the number of days of participation in these activities because of differences in the questions regarding the time spans that individuals participated in off-farm activities between the last round and the previous rounds and because of potential measurement error. For both off-farm wage work and self-employment, the number of days spent on these activities in the past four months prior to the survey was asked in all rounds except in round six where individuals were instead asked the number of months they participated in the last 12/13 months.

The survey also provides detailed information on different types of shocks that households faced in the previous agricultural season. In all rounds, information is available on farm specific shocks related to rainfall based on a series of questions such as whether there was enough rain at the beginning of the main rainy season; whether the rain in the main rainy season came on time and whether rain stopped on time, and whether there was rain near harvest time. Moreover, the survey asked for crop related shocks such as damage through flooding, wind, plant disease, insects and weeds. Finally, the survey also provides information on other agricultural shocks (availability of oxen and labor) and health shocks. However, the information on other agricultural shocks including the health shock is only available for the first three rounds and the last round but not for the two rounds in between.

Many of the 'bargaining power indicators' we use, are constructed using information on a specific module on family and marriage history included in 1997 (round four). This information was then enriched with the insights gained from the FGD. The module in ERHS provides both time variant and invariant potential indicators of power. However, we

[12] Nearly all households in the first round are also found in the second and the third round. However, 7 percent of households in the fourth round; and 23 percent of households in the fifth round and 35 percent of household in the last round have attrited relative to the first round. Dercon *et al* (2008) examined whether the sample attrition is random or not and found that there is no statistical difference between attritors and non-attritors in basic socioeconomic characteristics such as age, sex of the head, and assets (fertile land, all land holding and cattle) or consumption.

only focus on the latter, since we do not have any information on these indicators in the survey rounds before and after 1997.

3.2. Focus Group Discussions

From December 2008 to February 2009, I conducted Focus group discussions in rural Ethiopia to enrich the information on women's bargaining power collected with the ERHS and to see whether measures usually used in the literature are relevant and applicable in the context underlying this study. Moreover, the FGD also has helped to identify new proxies, not yet discussed in the literature but relevant in the given context. All sites chosen for the FGDs are also covered by the ERHS. Though the villages in ERHS reflect, as mentioned above, differences in the farming systems in the country, they also overlap with an ethnical divide, which is particularly useful for the focus group discussions, since it allows reflecting on the full range of ethnical settings present in Ethiopia. Hence, we focused on four major regions (Oromiya, Amhara, Tigray and Southern Nations and Nationalities) which, again, together cover almost the total cultural heterogeneity in the country.[13]
Separate FGDs were conducted with women and men groups (6 to 8 individuals each) to understand men's and women's perceptions related to factors that affect power relations. In the next section, we discuss the results and implications of the FGD in more detail.

3.3. Descriptive Statistics

a) Non-farm Work

Figures A.1 and Figure A.2 provide information on men's and women's participation rates in off-farm self-employment and dependant wage work. While both men's and women's participation rates are rather low, men's participation is found to be greater than that of women in both types of activity. Smaller differences by gender are observed in off-farm self-employment. It is interesting to note that in particular married women's participation in off-farm self-employment is higher than their participation in wage work. In the first round, 18 percent of men and 17 percent of women participated in off-farm self-employment. However, a huge difference by gender is prevalent in the fourth round where only 0.6 percent of women participated in this type of work while men's participation was about 13 percent. This could possibly be due to a decline in the poverty incidence from 55 percent in the third round to 32 percent in the fourth round (see Table A.4). Dercon *et al. (*2008) also argued that this might have been caused by the fact that the data for this round was collected during harvest seasons where agricultural incomes are particularly high. In the last two rounds, the gender difference in the participation rates in self-employment narrowed down again, to about 4 percentage points.

Regarding dependent wage work, we find a substantial difference by gender throughout all survey rounds. Overall, nearly 16 percent of men but only 3 percent of women, on average, participated in wage work. As for self employment, the lowest female participation rate in wage work occurred during the fourth round (about 2 percent).

Table A.1 and Table A.2 show the participation rates of both men and women in different types of off-farm work and wage work. Generally, it can be observed that certain activities are more predominantly done by men than women and vice versa. For instance, Table A.1

[13] One site from each region was selected for the FGDs. From Oromiya, Turufe-Kechema; from Tigray, Haresaw; from Amhara, Dinki; from Southern Nations and Nationalities, Imbdibir were selected.

shows that while men dominate off-farm activities such as weaving, trading grain and livestock and activities such as salt trade and traditional healing, women are mainly engaged in activities such as handicraft and collecting and selling firewood.

Women's participation is lower than that of men in most activities categorized under wage work (see table A.2). The largest participation gap, i.e. nearly 7 percentage points on average, is observed for unskilled work. With respect to farm wage work, women's participation is lower by 4 percentage points on average relative to men. Participation rates for both men and women in professional work such as teaching; administrative work, etc. are the lowest, possibly due to the fact that the large proportion of our sample constitutes individuals with no schooling at all.

We also checked whether participation in both off-farm self-employment and wage work shows variation with respect to the household poverty status as reported in Table A.3. Men from poor households show a higher participation in off-farm self-employment and wage work in the second, third and last round while more men from non-poor households participated in the first, fourth and fifth rounds. In contrast, more women from poor households participated in off-farm self-employment in almost all rounds except in the fourth round.

Across all survey rounds, more men and women from poor households participated in wage work except for the last two rounds for which we note a higher participation among individuals from non poor households. However, taking the total sample period as reference, one can state that the participation gaps between individuals from poor and non-poor households are quite marginal.

Table A.1 presents the descriptive statistics of the key variables used in this study for the sub-sample of married men and women (couples hereafter). The households in our sample have on average a household size of 6.5 and they own on average 1.35 hectares of land. Overall, nearly 43 percent of households have an income per capita lower than the official poverty line.[14] The highest poverty head count is registered in the third round (55 percent) and the lowest in the fourth round (32 percent).

The average age of married men and women in the sample is 47 and 37 years, respectively. A substantial share of individuals in the sample has not completed any form of schooling. This is particularly true for women. Nearly 84 percent of women and 63 percent of men never were enrolled in either formal or informal schooling. Few individuals have completed the primary level (25 percent of men and 11 percent of women). About 5 percent of women and nearly 12 percent of men attended either religious education or were involved in adult literacy programs.

The same table provides information on self-reported rain, crop, input and illness shocks. On average across all rounds 61 percent of the interviewed households reported that there was enough rain at the beginning of the rainy season and the rain in the main rainy season came on time. Nearly 47 percent of the households reported that the rain stopped on time. Variations of the percentage over time are quite substantial indicating that rain is very variable. Again, on average across all rounds 26 percent of the households reported rain near harvest time. Rain in harvest time can heavily damage and reduce the harvest and often requires to proceed immediately with the harvest. Nearly 20 percent reported that their crops

[14] The official poverty line is 2200 kcal/day/adult (MoFED, 2002).

suffered from wind/storm and 18 percent from flooding related shocks, again with substantial variations ranging from (nearly) 9 percent to 33 percent. A large share of households (43 percent) reported that they were unable to obtain oxen at the right time in the previous agricultural season. Labor shortages were reported by 21 percent.

Finally, the survey also collected information about illness related shocks, although not on the individual but on the household level. About 20 percent of the households reported that one or several family members were ill in the previous agricultural season.

The discussion on the different indicators of women's bargaining power combines the data from ERHS with the information from the Focus group discussions. Table A.1 lists the measures of bargaining power used in this study together with their means. In what follows we briefly discuss each measure.

- Economic Resources

The FGD revealed that though economic resources such as land and livestock brought to marriage matter for a woman's bargaining power, it is the relative rather than the absolute amount of what a woman brings to the marriage that affects her decision power. Hence, we included wife's share in the total land and livestock brought to marriage. In our sample, the average wife's share in the total land brought to marriage is only 2 percent. However, the average wife's share in the total livestock brought to marriage is 16 percent. The variation in the sample is high. Many women haven't brought any assets to marriage whereas in a few cases all assets were brought by the women.

FGDs also indicated the importance of parental wealth in improving a woman's say within a household. Women from rich parents are better protected from any form of abuse from their husbands. In fact, women from such households often threaten to leave their husbands if husbands do not behave properly. In our sample 25 percent of the women have richer parents relative to their husbands.

- Marital Arrangements

Different variables, which capture how marriages are arranged, are included in our set of measures, since these variables can also be considered as proxies for a woman's bargaining power (see Table A.7). The ERHS data shows that only 45 percent of cohabiting couples have a written marital contract while the rest were married only through either traditional or religious arrangements or only have verbal contracts. The FGDs revealed that a woman who has a written marital contract is able to get at least half of household assets in case of divorce and as a result have a relatively better 'threat point' than a woman without such a contract. This, in turn, affects the extent to which women can pursue their interests in the household. The men in the FGDs confirmed that there is less resistance against women's interests and needs in such households due to husbands' fear that wives take half of households' assets in the event of divorce.

Moreover, the focus groups suggested that women's bargaining power differs in a household in which either man and woman are from the same religion and ethnic group and a household where this is not the case. Traditionally, marriages are often arranged by couple's relatives and parents and usually occur between individuals from the same ethnic group and religion. Indeed our data shows that only 11 percent and 5 percent of couples in our dataset have different ethnicity and religion, respectively. Participants in the discussions said that since such marriages are arranged by couple's themselves, women in such households have

more decision making power due to the fact that the influence from existing social norms have a smaller impact on gender relations. In other words, marriage out of love instead of fulfilling societal obligations gives women a greater say and more liberty.

It can also be argued that women, who marry men with traits that are unacceptable under a specific norm, signal that they are able to do so because of the influence from other factors that boost their power position. Therefore, capturing these kinds of women's choices should allow us to proxy those factors that determine women's bargaining power. Beyond the fact that marriages in rural Ethiopia are arranged by either parents or the couples themselves, men at times engage in kidnapping a woman for marital purpose. This seems to be common considering the fact that 11 percent of the women in our sample were kidnapped for marriage. Having been kidnapped should be a sign of low bargaining power. Finally the FGDs revealed that since marriages in many occasions are arranged by couples' parents and relatives, couples often meet for the first time on the day of their marriage. In our data set, only 40 percent of couples talked to each other before marriage while the rest never had any communication prior to their marriages. Again, women that did not talk to their husbands before may also be in marriages where they have less say compared to households where women talked to their men before.

- Relationships and Networks

The importance of relationships and social networks on women's bargaining power is emphasized in our FGDs. It is reported that women who have brothers have better decision making power in their households. The focus groups indicated that women with brothers do more effectively than women without brothers pursue their interests in the process of intra-household decision making. In our sample, 32 percent of the women do not have a living brother. It was also emphasized that the presence of brothers is an opportunity for women to access the public sphere in their community.

3.4. Research Hypotheses

In this section we discuss the hypotheses we will subsequently test in the empirical part of the paper. We start with the hypotheses regarding the link between women's bargaining power and their labor supply to wage work and off-farm self employment. Then we formulate some hypotheses on how bargaining power may shape the women's labor supply behavior in times of agricultural shocks.

3.4.1. Labor Supply and Women's Bargaining Power

It is plausible that household members' labour allocation is subject to negotiation in a household, given that labour is a key input to generate income. However, various studies, in particular in the field of anthropology, suggest that in particular women face serious constraints when they enter this negotiation process. For instance, women often face patriarchal or norm-associated constraints that prevent them from allocating their labour to activities of their desire (see e.g. Kabeer, 2008). These studies argue that such constraints are rooted in men's fear of being subordinated or of losing their breadwinning role if their wives become economically too powerful. Moreover, norms are often such that they label the husbands of women that do participate in income earning activities as lazy, indolent, and entirely negligent of their family. Such labels, by signifying that husbands shirk their obligations, reinforce in turn powerful social norms that force men to provide for their families without any help from women.

Increased women's bargaining power, for example due to higher female education, the ownership of assets or land, or social capital can ease or challenge such constraints.[15] There are various ways through which a higher bargaining power can affect a woman's labour supply. On the one hand, a woman with a higher bargaining power has more control of her own income. This, in turn, gives her an incentive to participate in income generating activities. Moreover, women with more bargaining power may also more easily break rule and traditions that prevent them from offering labour outside the household. If for instance a woman's preference is to supply more labour to income generating activities, though, there is resistance from her husband, a higher bargaining power should allow her to do so. Obviously, women with increased bargaining power may also more easily resist to do work that is perceived as disagreeable and hard.

Hence, the impact of a woman's bargaining power on her participation on income generating activities depends on how work is perceived in the household and the community at large. If work is perceived as undesirable and difficult then an increase in bargaining power is expected to reduce participation in this kind of work. If work is considered as desirable and fulfilling though difficult, higher bargaining power should increase a woman's participation in this type of work.

3.4.2. Women's Labor Supply and Shocks

Non-farm labour supply is one of the most important mechanisms that households in developing countries use to cope with a variety of shocks on income (Kochar, 1995; Beegle, 2005). How exactly shocks affect the intra-household labour supply is likely to depend on various factors such as the nature of shocks, the religious and cultural norms. Labour supply adjustments can be made in three different periods of time. First, prior to the shock, if households anticipate shocks, they want to reduce their risk of fully exposed to the shock. Second, farmers may respond immediately after the shock occurred to compensate the direct income shortfall. Moreover, an adjustment can be made after a shock unfolded all its direct and indirect consequences.

In the first case, the labour supply response in the pre shock period differs depending on the type of agricultural shocks farmers expect. Farmers may choose risk management mechanisms that involve producing, for instance, short season crops and/or raising seedlings in nurseries for expected rain shocks such as rain delays or rains near harvest time. Such strategies demand more labour in farm work and as a result may not bring about significant changes in the supply of non-farm labour for both men and women. On the other hand, for farmers who decide to diversify their income across agricultural and non-agricultural sources, we expect an increase in men's labour supply to farm work and an increase in women's labour supply to non-farm work given the division of labour along traditional gender lines in the Ethiopian context.

Ethiopian farmers frequently also practice crop rotation to reduce the risk of damage through plant diseases, weeds and insects. This strategy does not necessarily have an impact on the total amount of labour required for farm work. However, in the anticipation of weeds, farmers may also make changes regarding how seeds are sowed. In Ethiopia, seeds

[15] Human resources include the skills and education levels while economic resources constitute ownership of assets, land or cash. Social resources such as various relationships, networks and support systems also enhance women's bargaining power.

are usually sowed randomly rather than in rows. Random sowing makes weeding a very time consuming task requiring about 140 hours per hour on average (Kebede, 2000). If farmers fear that weeds are likely to occur, then they may adjust their behaviour and sow seeds in rows. Given that such tasks are usually done using manual rather than mechanized means, we expect in this case the intensity of farm work for both men *and* women to increase while their participation in off-farm work declines.

Rain-related shocks are probably the most important shocks in the Ethiopian context. A rain delay for instance affects farming schedules in the short run by delaying seed bed preparation since lack of enough moisture makes ploughing difficult. This, in turn, increases the required intensity of farm work by increasing ploughing time. As ploughing is a task culturally assigned to men, such shocks are expected to increase the supply of men's labour to farm work. Even though women in Ethiopia culturally do not participate in ploughing, their work load usually increases in such periods as well.[16] The occurrence of a shock that intensifies men's farm work usually increases the time women spend on domestic work.[17] Hence, during peak agricultural seasons *both* men and women have less time for off-farm work.

Other shocks such as rainfall during harvest time affect individuals' labour supply, because in this case the harvest has to start immediately and has to be done as fast as possible to avoid to thresh cereals that are not dry enough. To cope with such shocks farmers often rely on labour sharing arrangements[18] or simply hire additional outside labour. The immediate (short run) impact of such shocks is that both men's and women's labour supply to farm work increases.[19] At the same time, we expect women's domestic work to intensify as they are required to prepare food and drinks for those working in the field. This, in turn, increases women's time burden when such shocks occur due to the dual role that they are expected to play.

It is, however, critical to note that the exact response to such shocks depends very much on cultural norms. A study from rural Ethiopia indicates that in many regions shocks such as plant disease or delayed rain are considered as punishments from God for not having fulfilled religious obligations. There is also evidence that farmers engage in cultural rituals to prevent shocks from occurring in some villages in Ethiopia.[20] Hence, it maybe that the labour supply response and the implementation of coping strategies more generally is smaller in regions where farmers believe in and accept such punishments.

In light of the aforementioned arguments, we can conclude that non-farm labour supply responses to agricultural shocks differ depending on the position of an individual within the household, and particularly between men and women and depend on the cultural context. Certain shocks and related coping strategies increase women's labour supply to both farm *and* domestic work, leaving them with little time to spend on non-farm activities.

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[16] The qualitative survey conducted by the author reveals that domestic work such as food, coffee, and drink preparation intensifies especially in agricultural seasons.

[17] For instance, women need to do more cooking and preparation of local drinks during periods of agricultural work for labor that assists in farm work, in which case this labor comes from labor sharing arrangements.

[18] Bevan and Pankhurst (1996) reported the presence of labor sharing arrangements among farmers in rural Ethiopia.

[19] Women in Ethiopia are responsible for 40 percent of agricultural labor and are also involved in agricultural activities such as land preparation, weeding, harvesting, threshing and storing (Frank, 1999).

[20] For example, farmers spray popcorns in their fields thinking that the disease will not occur (Ayimut and Abang, 2007)

In cases where both women and men increase labor supply to off-farm work, the type of off-farm work women engage in, may depend on how severely shocks affect household income. Very severe distresses or compulsions alter traditions in such a way that particularly women's labor supply to previously male dominated off-farm activities increases.[21]

It should also be noted that covariate shocks, i.e. shocks that affect income of many households in a community at the same time increase labor supply in the market and in consequence wages are rather low. Moreover, villagers' reduced income obviously also reduces the demand for goods produced or traded by women such as firewood, food and drinks.

4. Model Specification and Empirical Strategy

To test the hypotheses discussed in the previous section, we proceed in three steps. First, we examine how different dimensions of bargaining power affect women's non-farm labour supply. Second, we examine how women's (and men's) non-farm labour supply responds to agricultural shocks. Third, we examine how different dimensions of women's bargaining power shape the labour supply response to agricultural shocks. In what follows, we discuss how we implement these tests empirically and then proceed with the discussion of the results.

We start by studying the effects of women's bargaining power on women's off-farm labor supply. We estimate the following equation:

$$T_{it} = \beta_0 + X_{it}'\beta_1 + bp_i'\beta_2 + T_t'\beta_3 + P_{it}'\beta_4 + \varepsilon_{it}, \quad (1)$$

where T_{it} is a binary variable taking the value one if women i offers off-farm labor (either self-employed off-farm work or dependant wage work) in period t, X_{it} is a vector of individual, household and community characteristics such as age, age squared, education, land owned, household size and distance to the nearest market, bp_i represents a wide set of factors that affect a woman's bargaining power, T_t are wave dummies, P_{it} are seasonal dummies, and ε_{it} stands for individual period-specific random shocks. Given that we are particularly interested in the role of bargaining power, i.e. in the set of coefficients β_2, we can not introduce fixed effects in Equation (1), since bargaining power is time-invariant in our data set. Hence, to estimate Equation (1), we pool all rounds of the ERHS, introduce random effects and apply a between-estimator. Note that random effects make the strong assumption that time-invariant individual unobservable effects are uncorrelated with the included regressors. We check the robustness of our results using a logit specification.

In a second step, we examine how women's and men's off-farm labour supply responds to agricultural shocks. We use the following specification:

$$T_{it} = \beta_0 + X_{it}'\beta_1 + S_{it}'\beta_2 + t_t'\beta_3 + P_{it}'\beta_4 + \alpha_i + \varepsilon_{it}, \quad (2)$$

where: the vector S_{it} stands for a set of agricultural shocks (such as the coming of rain on time, whether there was enough rain at the beginning of the rainy season, whether rain

[21] Ellis and Woldehanna (2005) stress that distresses break traditions and women are allowed to supply labor outside their traditional space.

stopped on time, whether there was rain near harvest time, wind, flooding, weed, plant disease and insect related shocks) and a_i is the individual fixed-effect. All other variables correspond to those in Equation (1). Equation (2) is estimated with a fixed-effects linear probability model. Alternatively, one could use a probit or logit model, but this would require making strong assumptions on the fixed-effects. Moreover, these models drop from the estimation all observations that do not show any within variation in the sample, leading in our case, given that this occurs quite frequently to a serious selection problem. We estimate Equation (2) separately for both men and women. The comparison between men and women's labor supply behavior can give interesting insights in how gender affects labor supply in response to agricultural shocks. Although it is important to highlight, that we do only look at off-farm labor supply and ignore how agricultural labor supply responds to shocks.

In a third step, we analyze how different dimensions of women's bargaining power shape the labour supply response of women to agricultural shocks. Hence, we introduce in Equation (2) interaction terms between bargaining power measures and agricultural shocks:

$$T_{it} = \beta_0 + X_{it}'\beta_1 + S_{it}'\beta_2 + (S_{it} bp_i)'\beta_3 + t_t'\beta_4 + P_{it}'\beta_5 + \alpha_i + \varepsilon_{it}, \quad (3)$$

where $S_{it}bp_i$ is the interaction effect of agricultural shocks and different measures of bargaining power. Equation (3) is again estimated using a linear probability model with fixed-effects. It is only estimated for women.

Before we proceed to discuss our results it is worth to discuss the role of the individual fixed effects. The estimation of participation in off-farm work is subject to potential endogeneity bias due to omitted variables. Participation in non-farm work could be affected by unobserved permanent individual characteristics such as tastes for leisure or rates of time preference, and work choices (Lundberg, 1988). Additionally, household level unobservables such as the quality of landholding affect individuals' labor supply to the market. This is because households with higher land quality tend to have higher returns from their land which reduces individuals' labor supply to the market through the income effect. Another potential source of bias emanates from individual's perceptions of shocks which in turn may have an impact on how these shocks are managed. Individuals may ignore new information to persevere their beliefs and may willingly misread new evidence in the hope of supporting prior beliefs which may affect their ability to predict shocks or responses after shocks are realized (Doss *et al.*, 2006). Moreover, individuals' choices to accept preference consistent information uncritically and preference inconsistent information critically introduces cognitive biases that bring about differences in responses to different types of shocks. Further biases may occur due to culture specific factors that provide social safety nets which determine how individuals in specific communities manage risks and shocks (Doss *et al.*, 2006). Hence, applying fixed-effects can control these potential biases as long as they are time-invariant.

5. Results and Discussions

This section reports three sets of results: First, the impact of women's bargaining power on their non-farm labor supply; second, the impact of agricultural shocks on men and women's non-farm labor supply; third, the impact of women's bargaining power on the relationship between shocks and women's non-farm labor supply.

5.1. Bargaining power and Participation in Non-Farm Work

In this sub-section, we show the association between labor supply to self-employment off-farm work and dependant wage work and women's relative bargaining power using a random effects specification. Using a fixed-effects specification would have been preferable. However, since the bargaining power indicators considered are time invariant, identification using random effects estimation seems the only viable option. In principle, each indicator measures a different dimension of bargaining power and hence all indicators could be used simultaneously. However, given that at least some of the various bargaining power indicators that are used are strongly correlated, we estimate two specifications. One where we use all indicators together in one regression (see Table B.1) and one where we use each bargaining power indicator separately (see Table B.2). However, for most of the indicators, we do not find a difference between the signs of the various coefficients and the significance levels whether indicators are used together or one by one. An exception is the wife's share in the total land brought to marriage in the model of off-farm self-employment, where this variable is statistically significant when used alone while it is found insignificant when estimated with other indicators together, though the sign is still the same. Similarly, the variable "couples have a written marital contract" is found insignificant with a negative sign when used in isolation, while it is found significant, still with a negative sign, in the estimation with the other indicators.

It can be seen in Tables B.1 that not all dimensions of women's bargaining power are important for women's participation in off-farm self-employment and dependant wage work. We find that whether a wife talked to her spouse before marriage and the presence of a written marital contract are statistically significant determinants of a woman's participation in off-farm self-employment. We also find (in the estimation where we test each factor in isolation, Table B.3), that the wife's share in the total land brought to marriage is an important determinant of a woman's participation in off self-employment. In the case of wage work, the wife's share in the total livestock brought to marriage and a dummy variable that captures whether a wife has brothers are found to be important predictors of a woman's participation.

More precisely, an increase in bargaining power reduces a woman's probability of participating in off-farm self employment. The probability of participation in this type of work increases by 3 percentage points for a woman who has spoken to her husband before marriage compared to the one who did not. This is plausible given that a woman who is familiar with her husband before marriage tends to have a better say in household

negotiations and therefore she may easier than other women avoid this type of work. Again, marriages in the Ethiopian context are predominantly arranged by parents or relatives, i.e. couples often meet for the first time during their wedding. As indicated in the previous section, only 45 percent of couples in our sample spoke to each other before their marriage.

Moreover, the probability of participation in off-farm self-employment increases by 2 percentage points if she has a written marital contract relative to a woman who either has none, or 'only' a verbal or religious marital contract. Because women with a written marital contract have the assurance that they get half of household assets up on divorce, have a higher 'threat point' and therefore should have a higher bargaining power within their household. We also see in Table B.3 that a 10 percentage increase in the wife's share in the total land brought to marriage decreases the probability of participation by 12 percentage points.

We see, in contrast, that increased bargaining power is associated with a higher probability of participation in dependant wage work, indicating that different values are attached to both types of work. Off-farm self-employment includes activities that are considered as undesirable such as collecting firewood, selling local drinks, and traditional hair dressing which in our focus group discussions came out as activities done by poor women and is generally not desirable by the women and the community at large. On the other hand, wage work includes work such as food for work, hired labor which yield higher incomes and appreciations by the community and family members hence are more desirable by the women. We find, for instance, that a 10 percentage increase in wife's share in the total livestock brought to marriage increases a woman's participation probability in wage work by 4 percentage points. Moreover, we find that the probability of participation in wage work increases by 1.3 percentage points for a woman who has brothers.

Even for the variables which are found to be statistically insignificant, the coefficients show in most cases opposite signs. For instance, the variable 'wife kidnapped for marriage', has a positive sign in the self-employment equation and a negative sign in the wage work equation. The fact that the variable 'women kidnapped for marriage' is insignificant in both equations may be due to the fact that there are various forms of kidnapping ranging from forced to arranged marriages and, hence, some may indeed be associated with a status where a woman has not much to say in a household and others where this is not the case.[22]

We also find insignificant effects associated with the variables 'couple's being from either a different ethnic group or different religion'. However, unlike the findings of Quisumbing and Maluccio (2003) who found that wife's parental wealth increases expenditure on women's clothing and food, we find that wife's parental wealth does not play any role in explaining women's labor supply to both self-employment and wage work. This of course also shows that a particular bargaining power indicator may matter for one outcome (e.g. consumption of private goods) but not for another (e.g. labor supply).

[22] Kidnapping can be equivalent to eloping if wife's parents do not approve of the marriage but couples decide to get married or couples elope and seek parents' consent later. On the other hand, it may refer to marriage by abductions which occur when the men who resort to capturing a wife are often come from a lower status because of poverty, disease, undesirable ethnic group, etc. It also occurs to avoid payments of bride price which has to be paid when seeking a wife is legitimately done. For either of forms of kidnapping, legitimizing the marriage often occurs quite easily through village elders due to narrow opportunities in the marriage market for women under this circumstance.

An interesting implication of the findings above is that they show that not only indicators that reflect economic power but also indicators that reflect social relations, marital arrangements and social norms matter for women's decision power.

In sum the findings suggest that women are not only concerned about income and simply participate in any type of income earning activities without any regard for other equally important social standards. A woman's bargaining power serves, then, as a very important tool that women use to discriminate between work considered as desirable and fulfilling and work deemed as undesirable and difficult.

5.2. Shocks and Non- Farm Work

In this section we analyze how men and women modify their labor supply to off-farm self-employment and wage work in response to shocks. It is important to note that we do not observe what happens to farm labor. Thus, we cannot analyze whether increases in off-farm work are compensated by lower supply to farm work or whether increased female non-farm work goes along with increased male farm work. However, the results of this analysis are important since they show how the same shocks affect the non-farm labor supply of men and women in the given context. First we report the estimation results on the labor supply response to off-farm self employment. Then we discuss the estimation results on wage work.

Table B.3 (column1) reports the results for off-farm self-employment that were obtained using a simple OLS regression (pooled sample) and a fixed effects model. If not otherwise indicated, we rely on the fixed-effects model in our discussion.

Several interesting insights can be drawn from these estimations. First, some of the agricultural shocks do not affect off-farm labor supply at all; this is particularly true for men. Second, and most importantly, the impact of agricultural shocks on individual's labor supply to off-farm self-employment shows a strong gender divide, which is not the case for dependant wage work.

Among the shocks considered, men's participation in off-farm self-employment is only affected by the presence of flooding in the previous agricultural season. With the exception of all the positive rain related shocks, all negative rain related and crop shocks are found to be statistically significant for women's participation in off-farm self-employment. Shocks such as rain near harvest time, wind/storm, insects, and weeds increase women's participation in off-farm self-employment while plant disease and flooding reduce her participation in this activity.

As expected, the occurrence of rain near harvest time, which is one of the most important agricultural shocks in Ethiopia, increases women's participation in off-farm self-employment whereas it is found statistically insignificant in the case of men's participation. A woman's probability of participation in off-farm self-employment increases by 2 percentage points if a household experiences rain near harvest time. Similarly, wind/storm increases women's participation while it is not found to be important for men's participation. The probability of a woman's participation increases by 3 percentage points if crops were hit by wind or storm.

We also find that women are more likely to engage in off-farm self-employment when crops are affected by insects. The probability of participation increases by nearly 2 percentage points for a woman. Moreover, we find that a woman's probability of participating in off-farm self-employment increases by 2 percentage points if a household experiences a weed shock.

For shocks such as flooding and plant disease, we observe a reduction in women's participation in off-farm work. Interestingly, flooding seems to have opposite effects on women's and men's participation in off-farm self-employment. While it increases men's probability of participation by nearly 3 percentage points, it reduces the probability of women's participation by nearly the same magnitude.

We also find a strong negative impact of plant disease on women's participation while it does not have any impact on men's participation. We also find that the probability of participation for women who reside in a household where crops were affected by this shock decreases by 2 percentage points. One may argue following Udry and Duflo's (2004) finding for West Africa where gender differences in response to certain shocks are attributed to the presence of separate plots for men and women and assuming that such disease may not have affected women's plots per se, given that they plant different crops. However, having separate plots by gender is not a widely held practice in Ethiopia, and hence, an alternative and perhaps more convincing explanation could be that farm households still supply more labor to farm work even though crops are damaged to a certain extent.

On the other hand, it is found that women are more likely to engage in self-employment when their households experience insect related crop shocks. The same sign is found for men, but it is statistically not significant.

Table B.3 (Column 2) reports the results for men's and women's participation in dependant wage work. The estimation shows, with the exception of wind/storm in the case of men and insects in the case of women, that all other agricultural shocks considered do not have any impact on men's and women's participation in wage work.

Participation in wage work for a married man is positively associated with a wind/storm shocks, i.e. this shock increases the probability of participation by 3 percentage points. However, this effect is statistically insignificant for women. When crops are affected by insects, women's probability of participation in wage work declines by 1.3 percentage points, whereas there is not statistically significant effect for men.

As we explained above we can with the data at hand not analyze what happens to agricultural labor following a shock. Some of these shocks may require an immediate increase in effort on the fields to mitigate the impact of the shock and hence increased labor supply by women in off-farm self-employment may go along with increased agricultural labor supply by men. Hence we examined the impact of a non agricultural shock, i.e. an illness shock which does not directly induce changes in the optimal labor required on the field. Hence we regressed men's and women's labor supply in off-farm self-employment and wage work on a dummy variable taking the value one if in the previous agricultural season at least one family member was ill. Unfortunately, we do not know whether in this case the person ill was one of both, the men or the women, or another household member.

The results indicate that an illness shock does not have any statistically significant effect on both men's and women's participation in off-farm self employment. No significant effect is also observed on men's participation in wage work but we find that women's participation on wage work increases following an illness shock.

In conclusion, we can say the following. More generally, the evidence suggests that women's off-farm work labor supply is widely used as a coping strategy for agricultural as well as non-agricultural shocks. This shows that shocks widely affect women's time allocation and

possibly adversely affect their leisure time. More particularly shocks do not have the same impact on self-employment and dependant wage work. While most of the negative shocks considered induce a labor supply response to off-farm self-employment, most of them do not affect wage work. The absence of labor supply response to wage work can easily be explained by absence of labor markets in a typical developing country like Ethiopia. Wage work heavily hinges on the demand and supply in the labor market and it is likely that during economic hardships that affect many households in a village or region, labor demand is rather small and labor supply is rather large. Hence, for households it is easier to resort to self-employment rather than to wage work. Second, the finding that shocks mainly affect women's labor supply to off-farm self-employment points to two interesting issues. (a) The gender divide is not only present in domestic and agricultural work but also in off-farm work. (b) Women's off-farm self-employment is used as a buffer to cope with agricultural shocks.

5.3. Bargaining Power and the Relationship between Shocks and Non-Farm Work

In this section, we discuss the impact of bargaining power on the relationship between agricultural shocks and women's labor supply on off-farm self-employment and wage work. Table B.4 reports the results of the interaction effects of the bargaining power and shock variables in off-farm self-employment using pooled and fixed effects estimations. All other included variables are the same as those in Table B.1. In particular, we always control for the linear effects of shocks but not in the case of the bargaining power variables where we do not observe changes in these variables over time, and hence the linear effect is included in the fixed effect.

Column (1) shows only those coefficients that are found statistically significant in separate estimations while column (2) shows all significant coefficients in the estimation where all interaction effects are included. With a few exceptions, the results from the separate estimations are more or less similar to the results in the combined estimation. The following discussion relies on the fixed effects estimation in column (2).

The results in the previous sub-sections showed that an increase in bargaining power reduces a woman's participation in off-farm self employment. We also found that most adverse agricultural shocks considered increase a woman's probability of participating in the same type of work. In this section, we test whether bargaining power shapes the labor supply response of women to such shocks.

We find that the interaction of wife's share in the total livestock brought to marriage with wind/storm shock has a statistically significant but negative impact on a woman's participation in off-farm self employment. It can be observed that a 10 percentage points increase in wife's share in the total livestock brought to marriage reduces the probability of a woman's participation in self-employment by 4 percentage points in the event of this shock. A somewhat comparable result is observed for the interaction with insect shocks where a 10 percentage increase in a wife's share in the total land brought to marriage reduces a woman's participation probability by nearly 5 percentage points. It should be recalled that both wind/storm and insect shocks were found to have a significant positive effect while the bargaining measured through share of livestock was found to have an insignificant negative effect.

We also note that rain near harvest time has a statistically significant negative effect on participation in off-farm self-employment for a woman who has richer parents. Previously, we reported a significant but positive effect of this shock but an insignificant effect of wife's parental wealth on a woman's participation in this type of work. Now, we see that the positive impact of this shock on a woman's participation is reversed for a woman with higher bargaining power measured by her parental wealth: a decline in the probability of a woman's participation by 6 percentage points for a woman who has richer parents is observed.

The interaction of the bargaining power variable - wife talked to her husband before marriage - and the positive rain shock variable - rains came on time - shows a significant and negative sign: for women who have presumably more bargaining power, the participation probability declines by nearly 5 percentage points compared to a woman who did not talk to her husbands before marriage. We previously found a negative effect of this bargaining power variable on a woman's participation in off-farm self-employment while we found a negative but insignificant impact of this shock. This perhaps indicates that a higher bargaining power seems to increase women's benefits from positive shocks as they can use more of their time alternatively.

For the same shock, we also find an increase in women's participation if she has a lower bargaining power captured by the variable-wife kidnapped for marriage. The probability of participation for a woman who was kidnapped for marriage increases by nearly 10 percentage points when a household experiences such a positive rain shock. It should be recalled that the linear effects of this bargaining as well as the shock variable were found statistically insignificant. Hence, whereas we would expect that a positive shock leads via its income effect to a reduction of labor supply to off-farm self-employment and more leisure, we see that for women with a relatively low bargaining power – measured here via the type of marital arrangement – labor supply actually increases. Thus, we can aptly argue that the elasticity of substitution between consumption and leisure for women with a lower bargaining power is different from that of women with relatively better bargaining position.

Above, we did not find any evidence that difference in ethnicity between husbands and wives matters a lot for participation in off-farm self-employment (see in section 5.1). However, this variable comes out as statistically significant when crops suffer from insect shocks. It should be recalled that the linear effect of insect shocks was found to increase women's participation in off-farm self-employment. The interaction effect, on the other hand, tells us that the probability of participation in off-farm self-employment declines by 9 percentage points for a woman whose ethnicity is different from her husband's when crops suffer from insects. A woman who marries a man outside of what the norm dictates must have a higher bargaining power because of factors that we do not directly observe but have allowed her to exercise her agency. The result indicates that such a woman is able to negotiate better to reduce her participation in undesirable work that she is expected to engage in during hard times.

The results can be summarized as follows. Despite the evidence from our previous estimations on the importance of women's labor supply to off-farm self-employment as an adjustment mechanism in the presence of negative agricultural shocks, the results in this section reveal that this is not necessarily the case particularly for women with relatively higher bargaining power. We find strong evidence that bargaining power tends to reverse a woman's responses to negative agricultural shocks in rural Ethiopia, i.e. women with higher

bargaining power tend to increase their labor supply to off-farm self-employment less than women with lower bargaining power in the event of adverse shocks.

Table B.5 shows both the pooled and fixed effects estimates of the interaction effects between bargaining and shock variables on a woman's participation in wage work. Again, column (1) and column (2) report only those interaction effects that were found significant in individual estimations and in the estimation that combines all the interaction variables, respectively. Our interpretations focus on the estimates in column (2).

Several of the bargaining power as well as the shock variables were found unimportant for a woman's participation in wage work. However, most of the interaction effects between these two sets of variables are found to be significant.

We previously did not find wife's share in the total land brought to marriage statistically significant for a woman's participation in wage work. However, we find its interactions with flooding, wind/storm, as well as weed shocks statistically significant and negative: we find a 10 percentage points increase in wife's share in the total land brought to marriage reduces the probability of a woman's participation in wage work by fairly similar percentage points (15, 17, and 18 percentage points, respectively) in the advent of these shocks.

Nonetheless, an opposite effect is observed in the case of wife's share in total livestock brought to marriage when interacted with insects and weeds shocks which are found to be statistically significant and positive. Previously we did find a positive and significant effect of wife's share in total livestock brought to marriage for a woman's participation in wage work. The interaction effects reveal that a 10 percentage points increase in wife's shares increases the probability of a woman's participation in wage work by 3 and 8 percentage points when household's crops are affected by insect and weed shocks, respectively.

It seems that more land brought to marriage reduces a woman's participation in wage work where as livestock seems to have the opposite effect in the presence of negative crop shocks. In principle, we expect an increase in a woman's participation in wage work as her bargaining power increases given that wage work is assumed to be desirable. It can be argued that land brought to marriage might be helpful for a woman to refuse offering more labor needed in times of economic hardships than what she prefers to offer under normal circumstances. Alternatively, it could be that the more land a woman brings to marriage, the higher the demand for her labor on the family farm, especially when labor intensive shocks like weeds occurs.

We find the interaction of bargaining power variable 'a wife has a different religion from her husband' and the positive rain shock variable 'enough rain' as well as the negative crop shock variable 'plant disease' relevant for women's participation in wage work. Despite our expectation that a positive rain shock reduces a woman's participation in wage work, the probability of participation in wage work for a woman who has a different religion is found to increase by nearly 5 percentage points when there is enough rain during farming season. On the other hand, a woman with the same traits reduces her participation in wage work when crops suffer from plant disease: the probability of participation declines by nearly 4 additional percentage points. Note that the corresponding linear effect, discussed above, was negative but insignificant, i.e. plant disease per se seems not to have substantial effects on women's labor supply in wage work.

We find the bargaining power variable 'wife talked to her husband before marriage' relevant for a woman's participation in wage work only when crops suffer from flooding. We observe an increase in participation probability by 3 percentage points in wage work. We did not find both variables having any significant impact in our previous estimations. Looking at the same shock, we also find a significant difference for participation in wage work between a woman who have a different ethnicity from her husband and a woman who have not; likewise, if a woman has brothers. We did find that the bargaining power variable 'a woman has brothers' having a significant but positive impact on a woman's participation in wage work.

Taking having a written marital contract as an indicator of higher bargaining power, we find that women with higher bargaining power increase less (by 3 percentage points) than women with lower bargaining power their labor supply to wage work in the presence of another (negative) rain shock: 'rain near harvest time' (the linear effect was positive, though not significant). We also find that the probability of participating in wage work declines by 2 (additional) percentage points for a woman who has brothers in case rains stops on time relative to women who do not have brothers. Hence, all these interactions suggest that women with higher bargaining power show a lower increase in labor supply to wage work in the case of negative shocks and a larger decrease in the case of positive shocks.

However, as can be seen in Table B.7, there are a few exceptions. For instance we find a significant positive impact if we consider the interaction between weed shocks and bargaining power measured through having brothers, i.e. women with a higher bargaining power show a larger not smaller response. Likewise, we find that a higher bargaining power measured through the difference in ethnicity leads to relatively higher woman's labor supply in the case that farmers have enough rain on time. The probability of participation in wage work also increases - by nearly 5 percentage points - in case the household is affected by crops that suffer from weeds. Moreover, we also find a significant negative association between a woman kidnapped for marriage and her participation in wage work when rains stop on time: the probability of participation declines by additional 4 percentage points. One would rather have expected that the reduction in labor supply is smaller for these women relative to women that were not kidnapped and thus are supposed to have a higher bargaining power.

To conclude, it is difficult to see a clear and dominant pattern. The direction and magnitude of the effects is shock specific and depends largely on how bargaining power is measured. That effects differ according to the measure used makes sense, as we argued above, each of these indicators measures a different dimension of bargaining power. However, we cannot exclude that measurement error in both, shocks and in our bargaining power measures, makes it difficult to uncover a clear pattern.

5.4. Robustness Checks

We conducted two checks on the robustness and validity of these results. First we re-estimated the equations using a conditional logistic regression given that the dependent variables are binary in nature. The use of conditional logistic regression does not alter our conclusion from the linear probability model. Most of the negative crop shocks matter for women's participation in off-farm self employed work while most shocks do not alter men's participation in this type of work with the exception of flooding. In the case of wage work, the only difference in the logistic regression is that plant disease which was not significant

under LPM is found significant for men's participation. All other significance levels are consistent with what is found in the linear probability model.

Second, we re-estimated our equations using shock aggregated at a village level. This is because self reported shocks are subject to measurement error because they represent attributions of causality by respondents rather than the events themselves (Hodinott and Quisumbing, 2008). This is because individuals might consider a shock as normal and may fail to report it or different groups may classify the same event in to different types of shocks. Furthermore, what household members actually report about the shock may be prone to their mood at the time of survey interview (Tesliuc and Lindert, 2002).

To minimize this problem, I use the share of households in the community that experienced the shock as a proxy for severity of the shock, instead of relying on household self-reports of severity (Carter, Little, and Mogues 2007) and estimations account for possible intra group correlation[23] and standard errors are adjusted accordingly.

Virtually, the results of the off-farm self employed equations for women are found robust to changes in the measurement of shocks. But we found that a wind/storm shock which was not significant is now found positive and significant in the women's wage work equation which is still consistent with our hypothesis that negative shocks trigger more participation in non-farm work.

However, there are some changes introduced in the results of both men's off farm employment and wage work equations. One observation particularly in the case of off farm self employment is that with the new estimation, shock variables that are no significant for women's participation such as "rain came on time during the rainy season" and rain stopped on time" . When rains come on time during the rainy season, men's participation in off farm self employment decreases. Also, when rain stops on time, men participate more on off-farm self employment. These were found insignificant when individually reported shocks were used. We also found that men participate more in off farm work when there is rain near harvest time which was not also the case in the previous estimation. We found that flooding affects men's participation positively in our previous estimation. However, using village averages the probability of men's participation declines in the presence of flooding with the same level of significance. The results using the individual shocks reported for men wage work equation are found robust. However, insect shocks which reduced participation in wage work is no more significant when shocks are aggregated at the village level while at the same time we find that a wind and storm shock increases a woman's participation in wage work which is not the case in the previous estimation.

6. Conclusions

Incomes of poor rural households are usually extremely volatile, hence, understanding how individuals across and within households respond to this volatility has been the focus of a newer literature. This paper investigates whether women's labor supply to non-farm work is a result of a bargaining process within the household. It also investigates whether there are differential responses in men's and women's non-farm labor supply to important agricultural shocks and how bargaining power shapes women's responses to these shocks. The study uses a unique panel data drawn from the Ethiopian Rural Household Survey. It also attempts to link this data to information obtained from focus group discussions conducted in a sub-

23

sample of the survey villages that particularly helped in identifying factors that villagers perceive to be important for women's bargaining power.

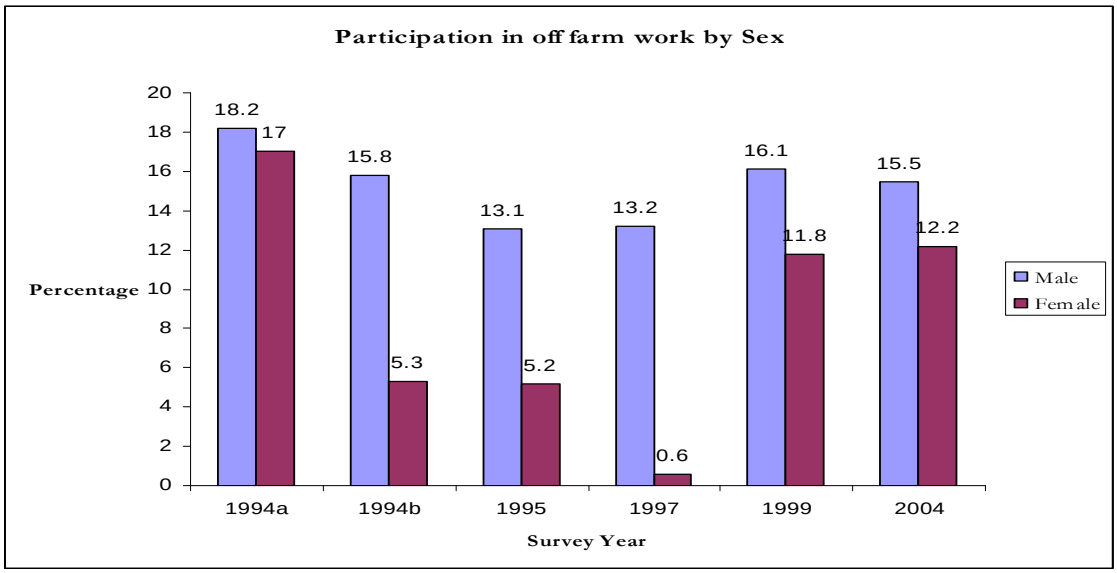
Given the wide interest that surrounds the impact of women's bargaining power on different outcomes, the study provides a number of interesting insights. We find evidence that women's labor supply to non-farm work is a result of a bargaining process within the household. More specifically, the findings of the study suggest that an increase in women's bargaining power reduces women's labor supply to off-farm self-employment while it increases their labor supply to off-farm wage work. This is quite a striking result since it suggests that not all income generating activities are necessarily desirable and that women use their bargaining position to adjust their labor supply to different types of work. This is quite consistent with what has been revealed in the focus group discussions where women frequently stated that most self-employment activities such as collection of firewood, preparation of local drinks, engaging in traditional hair making, pottery making are generally considered as undesirable but women engage in these activities to cope with economic problems. In contrast, the fact that a woman's bargaining power increases wage work that includes professional work, skilled work, food for work, and trading suggests that wage work is rather perceived as desirable.

We also observe a strong gender divide on the impact of negative agricultural shocks on women's and men's labor supply in the case of off-farm self-employment while at the same time we find that shocks do not particularly initiate both men's and women's labor supply to wage work. The evidence that households resort to off-farm self-employment rather than wage work can be put in a wider context of the literature that discusses the failure of labor markets to serve as income adjustment mechanisms in the presence of shocks. We provide evidence that households find it easier to resort to off-farm self-employment which are often done by women hence women's labor supply to off-farm self-employment serves as an adjustment mechanism. This finding can be further linked to the issue of women's time burdens in the face of economic hardships since they are predominantly responsible for most reproductive work and that the extra time spent on off-farm work plausibly comes from a reduction in their leisure time. This, in conjunction with, the evidence that suggests the deterioration in women's nutritional status as a result of shocks (Dercon and Krishnan, 2002) points to the multifaceted impacts shocks might have on women's physical as well as mental health in rural Ethiopia. It should also be emphasized that shocks that affect women's labor supply outside their homes conceivably increase the demand for children's labor in domestic work as they are the only alternative source of labor in the absence of women (Grootaert and Kanbur, 1995).

Our evidence also shows that most bargaining indicators are found important when interacted with the shock variables. This may suggest that power relations become particularly important during economic distresses. More specifically, bargaining power helps to reverse the impact that negative shocks have on women's off-farm self employment, i.e. women deemed to have higher bargaining power tend to participate less in off-farm self-employment during economic hardships. On the other hand, bargaining power rather reinforces the impact that shocks have on participation in wage work. This again underlines the argument made above that women perceive off-farm self-employment as undesirable but wage work as desirable and fulfilling.

Appendix

Figure A.1: Participation Rates in Off-farm Self-employment by Gender (%)



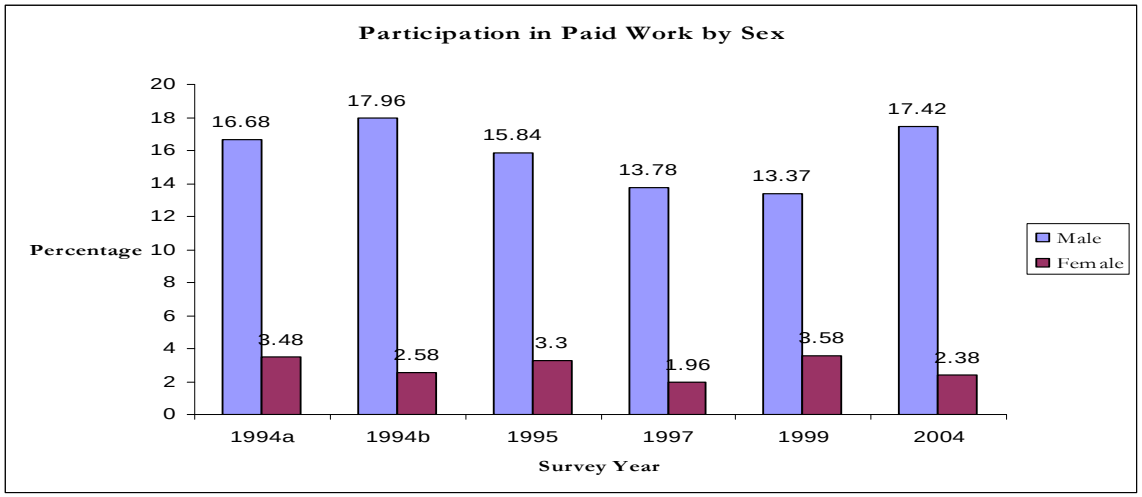
Source: Own calculation from ERHS (1994-2004)

Table A.1: Participation Rates in Different Types of Off-farm Self-employment Activities by Gender (%)

		1994a	1994b	1995	1997	1999	2004	Total
Weaving and Spinning	Men	2.02	2.03	1.37	1.02	0.98	1.69	1.52
	Women	3.02	0.46	0.46	0.00	1.08	0.3	0.93
Handicraft including Pottery	Men	1.92	1.20	1.56	2.14	0.33	2.11	1.54
	Women	3.12	2.12	1.65	0.00	1.08	1.78	1.63
Trading Grain	Men	3.85	7.18	4.85	3.72	4.57	4.78	4.84
	Women	3.67	2.85	2.48	0.28	1.63	5.05	2.53
Trading Livestock	Men	1.92	2.85	1.92	3.07	1.52	4.35	2.53
	Women	0.18	0.09	0.46	0.09	0.54	0.89	0.34
Collecting and Selling Firewood	Men	0.00	0.37	0.00	0.00	0.00	0.00	0.07
	Women	7.79	0.28	0.18	0.28	5.75	3.86	2.9
Transport by Pack animals	Men	0.55	0.64	0.46	1.21	0.11	0.28	0.57
	Women	0	0	0	0	0.11	0	0.02
Other off-farm work (milling, traditional healer, salt trade, etc)	Men	1.37	0.37	1.74	1.21	5.22	1.40	1.82
	Women	0.37	0.00	0.18	0.09	2.06	1.04	0.56

Source: Own calculation from ERHS (1994-2004)

Figure A.2: Participation Rates in Wage Work by Gender



Source: Own calculation from ERHS (1994-2004)

Table A.2: Participation in Different types Wage Work by Gender (%)

		1994a	1994b	1995	1997	1999	2004	Total
Hired in Farm work	Men	5.32	8.56	5.31	5.03	4.35	5.62	5.74
	Women	0.46	1.01	0.73	0.74	1.3	0.3	0.77
Professional work	Men	0.37	0.55	0.55	1.02	0.54	0.7	0.62
	Women	0	0.09	0	0	0.22	0	0.05
Skilled worker(builder)	Men	1.74	2.85	1.47	2.98	2.39	1.12	2.14
	Women	0.09	0.09	0	0.09	0.11	0	0.07
Unskilled worker	Men	7.37	6.74	9.71	18.63	20.24	6.07	10.01
	Women	4.17	1.69	4.35	3.7	2.22	2.33	2.99
Food for work	Men	5.87	5.89	6.41	0.84	5.54	15.87	6.21
	Women	2.29	1.2	2.39	0.37	2.93	4.16	2.07
Other wage work(trader, driver, mechanic, etc)	Men	1.92	1.29	1.19	0.93	2.39	2.39	1.62
	Women	0.37	0.55	0.18	0.74	0.11	0.45	0.4

Source: Own calculation from ERHS (1994-2004)

Table A.3: Participation Rates in Off-farm Self-employment and Wage Work by Household Poverty Status and Gender (%)

	Self-employment Off-farm Work				Wage Work			
	Men		Women		Men		Women	
Survey Round	Poor	Non Poor	Poor	Non Poor	Poor	Non Poor	Poor	Non Poor
1994a	15.72	20.6	18.94	15.1	18.94	14.56	5.68	1.42
1994b	17.73	13.99	5.78	5.01	21.51	14.85	3.78	1.55
1995	13.61	12.05	6.46	3.61	16.16	15.86	3.57	3.18
1997	11.95	13.83	0.29	0.69	12.83	14.38	2.33	1.80
1999	15.3	16.58	11.9	11.78	9.35	15.87	3.40	3.69
2004	18.64	13.39	14.76	10.45	15.41	18.71	0.37	3.73

Source: Own calculation from ERHS (1994-2004)

Table A.4. Descriptive Statistics of Key Variables

Variables		1994a	1994b	1995	1997	1999	2004
Age in years	Men	47.2	47.2	47.2	47.2	47.2	47.2
	Women	37.0	37.0	37.0	37.0	37.0	37.0
No schooling	Men	64.0	64.0	64.0	63.0	61.9	58.3
	Women	84.8	84.8	84.8	84.2	82.9	81.1
At least primary education	Men	24.2	24.1	24.0	24.8	24.9	27.6
	Women	9.9	9.9	10.0	10.2	11.7	12.9
Other education	Men	11.4	11.4	11.5	11.7	12.5	13.4
	Women	11.4	11.4	11.5	11.7	12.5	13.4
Poor		48.4	46.4	55.5	32.2	38.3	39.3
Household Size		7.0	7.0	6.0	6.0	7.0	6.0
Land(in Hectares)		1.4	1.4	1.5	1.5	1.3	1.0
Distance to the nearest town in Kilometers		11.9	11.9	11.9	11.9	11.9	11.9
Kiremit rains came on time		57.6	57.6	40.2	72.5	68.0	68.5
Enough rain at the beginning of the rainy season		60.8	60.8	40.0	69.1	66.3	69.9
Rain stopped on time		43.2	43.2	30.4	55.9	55.6	52.2
Rained near harvest time		38.3	38.3	14.1	20.6	14.8	31.4
Crop suffered from wind		33.1	33.1	8.6	12.5	10.5	19.7
Crop suffered from flooding		30.3	29.6	8.9	14.6	12.8	13.0
Crop suffered from plant disease		44.6	44.6	10.5	24.5	70.5	24.3
Crop suffered from insects		37.4	37.4	10.2	20.2	49.6	20.9
Crop suffered from weed		26.4	26.4	5.8	9.5	50.5	12.7
Unable to get oxen at the right time		43.8	43.8	19.1			29.8
Unable to get labor at the right time		21.5	21.5	8.2			14.8
Family members were ill		20.0	20.0	8.6			20.5
Wife's share in the total land brought to marriage		2.0	2.1	2.0	2.5	1.7	1.3
Wife's Share in the total livestock brought to marriage		15.7	15.7	15.7	15.5	15.4	15.3
Wife talked to spouse before marriage		38.3	38.2	38.2	39.7	38.7	40.4
Wife was kidnapped for the marriage		11.3	11.3	11.2	10.8	10.6	9.9
Husband and wife do have written marital contract		44.7	44.8	45.0	45.5	45.5	42.4
Wife and husband are from different ethnic groups		2.1	2.1	2.2	2.2	2.2	2.3
Wife and husband have different religion		11.4	11.5	11.7	12.0	10.5	9.3
Wife has brothers		73.8	73.9	73.7	80.3	73.3	73.7
Wife's parents are richer than husband's parents		25.3	25.4	25.2	25.2	25.1	26.4
Number of Observation(total)		2,182	2,172	2,182	2,148	1,842	1,582

Source: Own calculation from ERHS (1994-2004)

Table B.1: Estimation Results of the Impact of Bargaining Power Indicators on Married Women's Participation in Off-farm Self Employment and Wage work

Variables	Off-farm self employment		Wage work	
	Pooled	Random Effects	Pooled	Random Effects
Age in years	0.005**	0.005**	0.002	0.002
	(0.002)	(0.002)	(0.001)	(0.001)
Age squared	-0.000***	-0.000***	-0.000**	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
At least primary education	0.005	0.004	-0.016*	-0.015
	(0.016)	(0.016)	(0.009)	(0.010)
Other education	0.020	0.016	-0.011	-0.011
	(0.025)	(0.024)	(0.013)	(0.014)
Household size	-0.007***	-0.006***	-0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
Land in hectares	0.015***	0.014***	-0.008***	-0.006***
	(0.004)	(0.004)	(0.002)	(0.002)
Distance (Km)	-0.008***	-0.008***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Wife's share in the total land brought to marriage	-0.014	-0.011	0.051	0.056
	(0.026)	(0.026)	(0.044)	(0.045)
Wife's share out of the total livestock brought to marriage	-0.019	-0.019	0.033**	0.039***
	(0.013)	(0.013)	(0.014)	(0.014)
Wife talked to spouse before marriage	-0.032***	-0.033***	0.004	0.004
	(0.011)	(0.011)	(0.007)	(0.007)
Wife kidnapped for marriage	0.003	0.004	-0.014*	-0.012
	(0.015)	(0.015)	(0.008)	(0.009)
Couples have written marital contract	-0.020*	-0.020*	-0.004	-0.007
	(0.011)	(0.011)	(0.007)	(0.007)
Wife has brothers	0.011	0.012	0.011	0.013*
	(0.011)	(0.011)	(0.006)	(0.007)
Wife comes from a different ethnic group	0.001	0.001	-0.000	0.001
	(0.015)	(0.015)	(0.010)	(0.011)
Wife's religion different from husband's	0.015	0.016	0.019	0.015
	(0.029)	(0.029)	(0.018)	(0.018)
Wife's parents richer than husband's	0.008	0.008	0.009	0.011
	(0.012)	(0.012)	(0.008)	(0.008)
Constant	0.259***	0.257***	0.021	0.028
	(0.047)	(0.047)	(0.032)	(0.032)
Observations	4363	4363	4363	4363
R-squared	0.096		0.040	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; shocks, round and season dummies are controlled but not reported.

Table B.2: Estimation Results of Bargaining Power Variables on Married Women's Participation on Off-farm Self-Employment and Wage Work (Estimated Individually)

	Self Employed Off-farm work		Wage Work	
Variables	Pooled	Random Effects	Pooled	Random Effects
Wife's share out of the total land brought to marriage	-0.029	-0.117***	0.063	0.068
	(0.026)	(0.029)	(0.042)	(0.043)
Wife's share out of the total livestock brought to marriage	-0.015	-0.014	0.033**	0.038***
	(0.012)	(0.012)	(0.013)	(0.013)
Wife talked to spouse before marriage	-0.029***	-0.029***	0.004	0.004
	(0.010)	(0.010)	(0.007)	(0.007)
Wife kidnapped for marriage	0.007	0.008	-0.015*	-0.013
	(0.014)	(0.014)	(0.008)	(0.009)
Couples have written marital contract	-0.015	-0.015	-0.002	-0.005
	(0.010)	(0.010)	(0.007)	(0.007)
Wife has brothers	0.008	0.008	0.011*	0.013**
	(0.011)	(0.011)	(0.006)	(0.006)
Wife comes from a different ethnic group	-0.000	-0.000	-0.003	-0.004
	(0.015)	(0.015)	(0.008)	(0.009)
Wife's religion different from husband's	0.017	0.018	0.006	0.003
	(0.025)	(0.025)	(0.015)	(0.014)
Wife's parents richer than husband's	0.010	0.011	0.009	0.012
	(0.012)	(0.012)	(0.008)	(0.008)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; socioeconomic and shock variables, round and season dummies are controlled in each case.

Table B.3: Estimation Results of the Impact of Agricultural Shocks on Married Men's and Women's Participation in Off-farm Self Employment and wage work

	Off-farm self employment				Wage work			
	Married Men		Married Women		Married Men		Married Women	
Variables	Pooled	Fixed effects	Pooled	Fixed effects	Pooled	Fixed effects	Pooled	Fixed effects
Rain in the main rainy season came on time	-0.006	-0.011	-0.005	0.009	-0.015	-0.012	-0.004	-0.004
	(0.012)	(0.012)	(0.010)	(0.010)	(0.013)	(0.013)	(0.006)	(0.006)
Enough rain at the beginning of the rainy season	0.001	-0.008	0.003	-0.002	-0.008	0.000	0.003	0.009
	(0.013)	(0.011)	(0.009)	(0.010)	(0.013)	(0.013)	(0.006)	(0.007)
Rain stopped on time	0.013	0.016	-0.014*	-0.000	0.005	0.010	0.011**	0.008
	(0.012)	(0.010)	(0.008)	(0.009)	(0.011)	(0.012)	(0.005)	(0.006)
Rained near harvest time	0.007	0.008	0.016	0.020*	-0.008	-0.010	-0.001	0.001
	(0.013)	(0.012)	(0.010)	(0.011)	(0.012)	(0.013)	(0.006)	(0.006)
Crop suffered from wind/storm	-0.029**	0.005	0.046***	0.033**	0.034**	0.031**	0.002	0.003
	(0.014)	(0.014)	(0.012)	(0.013)	(0.015)	(0.015)	(0.006)	(0.007)
Crop suffered from flooding	-0.003	0.027**	-0.041***	-0.028***	-0.025*	-0.016	0.008	0.004
	(0.014)	(0.013)	(0.011)	(0.010)	(0.014)	(0.014)	(0.006)	(0.007)
Crop suffered from plant disease	0.033**	0.013	-0.009	-0.022**	0.041***	0.017	-0.002	-0.006
	(0.014)	(0.012)	(0.010)	(0.010)	(0.013)	(0.013)	(0.005)	(0.006)
Crop suffered from insects	-0.047***	0.001	-0.003	0.018*	-0.005	0.006	-0.019***	-0.013**
	(0.013)	(0.012)	(0.010)	(0.010)	(0.012)	(0.013)	(0.005)	(0.006)
Crop suffered from weed	-0.047***	-0.016	0.018	0.022*	0.007	0.002	0.014	0.002
	(0.014)	(0.013)	(0.012)	(0.013)	(0.015)	(0.016)	(0.009)	(0.009)
Constant	0.210***	0.185***	0.187***	0.178***	0.134***	0.152***	0.025***	0.028***
	(0.018)	(0.014)	(0.015)	(0.014)	(0.017)	(0.015)	(0.008)	(0.008)
Observations	5437	5437	5382	5382	5437	5437	5382	5382
R-squared	0.017	0.011	0.057	0.080	0.019	0.016	0.019	0.009

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; round and season dummies are controlled but not reported

Table B.4: Estimation Results of Interaction Effects between Bargaining Power Variables and Shocks on Married Women's Participation on Off-farm Self Employment

	Each interaction term Estimated Individually		All interaction terms estimated Together	
Variables	Pooled	Fixed Effects	Pooled	Fixed Effects
Wife's share in the total livestock brought to marriage × crop suffered from wind	-0.073***	-0.044*	-0.084***	-0.035
	(0.026)	(0.023)	(0.028)	(0.025)
Wife's share in the total livestock brought to marriage × crop suffered from insects	0.027	-0.042	0.019	-0.051*
	(0.029)	(0.029)	(0.029)	(0.029)
Wife's parents richer than husbands × rain near harvest time	-0.037	-0.066***	-0.025	-0.061***
	(0.024)	(0.023)	(0.024)	(0.023)
Having brother/s × crop suffered from plant disease	0.022	0.044*	0.024	0.039
	(0.022)	(0.026)	(0.022)	(0.026)
Wife talked to husband before marriage × rain came on time	-0.029	-0.039*	-0.035	-0.048**
	(0.020)	(0.021)	(0.022)	(0.022)
Wife kidnapped for marriage × enough rain at the beginning of the rainy season	-0.089**	-0.063*	-0.069*	-0.053
	(0.036)	(0.037)	(0.037)	(0.039)
Wife kidnapped for marriage × rain came on time	-0.016	(0.031)	0.106***	0.097**
	(0.030)	0.001	(0.037)	(0.038)
Wife comes from a different ethnic group × crop suffered from insects	-0.057*	-0.047	-0.078***	-0.085***
	(0.034)	(0.032)	(0.030)	(0.032)
Observations			4363	4770
R-squared			0.116	0.103

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; socioeconomic and shock variables, round and season dummies are controlled in each case.

Table B.5: Estimation Results of Interaction Effects between Bargaining power variables and Shocks on Married women's participation on Wage work

	Each interaction term Estimated Individually		All interaction terms estimated Together	
VARIABLES	Pooled	Fixed Effects	Pooled	Fixed Effects
Wife's share in the total land brought to marriage × enough rain at the beginning of the rainy season	0.011	0.158*	0.020	0.142
	(0.134)	(0.089)	(0.134)	(0.090)
Wife's share in the total land brought to marriage × crops suffered from flooding	-0.036	-0.144**	-0.032	-0.145**
	(0.070)	(0.065)	(0.072)	(0.058)
Wife's share in the total land brought to marriage × crop suffered from wind/storm	-0.147	-0.198***	-0.136	-0.171**
	(0.093)	(0.075)	(0.097)	(0.074)
Wife's share in the total land brought to marriage × crop suffered from weed	-0.070	-0.133	-0.166**	-0.184*
	(0.074)	(0.093)	(0.080)	(0.094)
Wife's share in the total livestock brought to marriage× crop suffered from insects	-0.029	0.030**	-0.024	0.030**
	(0.018)	(0.013)	(0.019)	(0.015)
Wife's share in the total livestock brought to marriage× crop suffered from weed	0.119***	0.064*	0.121***	0.080**
	(0.045)	(0.036)	(0.046)	(0.034)
Wife's share in the total livestock brought to marriage × crop suffered from wind/storm	-0.034	-0.043*	-0.027	-0.036
	(0.031)	(0.024)	(0.034)	(0.024)
Wife's religion different from husband's × enough rain at the beginning of the rainy season	0.069**	0.050*	0.062**	0.051*
	(0.027)	(0.030)	(0.031)	(0.031)
Wife's religion different from husband's× crop suffered from plant disease	-0.021	-0.033	-0.024	-0.044*
	(0.019)	(0.021)	(0.022)	(0.025)
	(0.027)	(0.030)	(0.031)	(0.031)
Wife talked to spouse before marriage × crop suffered from flooding	0.008	0.012	0.022	0.030*
	(0.011)	(0.011)	(0.016)	(0.016)
Wife comes from a different ethnic group× enough rain at the beginning of the rainy season	0.038***	0.046**	0.027**	0.047***

	(0.014)	(0.020)	(0.012)	(0.018)
Wife comes from a different ethnic group × crop suffered from flooding	0.002	0.037*	0.015	0.048**
	(0.018)	(0.020)	(0.018)	(0.021)
Wife comes from a different ethnic group × crop suffered from wind/storm	0.026	0.035**	0.015	0.019
	(0.017)	(0.016)	(0.018)	(0.016)
Couples have written marital contract × rain near harvest time	0.004	-0.023**	-0.005	-0.025**
	(0.012)	(0.011)	(0.013)	(0.012)
Wife has brothers × enough rain at the beginning of the rainy season	0.028**	0.032**	0.025*	0.023
	(0.013)	(0.015)	(0.014)	(0.016)
Wife has brothers × rain stopped on time	0.005	-0.023*	-0.000	-0.021*
	(0.012)	(0.012)	(0.012)	(0.013)
Wife has brothers × crop suffered from weed	0.036**	0.033**	0.040**	0.035**
	(0.016)	(0.015)	(0.016)	(0.016)
Wife has brothers × crop suffered from flooding	-0.003	-0.003	-0.004	-0.005**
	(0.002)	(0.002)	(0.003)	(0.002)
Wife kidnapped for marriage × rain stopped on time	-0.034***	-0.030**	-0.025*	-0.043***
	(0.012)	(0.012)	(0.015)	(0.012)
Observations			4363	4770
R-squared			0.074	0.050

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; socioeconomic and shock variables, round and season dummies are controlled in each case.

References:

Agarwal,B. (1997). "Bargaining" and Gender Relations: Within and Beyond the Household", *Feminist Economics* 3(1):1-51

Ayimut, K. M. and Mathew, A. M. (2007). 'Farmers' Knowledge of Crop Diseases and Control Strategies in the Regional State of Tigrai, Northern Ethiopia: Implications for Farmer–Researcher Collaboration in Disease management', *Agriculture and Human Values* 25(3):433-452.

Becker, G. (1973). 'A Theory of Marriage', *Journal of Political Economy* 81(4):813.

Becker, G. (1965). 'A Theory of the Allocation of Time', *Economic Journal* 75:493-517.

Beegle, K. (2005). 'Labour Effects of Adult Mortality in Tanzanian Households', *Economic Development and Cultural Change* 53:655–683.

Beegle, K., Frankenberg, E. and Thomas, D.(2000). 'Bargaining power within Couples and Use of Prenatal and Delivery Care in Indonesia', *Studies in Family Planning* 32(2):130-146.

Bevan, P. and Pankhurst, A. (1996). 'Ethiopian Village Studies', Mimeo, Centre for the Study of African Economies, University of Oxford.

Bittman, M., E., Sayer,P., L., Folbre, N., & Matheson, G. (2003). 'When does Gender Trump Money? Bargaining and Time in Household Work', *American Journal of Sociology* 109:186–214.

Blundell.R and MacCurdy, T. (1999) 'Labor Supply: A Review of Alternative Approaches" in Ashenfelter.O and Card. D. (eds), *Handbook of Labor Economics* (Amsterdam: North Holland).

Carter, M., and Katz,E.(1997. 'Separate Spheres and the Conjugal Contract,' in Lawrence Haddad, John Hoddinott, and Harold Alderman, eds. *Intra household Resource Allocation in Developing Countries: Models, Methods, and Policy*, pp. 95 – 111. Baltimore: Johns Hopkins University Press.

Dercon,S., Hoddinott, J. and Woldehanna, T. (2008). 'Shocks and Consumption in 15 Ethiopian Villages, 1999-2004', *Journal of African Economies* doi:10.1093/jae/eji022

Dercon, S. and Hoddinott, J. (2004) Health, shocks and Poverty Persistence, in S. Dercon (Ed.) *Insurance against Poverty* (Oxford: Oxford University Press), pp. 124–36.

Dercon, S. and Krishna, P. (2000). 'In Sickness and In Health: Risk Sharing within Households in Rural Ethiopia', *Journal of Political Economy108* (10).

Doss, C., McPeak, J. and Barrett, C.B. (2008). 'Interpersonal, Intertemporal and Spatial Variation in Risk Perceptions: Evidence from East Africa', *World Development* 36(8): 1453-68.

Doss, C. (1997). 'The Effects of Women's Bargaining Power on Household Health and Education Outcomes: Evidence from Ghana', Paper Presented at the Population Association of America Annual Meetings, March 27-29, Washington, D.C.

Doss, C.R. (1996). 'Intra household Resource Allocation in an Uncertain Environment', *American Journal of Agricultural Economics* 78:1335–1339.

Duflo, E., and Udry, C. (2004). 'Intra household Resource Allocation in Cote d'Ivoire: Social Norms, Separate Accounts and Consumption Choices', NBER working paper No.W10498.

Ellis, F. and Woldehanna, T. (2005). 'Ethiopia Participatory Poverty Assessment 2004-05', Forthcoming.

Fafchamps, M and Quisumbing, A. (2002). 'Control and Ownership of Assets within Rural Ethiopian Households', *Journal of Development Studies* (38): 47-82.

Fafchamps, M. (1999). 'Risk Sharing and Quasi Credit', *Journal of International Trade and Economic Development* (8)3: 257-78.

Fafchamps, M and Quisumbing, A. (1998). 'Human Capital Productivity and Labor Allocation in Rural Pakistan', *Journal of Human Resources* 34(2):369-406.

Frank, E. (1999). 'Gender, Agricultural Development and Food Security in Amhara, Ethiopia: The Contested Identity of Women Farmers in Ethiopia', Mimeo, USAID/Ethiopia.

Friedberg, L. and Webb, A. (2006). 'Determinants and Consequences of Bargaining Power in Households', NBER Working Paper No.12367.

Goldstein, M. (1999). 'Chop Time, No Friends: Examining Options for Individual Insurance in Southern Ghana', Manuscript, Department of Agricultural and Resource Economics, University of California, Berkeley.

Grossbard-Shechtman, A. (1984). 'A theory of Allocation of Time in Markets for Labour and Marriage', *Economic Journal* 94: 863-882.

Grossbard-Shechtman, S. A. and Shoshana, N. (1988). Women's Labor Supply and Marital Choice, *Journal of Political Economy*, 96: 1294-1302.

Grootaert, C. and Kanbur, R. (1995). ' Child Labor: An Economic Perspective', *International Labor Review* 134(2): 187-203.

Gupta, S., Ash, M. (2006). 'Whose Money, Whose Time? A Nonparametric Approach To Modeling Time Spent On Housework', University of Massachusetts, Department of Economics, Working Paper No. 06.

Hoddinott, J. (2006). 'Shocks and their Consequences Across and Within Households in Rural Zimbabwe', *Journal of Development Studies* (42) 2:301-321.

Kabeer, N. (2008). Paid Work, Women's Empowerment and Gender Justice: Critical Pathways of Social Change, Pathways Brief issue 3.

Kebede,B. (2000). 'Intra-household Distribution of Expenditures in Rural Ethiopia: A Demand Systems Approach', Mimeo, Centre for the Study of African Economies and St. Anthony's College, Oxford University.

Kebede, D. (2000). 'Weed Control Methods in Ethiopia', Ministry of Agriculture, Addis Ababa.

Kochar, A. (1999). 'Smoothing Consumption by Smoothing Income: Hours-of-Work Responses to Idiosyncratic Agricultural Shocks in Rural India', *Review of Economics and Statistics*, 81(1): 50-61.

Kochar,A. (1995). 'Explaining Household Vulnerability to Idiosyncratic Income Shocks', *The American Economic Review* (85)2:159-64.

Lundberg, S. (1988). 'Labour Supply of Husbands and Wives', *Review of Economics and Statistics* 70: 224-235.

McElroy, M. B., and Horney, M. J. (1981). 'Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand', *International Economic Review* 22:333–49.

Ministry of Finance and Economic Development of Ethiopia (MoFED). (2002). 'Ethiopia: Sustainable Development and Poverty Reduction Program', Addis Ababa, Ethiopia, MOFED, Development Planning and Research Department.

Quisumbing, A. and Yohannes, Y. (2005). 'How Fair is Workfare? Gender, Public Works and Employment in Rural Ethiopia', Policy Research Working Paper No. 3492, World Bank, Washington.

Quisumbing, A.R. and Maluccio, J. A. (1999). 'Intra household Allocation and Gender Relations: New Empirical Evidence', Policy Research Report on Gender and Development, Working Paper Series No. 2, World Bank Development Research Group/Poverty Reduction and Economic Management Network. Washington DC: World Bank.

Rosenzweig, M. and Stark, O. (1989). 'Consumption-Smoothing, Migration, and Marriage: Evidence from Rural India', *Journal of Political Economy* (97): 905-926.

Schultz, T.P. (1990). 'Testing the Neoclassical Model of Family Labour Supply and Fertility', *Journal of Human Resource* 25(4): 599-634.

Seebens, H. and Sauer, J. (2006). 'Bargaining Power and Efficiency: The Case of Rural Ethiopian Households', *forthcoming.*

Varian, H. (1992). *Microeconomic Analysis*, Third edition. Norton: New York.