Determinants and Efficiency of Sharecropping in Rice Production: the Case of Fogera District, Ethiopia

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Abstract

In this paper, the authors analyze the factors that affect choice of share tenancy and the differences in input and output intensities between owned and sharecropped land. The analysis is based on the responses of randomly selected 120 farm households in Fogera district of West Amhara Region. The authors considered 398 plots cultivated by the sample households whereby a multinomial logistic regression model was employed. The results show that the decision to share-in land is positively related to the relative size of adult family labor to land while it is negatively related to age of the household head, female headship of households and the perceived monetary value of a plot. On the other hand, the decision to share-out land is positively related to female headship and credit access but it is negatively related to oxen ownership, absence of disabled adult family labor and the perceived value of a plot. The results also have some implications on Marshallian arguments against sharecropping tenancy which states that sharecropping is inefficient as compared to fixed rent tenancy since it doesn't provide the highest incentive for the tenant to put maximum efforts in the production process while monitoring costs are usually high to be fully incurred by the landlord. In this regard, this analysis which compares sharecropping tenancy with other forms of cultivation arrangement with respect to three major inputs (labor, draft power, and seed) does not support the Marshallian argument.

1. Introduction

One of the central policy challenges facing economies like Ethiopia is the issue of land ownership. This importance emanates from the fact that economic growth, employment and basic survival of the majority of the population depend on the productive efficiency of the agricultural sector. Significant improvements in agricultural productivity are crucial to address the worsening conditions of poverty and food security in Sub-Saharan Africa (Omit et al., 2000). In Ethiopia, improvement in land productivity is vital to enhance and sustain the welfare of the largely agrarian population.

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Major issues of the existing land tenure system such as declining farm size, tenure security, and subsistence farming practices are linked to the causes of poor performance of the agricultural sector. In many studies the land tenure system is cited as the major holdup to the adoption of sustainable and long-term land improvement and management practices. As a result, the land tenure issue has remained one of the sources of disagreement and focus of debate among politicians, academicians and other concerned stakeholders in Ethiopia.

Much of the debate on land tenure in Ethiopia does not seem informed by sound theoretical foundations and empirical evidence; rather, they are largely guided by ideological outlooks that lack serious considerations for social and economic implications (Yigremew, 2001). Moreover, land tenure debates are fixated in the state versus private ownership dichotomy though these are the only two polar end points of several possible tenure arrangements (Berhanu et al, 2004).

Nowadays, three options are available for smallholders to access farm lands in Ethiopia: land distribution for which peasant associations are mandated, the other two being inheritance and informal land use arrangements (sharecropping and fixed rent). Accessing land through land distribution is less likely because land distribution is officially kept in abeyance by most regional governments including Amhara region at present for the reason that farmlands are getting fragmented as a result of continuous redistribution in the past. Moreover, available potential lands are dwindling through time to accommodate the growing number of rural youth. The allocation of the limited lands available is also conditional on proof of permanent physical residence, ability to farm continuously, and pay administrative dues and obligations which many may not fulfill (Tesfaye, 2004). Meanwhile, farmlands are getting fragmented as a result of informal distribution within family members. These situations have made informal land use arrangements quite popular in Amhara region in general and Fogera district in particular. Thus, we got interested in informal land use arrangements for this study.

For the sake of analytical advantage informal land use arrangements were classified into six categories namely: (1) pure owners (autarkies), (2) pure share-in croppers (pure tenants), (3) pure share-out croppers (pure landlords), (4) mixed owner/share-in croppers (owner-cum sharecroppers), (5) mixed owner/share-out croppers and (6) mixed owner/ share-in croppers/ share-out croppers. The core objective of the analysis was to know what factors determine farmers' choice of one form of land use arrangement over the other. The authors were also interested if they could find supporting evidence for the so-called Marshallian argument

against sharecropping which states that sharecropping is inefficient as compared to fixed rent tenancy since it doesn't provide the highest incentive for the tenant to put maximum efforts in the production process while monitoring costs are usually high to be fully incurred by the landlord (discussion follows elsewhere in this paper).

The paper is organized as follows. Section 2 provides the setting on the land rights systems in the study region, where as section 3 covers a brief review of the literature including Marshallian argument, the role of uncertainty, transfer rights in land and empirical evidence on the determinants of tenancy incidence. Section 4 presents the methods of the study including description of the study areas. Section 5 presents and discusses the results and Section 6 summarizes and concludes the paper.

2. Land Rights in Rural Areas of Amhara Region

The state is the owner of all land in Ethiopia. The land is granted with holding rights by the government to the population of the region. There are three types of land rights. The first is landholding right which is defined as "a right of any farmer, semi pastoralist, or any other body (=person) vested with the right on it to be the holder of a land, to create all assets on land, to transfer an asset he created, not to be displaced from his holding, to use his land for agriculture and natural resource development and other activities, to rent a land, to bequeath the same to transfer it as a gift and includes the likes" (ANRS, 2006). A landholder can transfer his use right to another person in three different ways; by inheritance, gift and rent. Holding rights also be transferred in land exchange, so called consolidation of plots. For example, two farmers can exchange land parcels of equal value to improve and simplify farming.

The second is the use right. There is no clear definition of use right in the legislation, but according to the woreda officers and Environmental Protection, Land Administration and Use Authority (EPLAUA) staff, a use right is the right to exploit land for a certain purpose stated in an agreement between the user and the holder. The purpose of the use right can be for individual needs, for example, cultivating and living. It can also be a use right, made out for an institution or an organization, for instance, schools and churches often have use rights to their land. Any person, both natural and legal person, vested with rural land use right can transfer as a gift or in rent to another person.

The third one is rent and lease. A land holder has the use right of his or her land, but a person can also get a use right of land by renting or leasing it from a

land holder. A lease or rent agreement can be made out for a maximum of 25 years. If the agreement is for more than three years it must be registered at the district desk office. A written agreement explains the location of the land, the duration of the agreement and the amount to be paid. It is possible to sub-contract the land if the land holder approves. The reason for including rent in the regional proclamation as one form of land use arrangements is to formalize informal land markets. However, only tacit recognition has been given by local and regional officials to sharecropping which is the dominant form of land use contracts in the region. Actually, not only sharecropping but also most of the fixed rent contracts are undertaken informally as very few formal agreements are documented at woreda level offices responsible for this purpose.

A system for registration of properties and land users has been developed and is in use in all districts in Amhara region. This land administration project started in 2002. When the plots have been registered the land holder receives a certificate called "book of possession". By mid 2005 five million landholders got their books of possession. The purpose of the book of possession is to strengthen tenure security and to give the farmers an incentive to protect their land and natural resources on it. It contains information about the land holder(s), fertility and use of land, the location of the parcels and borders defined by geodetic coordinates or bordering properties. While issuing the book of possession, the district keeps its own records with the same information in another book called the "book of registration".

When the land redistribution started, land was first grouped in three categories depending on the quality of the soil. The land was then handed out to the people with equal shares from every category of land. Because of the categorization of the land, the land parcels given to the people were spread over quite a big area. This has later on led to a big demand for consolidation of land parcels between the farmers to improve the property structures and make farming more efficient. The land redistribution process is the basis of the current land rights registration.

3. Literature Review

3.1. Theoretical Issues

The debate against sharecropping tenancy dates back to the times of Alfred Marshall in the late 19th century. Marshall and subsequent followers argue that sharecropping is inherently an inferior tenancy when compared to the fixed-rent tenancy as well as pure cultivator-owned system. The argument for the inefficiency

(or inferiority) of sharecropping relies on the assumption that the application of inputs by the tenant, such as labor, cannot be perfectly monitored and enforced by the landlord. If perfect monitoring were possible, the form of the tenancy contract would be irrelevant for our understanding of productive efficiency, because the efficient use of labor would be dictated by the landlord, irrespective of the particular choice of contract. It is based fundamentally on the appropriate provision of incentives. If the effort of the tenant cannot be monitored and controlled by the landlord, the tenant has an incentive to undersupply his effort as part of the output produced by him gets siphoned off to the landlord. Thus, Marshallian argument assumes a prohibitively high cost of monitoring the tenant's activities will lead to the productivity inefficiency of sharecropping (Shaban, 1987).

If a fixed rent system is reasonably superior to a sharecropping arrangement, not only from a social efficiency angle, but also from the point of view of the landlord's individual rationality, then what is the reason behind the enduring popularity of sharecropping in real world agricultural practice? This is a theoretical puzzle which can be answered only through empirical studies. However, there are some theoretical speculations in this regard. Several theoretical reasons are given among which uncertainty in agriculture is the dominant one (Ray, 1998; Newberry and Stiglitz, 1979). In this regard, sharecropping is generally considered as a risk sharing instrument between the landlord and the tenant. Considering agriculture in developing countries as full of uncertainty, scholars in this line of reasoning argue that despite its high output advantage to both the tenant and the landlord, fixed-rent tenancy is less preferable to the tenant. This is because under fixed-rent tenancy the tenant is the one who takes the full burden of risk associated with natural shocks that might adversely affect the level of production from the land under the contract while the landlord is free from this burden. The landlord can play on this preference by cutting the tenant's share a bit more, but not too much, so that the tenant still prefers the sharecropping contract. This situation makes sharecropping to be rationally acceptable for both parties. Thus, as Ray (1998:434) put it, "sharecropping emerges as a way to share, not just the output of the productive activity, but the risk associated to it as well".

The line of argument of the so-called monitoring approach (sometimes labeled as "the new school") forms the other theoretical reason for the existence of sharecropping tenancy. In contrast to the Marshallian arguments, proponents of the monitoring approach argue that sharecropping is as efficient as fixed-rent contract (Cheung, 1968; 1969; Newberry, 1974; Stiglitz, 1974). Their argument is based on the assumption that the landlord can monitor the tenant's activities

effectively and inexpensively. According to these scholars, landlords can stipulate the intensity of labor input per unit of land and devise effective monitoring mechanisms to extract the maximum benefit from their land. The theoretical discussions of this approach are extensively made in Newberry (1974, 1975, and 1977) and Stiglitz (1974).

3.2. Empirical Evidence

Theoretically many factors can be considered responsible for the incidence of tenancy. For example, depending on the tenant's age it is expected to see that the youngest tenants would be working for wages, those in the intermediate age for rent and the oldest for share (Chaudhuri and Maitra, 1997; Fujimoto, 1996). Moreover, the quality of land affects the choice of the contract. Chaudhuri and Maitra (1997) found that an increase in the age of the head of the cultivating household and the value of the plot under cultivation increases the probability that the land is under tenant cultivation (i.e., cultivated under a share or rental contract). Other important factors for the incidence of tenancy are the disability status and credit access of an adult member of the household. In this regard, they found that if an adult member is unable to work, then the probability of that family working as tenant goes down and if a farmer has better access to credit, the farmer would most likely be working for a rental contract. Similarly, Fujimoto (1996) found that the older the age of the landlord, the smaller the area of rented land, the closer the field to the landlord's house and the smaller the size of the tenant's farm, the more likely was a particular contract to take the form of share tenancy. Fujimoto's study also suggests that a tenancy contract was more likely to take the form of fixed rent when the landlord resided in a village different from that of the tenant.

Most existing empirical studies in Ethiopia on land tenure systems emphasize on land tenure security, farmers' willingness to pay for institutionalizing more secured land tenure arrangements and the effect of land reform under different regime of the country. However, there are notable studies on informal land markets (Bereket and Croppenstedt, 1995; Abebe, 2000; 2004; Dessalegn, 1984; and Deininger et al, 2006). These studies address different aspects of informal land use arrangements and try to test the importance of different factors vis-à-vis farmers' choice of one form of land use arrangement over the other.

Some studies reveal that the quality of owned land is better than rented land in terms of productivity level with the exception for poor households, half of whom could find no perceptible difference between them (Abebe, 2004; Tesfaye,

2004; Bereket and Croppenstedt, 1995). Abebe (2004) argues that since rented land has been on frequent sale, no crop rotation particularly with leguminous crops nor fallowing is practiced, land that is exposed to erosion or drainage problems is often leased out. The findings from a survey of villages in Southern Ethiopia (Tesfaye, 2004) also reveal that farmers who lease out land tend to share out eroded or poor quality land. These results are in conformity with those obtained by Shaban (1987) in eight Indian villages.

Some other studies disclose that informal land markets are indispensable mechanisms of accessing agricultural land for the majority of oxen-rich and/or newly established landless households (Abebe, 2000; 2004). Abebe (2000) argues that rental land markets play an entitlement redistributive role without necessarily registering any notable productive improvements. However, he could not try to investigate whether informal land markets do have an efficiency enhancing function. In his latter study, Abebe attempts to examine the factors that influence households' scope and pattern of participation in informal land markets and explores the likely impacts of agricultural growth, equity and rural livelihood in general (Abebe, 2004). However, he discussed informal land markets with the concept of agrarian differentiation in lump sum without separately analyzing the effect of different types of these markets such as sharecropping and fixed rent.

Bereket and Croppenstedt (1995) also conducted a similar study. They argue that sharecropping can bring the ratios of various inputs in line with efficient production. Their results generally suggest that sharecropping is used as a form of adjusting land size to factor endowments. However, one cannot be sure how important this adjustment is in disposing excess endowments from the results since ownership categories (share, non-share) are not clearly indicated. A contrasting result to Bereket and Croppenstedt's (1995) study is that of Deininger et al (2006), who found that the extent to which rental markets allow households to attain their desired operational holding size is extremely limited. The possible reasons underlying such behavior are factor market imperfections (no rental for oxen), lack of alternative employment opportunities, and tenure insecurity.

4. Methodology

4.1. Data Collection

The study mainly depends on primary data collected in November 2008 through a household survey. A two-stage stratified random sampling technique was used to select representative samples. While the primary sampling units are rice producing *kebeles* (smallest administrative unit of Ethiopia similar to a village)

in Fogera district, households are the ultimate sampling units of this study. First, three kebeles—namely: Shina, Avoana Kokit and Kuhar Michael—were selected purposively since rice is produced there. Thereafter, households in each of the selected kebeles were categorized into two strata based on the sex of household heads using member lists of the kebeles. Thirty households were selected from each kebele from the stratum of male-headed households whereas 10 households were selected from the female-headed category. This yielded a total sample size of 120 households. A structured questionnaire was developed and used to collect the data. In order to supplement the primary data, secondary data were collected from different offices such as Fogera district agriculture and rural development office.

4.2. Data Analysis

This study uses two types of econometric models. A multinomial logit model is used to analyze determinants of land contractual choice whereas a multiple linear regression (with OLS estimation technique) is used to examine whether input and output intensity differences exist between owned and sharecropped land.

Our multinomial logit model constitutes a dependent variable with three discrete values: own cultivation, share-in cropping, and share-out cropping. Here it is assumed that there is an underlying response variable, *Contract* * defined by the regression relation

$$Contract^* = \beta^* X + U \quad \text{.....(1)}$$

Where X denotes a vector of factors such as age, sex, farm size, ox-ownership, household size, access to credit, plot value, irrigation status and soil fertility of the plots under cultivation and U is the error term assumed to be distributed normally with zero mean and unit variance. However, in practice *Contract** is unobservable and what will be observed is the multinomial variable *Contract* such that

$$Contract = \begin{cases} 0, \text{ if } & Contract^* \leq 0 \\ 1, \text{ if } & 0 < Contract^* < \mu \\ 2, \text{ if } & Contract^* \geq \mu \end{cases} \quad \text{.....(2)}$$

Following Greene (2003), the log likelihood function is:

$$L(\beta,\mu)=\sum_{CONTRACT=0}\log\Phi(-\beta X)+\sum_{contract=1}\log\Phi(\beta X-\mu)+\sum_{contract=2}\log\{\Phi(\mu-\beta X)-\Phi(-\beta X)\}...(3)$$

Maximum likelihood estimates of the parameter of the model are obtained by maximizing this likelihood function. Both household and plot level characteristics were included as the explanatory variables in order to see the effect of household characteristics on contract choice while the variation in plot characteristics is controlled.

The comparison of a family's average inputs and outputs per unit area on owned and sharecropped land was first proposed by Bell (1977) in testing the implications of the monitoring and the Marshallian approaches for sharecropping. Such a test holds constant family-specific characteristics such as management, access to non-traded inputs, and prices of traded inputs and outputs. This method was later effectively demonstrated by Shaban (1987). This approach was adopted to compare the input intensities and productivities on owned and sharecropped land of the same household. The estimated model is:

$$Y_{ij}=\theta S_{ij}+\beta X_{ij}+D_t+U_{ij}.....(4)$$

Where, Y_{ij} denotes the value of either crop output or of variable inputs (human labor, a pair of oxen labor, or seed in kilogram) use per hectare by household i on plot j; S_{ij} is a dummy variable that equals 1 if the plot j of household i is owner cultivated and 0 if the plot is sharecropped; X_{ij} is a vector of exogenous plot characteristics such as irrigation and plot fertility status and the perceived value of the plot; D_{vt} is a vector of time-varying district dummy that captures season and community specific effects; and U_{ij} is the error term which represents unobserved plot and household variables and is assumed to be identically and independently distributed with mean zero and finite variance.

A test between the competing approaches to modeling sharecropping will be carried out based on the pure effect of tenancy, which is captured by the intercepts of ownership dummy (θ). The assumption of perfect monitoring of sharecroppers' activities is taken as the null hypothesis that predicts: $H_0:\theta = 0$. The Marshallian productive inefficiency of sharecropping would prevail if the mixed sharecroppers supply more inputs per hectare to their owned relative to sharecropped land: $H_A\theta > 0$

Table 1 shows definitions of the variables used in multinomial logit model and multiple regression models.

Table 1. Definitions of Variables

Variable	Definition
Age of household head	Age of household head
Age square	Square of age
Sex	A dummy variable which takes a value of 1 if the household head is female and 0 otherwise
Size of adult family labor	Number of household members between 15 and 60 years old
Number of oxen owned	Number of oxen owned
No disabled family members	A dummy variable which takes the value of 1 if a household doesn't constitute a disabled member and 0 otherwise
Access to credit	A dummy variable which takes on a value of 1 if the household has access to credit and 0 otherwise
Off-farm employment	A dummy variable which takes on a value of 1 if the household has access to off-farm employment and 0 otherwise
Plot value	Perceived value of plots in Birr
Irrigation	A dummy variable which takes a value of 1 if a plot is irrigated and 0 otherwise
Soil fertility status	A dummy variable which takes a value of 1 if a plot is perceived to be fertile and 0 otherwise
Draft power	Draft power (oxen days/ha)
Hired labor	A dummy variable which takes on a value of 1 if a household uses hired labor and 0 otherwise
Female labor	A dummy variable which takes on a value of 1 if a household uses female labor and 0 otherwise
Family labor input	Amount of family labor used in farm activities (mandays/ha)
Hired labor input	Amount of hired labor used in farm activities (mandays/ha)
Ownership dummy	A dummy variable which takes the value of 1 if a farm plot is shared-in and 0 if it is owned.

5. Results and Discussions

5. 1 Household characteristics

Table 2 shows that the average number of ox ownership of share-in croppers (2.2) is significantly higher than autarky (1.7), which in turn is higher than share-out croppers (0.7), implying that share-in cropper is significantly better than autarky, which in turn is better than share-out cropper.

Though there was significant difference in area owned between those sharing-in and sharing-out croppers and those of own cultivators (0.88, 0.59 and 0.72 hectares, respectively), land rental markets lead to a more concentration of operational land holdings towards share-in croppers (i.e., 0.88, 1.00 and 0.19 hectares, respectively). The average area of shared-out land per household was 0.54 hectares with 0.41 hectares for shared-in land. This shows that a relatively smaller number of households shared-out some portions of their own land to a relatively larger number of households which is twice their number. This, in turn, implies that land is redistributed from a few landlords who have large farm size to many tenants who own a smaller land.

According to the perception of local people the sample households in each kebele were classified into three distinct strata on the basis of wealth status such as rich, medium and poor. Out of those households who participated in informal land markets, the middle stratum takes the first rank, which accounts for about 55 per cent while the poor and the rich strata are second and third, which account for 30 per cent and 15 per cent, respectively.

The poor take the leading position in share-out cropping while the middle and the rich stratum is the first and the second in share-in cropping, respectively. This implies that the poor participated mainly on the supply side while the middle and the rich strata participated on the demand side of land rental markets as the former stratum faced shortage of other factor endowments than the latter two. Since the other factor markets (such as labor, ox and credit) are missing or incomplete in the study areas, farmers use land markets as a substitute for those missing or incomplete markets. In line with this Abebe (2000, 2004) suggest that the functions of rental land markets cannot be properly understood by confining analysis only on land markets without linking with other factors markets.

Overall, household level information for the whole sample, and separately for those sharing-in, sharing-out and pure owners provides the following important inferences. The first is that land markets are very important in the study areas, i.e., 65 per cent of households participate in rental markets. Of those participating in the land rental markets, about 67 per cent are sharing-in land which is twice that of sharing-out. The second inference is that female-headed households account for about 73 per cent among sharing-out, 24 per cent among those in autarky and 2 per cent among those sharing-in. The fact that more than 63 per cent of all female-headed households share-out land implies that one important function of land rental is to transfer land from resource poor female-headed households to resource rich male-headed households. On the other hand, participants on the

demand side of land rental markets are largely land constrained farmers who have relatively sufficient labor, oxen and cash, but those who are short of oxen, labor and cash, particularly female-headed shared out their land.

Table 2. Household Characteristics based on Land Tenure Status

Variables	Pure owner (1)	Share-in cropper (2=4+5)	Share-out cropper (3=6+7)	Mixed share-in cropper(4)	Pure Share-in-croppers(5)	Mixed Share-out-croppers(6)	Pure Share-out-croppers(7)
Age of head in years	44.86	40.42**	47.58	40.84	33.67	45.00	47.26
Female head dummy (%)	23.81	1.92***	73.08***	2.04	0.00	33.33	0.84
Head educational level in years	2.36	2.40	0.96**	2.39	2.67	0.50	1.16
Household size in no.	5.90	5.96	4.23***	5.98	5.67	5.50	3.79
No.of adult female	1.43	1.40	1.19*	1.43	1.00	1.50	1.11
No.of adult male	1.69	1.75	0.69***	1.76	1.67	1.00	0.63
No. of dependent (<15 & >60)	2.79	2.81	2.35	2.80	3.00	3.00	2.05
No. disabled adult dummy (%)	97.62	94.23	96.15	93.88	100.00	100.00	0.95
None or one ox owner dummy (%)	45.24	15.38***	80.77***	12.24	66.67	33.33	0.95
Two oxen owner dummy (%)	35.71	57.69**	15.38**	59.18	33.33	50.00	0.05
Three or more oxen owner dummy (%)	19.05	26.92	3.85**	28.57	0.00	16.67	0.00
No.of ox owned	1.71	2.17***	0.62***	2.22	1.33	1.67	0.32
Owned area in ha	0.88	0.59***	0.72**	0.62	0.00	1.04	0.61
Shared area in ha	0.00	0.41***	0.54***	0.41	0.50	0.33	0.61
Total cultivated area in ha	0.88	1.00*	0.19***	1.03	0.50	0.75	0.00
Credit access dummy (%)	26.19	28.85	42.31*	26.53	66.67	0.00	0.53
Amount of credit received in birr	661.90	425.38	411.54	380.00	1166.67	0.00	510.53
Off-farm employment opportunity dummy (%)	9.52	11.54	3.85	12.24	0.00	0.00	0.05
Amount of wage earned in birr	7.14	119.23*	103.85	126.53	0.00	0.00	142.11
Extension access dummy (%)	100.00	98.08	84.62***	97.96	100.00	100.00	0.84
Distribution over districts							
Shina (%)	26.19	30.77	50.00	28.57	66.67	50	47
Avoana (%)	57.14	26.92	7.69	28.57	0.00	33.33	0.00
Kuhar (%)	16.67	42.31	42.31	42.86	33.33	16.67	53
Wealth status							
Poor (%)	21.43	9.62	69.23	4.08	100.00	16.67	0.84
Medium %)	64.29	69.23	26.92	73.47	0.00	66.67	0.16
Rich (%)	14.29	21.15	3.85	22.45	0.00	16.67	0.00
Number of observations	42	52	26	49	3	6	19

Source: Own computation from survey data

Note: cultivated area is defined as the sum of area of owned and shared-in plots minus area of shared-out plots while number of cultivated plots is the sum of number of own plots and shared-in plots minus number of shared-out plots. The number in each cell represents the average values for the corresponding variable across land tenure status * Significant at 10 %, ** significant at 5 %, *** significant at 1 %

5.2 Plot Characteristics

Table 3 presents data on the type and amount of inputs and output produced and various attributes of 398 sample plots cultivated by the sample households in

the production year (2007/08). The first 3 columns are based on the whole sample whereas the last two columns represent the sub-sample of owner-cum-sharecroppers. Columns 3 and 6 show statistical significance of the difference in means between owned and sharecropped plots.

Table 3. Plot Characteristics and Input Use

	Total sample			Owner-cum-sharecroppers	
Variables	Own cultivated	Shared-in	Shared-out	Own Cultivated	Shared-in
Crop yield per ha	52.55	45.82***		52.64	47.06**
Plot area in ha	0.27	0.25**	0.28	0.27	0.25*
Irrigated dummy (%)	42.37	32.94*	3.92***	47.79	33.33**
High fertile dummy (%)	29.39	29.41	25.49	27.19	32.05
Plot value in birr/ha	5599.24	3950.59	3556.86***	5415.93	3997.44***
Seed per ha	173.24	149.68***		160.14	148.24**
Pair of oxen days per ha	19.13	16.84***		19.43	17.16**
Adult female family labor dummy (%)	87.40	91.76		92.11	91.03
Female family labor (MD)	256.17	305.05		262.68	302.69
Male family labor (MD)	1113.48	1055.69		1188.18	1095.40
Total family labor (MD)	1369.65	1360.74		1450.87	1398.09
Adult female hired labor dummy (%)	19.08	22.35		23.68	23.08
Female hired labor (MD)	26.31	41.21*		41.57	44.46
Adult male hired labor dummy (%)	58.02	45.88**		56.14	47.44
Male hired labor (MD)	261.59	192.16		197.33	201.76
Total adult hired labor dummy (%)	58.02	45.88**		56.14	47.44
Total hired labor (MD)	287.90	233.37		238.91	246.22
Total labor (MD)	1657.55	1594.11		1689.77	1644.31
Distribution over districts					
Shina (%)	32.06	41.18	49.02	32.74	37.18
Avoana (%)	45.80	23.53	5.88	34.51	25.64
Kuha (%)	22.14	35.29	45.10	32.74	37.18
Number of observations	262	85	51	113	78

Source: Own computation from survey data 2007/08

Significant levels reported for t-tests of the means between owned and shared-in plots for the total sample and sub-sample of owner-cum-sharecroppers. * significant at 10 %, ** significant at 5 %, *** significant at 1 %. MD represents man-days.

The results show that productivity (output per hectare) is on average significantly lower on shared plots than owned plots for the overall sample as well as for owner-cum-sharecroppers. This may be due to the fact that owned plots (as also revealed by other studies such as Abebe, 2004 and Tesfaye, 2004) are better in quality. Moreover, it may be because of lower intensities of some

important inputs (e.g. seed rate and draft power) in shared-in plots as compared to owned ones. However, the difference in productivity is not attributed to labor input (both family labor and hired labor) and soil fertility since the owned and sharecropped plots are not significantly different with respect to these variables.

The terms of contract for inputs and outputs in sharecropping are almost the same in each kebele. Land is provided by the landlord. The dominant sharing rules in other inputs, output and by-products are as follows. Outputs are shared equally by landlord and sharecropper in Shina and Kuhar while the landlord's share of output in Avoana is about 45 per cent. In Shina, the costs of inputs are shared by the landlord: for labor about 4 per cent, seed 3.4 per cent, bullock labor 1.7 per cent and equipment 1.7 per cent whereas the costs of all inputs are fully borne by the sharecropper in Avoana. In Kuhar, the landlord shares costs of inputs like labor which account for 2.4 per cent, seed 2.8 per cent, bullock 1.9 per cent whereas the cost of farm equipment is fully borne by sharecroppers. The by-products (straw) shared by the landlord account for about 45 per cent, 37 per cent, and 35 per cent in Kuhar, Shina and Avoana, respectively. By and large, outputs are shared equally between the landlord and the sharecropper in all of the sample kebeles. The landlord takes about 40 per cent of crop residue whereas his contribution in regard to inputs ranges from 0.375 per cent to 2.61 per cent which implies that input costs are almost entirely borne by the sharecropper. This situation seems to have a significant impact on the difference of intensities of inputs and output among share and own plots of land.

About 15 per cent of the households who participated in sharecropping said that neither they are friends nor have any other kinds of relationship with the person with whom they have contract agreements. Friendship and kinship account for about 18 per cent and 67 per cent, respectively. According to the responses, sharecropping partners are selected based on the following qualities: trustworthiness (54 per cent of the responses), hard work (18 per cent), willing to help each other (7 per cent), trustworthiness and hard work (4 per cent), and other reasons (17 per cent). An important observation here is that a large portion (15 per cent) of the contracts were with those people out of their kinship domain implying that the land rental markets are relatively competitive and hence if the tenant has a reputation for trustworthiness and is hardworking, s/he may acquire land through informal markets.

The contract duration in the study areas is on an average less than three seasons. Participants in land rental markets reported that the demand for rice land in Fogera woreda is increasing through time and hence, some tenants are willing to pay cash in lieu of the stipulated proportion of output they should share with the landlord. As a result of the high level of demand for land, landlords usually prefer to shorten the period of the contract in order to maximize their benefit. The majority (80 per cent) of the demand arises from the same village.

5.3. Econometric Results

5.3.1. What Determines the Decision to Share-in or Share-out

Table 4 presents the maximum likelihood results of the multinomial regression. A positive sign on the estimated coefficient indicates that the variable increases the probability that the plot is shared-in or shared-out whereas a negative sign indicates the variable increases the probability that the plot is kept under owner cultivation. Column 2 and 4 present the estimated coefficients. Among the explanatory variables included in the model, age of household head, number of adult household members, sex of the household head, and perceived value of the plot significantly influence farmers decision to share-in land whereas age of household head, age square, number of oxen owned, sex of the household head, access to credit, absence of disabled person in the household, and plot value significantly influence farmers decision to share-out their land.

Age of the household head is negatively significant at 10 per cent and 5 per cent level for the incidence of share-in and share-out cropping, respectively. On the demand side this implies that as age of household head increases, the probability of that family working as tenant goes down whereas on the supply side it implies that the probability that a plot being under owner cultivation increases instead of being shared-out, as age of the household head increases. Both cases imply that as age of the household head increases, the odds ratio of participation on land rental markets goes down.

Age square positively influences farmers decision to share-out their land but it doesn't influence their decision to share-in. The significance of age of the household head and its square with respect to the decision to share-out land indicates the existence of a 'U' shape relationship: i.e. first the probability that a household shares-out it land decreases up to a certain level of age and then it increases after that level of age.

The perceived value of a plot is negatively significant for share-in and share-out cropping in the expected way, showing that the perceived value of the plot definitely has an impact on the choice of the contract. This implies that the probability of a plot being under share tenancy decreases with an increase in the perceived value of the plot. The marginal analysis also shows that as the perceived value of the plot increases by 1 per cent the probability of that plot being under share-in (share-out) cropping decreases on average by 15 (2) per cent, respectively. Ghosh (1995) also predicts a sharp testable relationship between land quality and

contractual form. He argues that the best quality land will be cultivated by the owner, medium grade land will be sharecropped and the poorest quality land will be rented out on fixed rent basis. The empirical result of this study on this regard goes in favor of this argument.

Table 4. Multinomial Logistic Regression Results for Choice of Land Use Arrangements

CONTRACT = 0, if plot is under owner cultivation (used as a base in this analysis)
= 1, if plot is under share-in cropping
= 2, if plot is under share-out cropping

Variables	Shared in		Shared out	
	Coefficient	Marginal effect	Coefficient	Marginal effect
Age of HH head	-0.19896*	-0.0290946	-0.3547015**	-0.005425
Age square	0.0017634	0.0002565	0.0035582**	0.0000552
No. of adult HH members	0.0495893*	0.0077005	-0.0493215	-0.0010061
Number oxen owned	0.0309369	0.0056788	-0.2991966***	-0.0052238
Sex of HH head	-1.453708*	-0.1756585	2.538932***	0.127935
Access to credit	0.417187	0.0621358	0.9622968*	0.017917
Off-farm employment	0.1305082	0.0159064	0.8966674	0.0217278
No disabled members	-0.1003698	0.0114959	-2.39662**	-0.1320589
Plot value	-0.99069***	-0.1455796	-1.548981**	-0.0232937
Plot fertility	0.2280992	0.0356994	0.0099477	-0.0005985
If plot irrigated	-0.1576031	-0.0199151	-1.30014	-0.0193113
Constant	11.33308***		22.01364***	
Number of observations		398		
LR chi2		229.72		
Prob > chi2		0.0000		
df		22		
Pseudo R2		0.3324		

Source: Own computation from survey data 2007/08
***, **, and * show significance at 1%, 5%, and 10% levels, respectively; HH= Household

The number of adult household members relative to the size of own land (man-land ratio) is positively related to the dependent variable. This implies that those households with relatively abundant labor force have high tendency to cultivate others' lands through sharecropping arrangements. For the sake of comparison, we also regressed the dependent variable on absolute size of the household labor force by removing the man-land ratio from the list of explanatory variables (result not reported). However, the latter variable was not significant, implying that what matters for the incidence of sharecropping tenancy is that of the relative size of adult family labor to land but not its absolute size. This is a reasonable result given that land is getting scarce in the study areas while productivity is still low.

The number of draught animals relative to the size of own land (oxen-land ratio), negatively influence the decision of farmers to share-out their land ($P < 0.01$). This strongly suggests that if the relative size of ox ownership increases, odds of participation on share-out cropping will go down. However, this variable doesn't have a significant relationship with farmers' decision to share-in land.

The other important variable in our regression is sex of the household head. The results show that female-headed households are more likely to share-out their land and less likely to share-in others' land for cultivation. The possible reason is that the role of women in managing farm activities is quite limited in Ethiopia because of cultural reasons. Rather, their domestic role is more pronounced and those who are engaged in farm management usually focus on backyard vegetable production or other petty activities of production.

Those households which constitute adult disabled members have higher probability to share-out their land as compared to their counter parts. In other words, households which are free from physical disability are less likely to share-out their land. The probability that a plot being under owner cultivation instead of being shared out for those households who do not have any disabled adult family labor will be on average 13% larger than those households who have disabled member(s). Indeed, this is a reasonable relationship given that most agricultural activities in Ethiopia require physical strength.

The access of farm household to credit is another important factor in our regression. Contrary to expectations, it has a positive and significant relationship to farmers' decision to share-out land. The marginal analysis in Table 4 indicates that the probability that a household shares-out its land will increase by 2 per cent if it gains access to credit. Perhaps, this is due to the fact that as the majority of households participating on the supply side is the poor and female headship, they may share-out their land in exchange for access to credit so as to meet their families' consumption needs.

5.3.2. Does Sharecropping Tenancy Matter for Efficiency

In order to examine whether share-cropping tenancy determines the level of efficiency among the sample households, a log-linear multiple regression model was used. An ownership dummy variable was included to test for the difference between owned plots and sharecropped ones in terms of output per hectare, labor input per hectare, draft power input per hectare, and seed rate. In this case data from those households who cultivated simultaneously their own plots and shared-in plots (hereinafter termed as owner-cum-sharecroppers) was only considered. Thus, valid data cases are 191 (collected from 49 owner-cum-sharecroppers). The results are displayed in Tables 5 and 6.

Table 5. Determinants of Rice Yield Intensity per Hectare for Owner-cum-sharecroppers

Variables	Excluding input use	All variables
Ownership dummy	0.1086953	0.0790253
	(0.099)	(0.091)
Seed per ha (log)		0.5795998***
		(0.180)
Hired labor MD per ha (log)		-0.0364344
		(0.082)
Family labor MD per ha (log)		0.1957634***
		(0.041)
Pair of oxen days per ha (log)		-0.010732
		(0.175)
Female family labor dummy[a]		-0.0853434
		(0.182)
Hired labor dummy[a]		0.3179732
		(0.476)
Irrigated plot	0.3196197***	0.2995173***
	(0.111)	(0.103)
High fertile plot	-0.5583705***	-0.5562065***
	(0.118)	(0.112)
Plot value (log)	-0.00473	-0.111326
	(0.142)	(0.132)
Shina	3.693442***	0.2628244
	(1.114)	(1.298)
Avoana	3.767037***	0.5131879
	(1.261)	(1.407)
Kuhar	3.858686***	0.7000399
	(1.197)	(1.329)
F	983.16	634.59
R^2	0.974	0.9789
Adj R^2	0.973	0.9773
No. of observations	191	191
No. of households	49	49

[a] represents a dummy variable=1 when that variable occurred and otherwise 0. Figures in parenthesis represent the standard error.

* significant at 10 % level, ** significant at 5 %, *** significant at 1 %

Though the coefficient of the ownership dummy is positive, it is not statistically significant at any acceptable level which implies that owned plots and shared-in plots do not differ from each other in terms of rice yield (Table 5). Similarly, the two types of farm plots do not differ from each other in terms of all the three major inputs considered (Table 6). Altogether, the analysis doesn't provide any support to the Marshallian inefficiency argument against sharecropping. Rather the results tend to support the monitoring approach. The possible reasons are: (1) Monitoring of tenants is relatively easy as land rental is concentrated among close relatives or friends and nearly most of the landlords reside within the same villages as tenants; (2) the existence of cost sharing for non-contractible inputs by the landlord would lead the owner-cum-sharecropper to give equal attention to the sharecropped land as compared to his/her own land; (3) the high demand for farm land in the area might have also forced the tenants to increase their efforts on sharecropped lands to buy approval of the landlord for the next round.

Table 6. Determinants of Input Intensity per Hectare for Owner-cum-sharecroppers

Variables	Seed per ha (log)	Bullock pair days per ha (log)	Total labor per ha (log)
Ownership dummy	0.0548675	0.0414691	-0.145414
	(0.039)	(0.043)	(0.155)
Irrigated plot	-0.0155208	0.0726939	0.1283556
	(0.044)	(0.048)	(0.174)
High fertile plot	-0.0018624	-0.0987842*	-0.0199993
	(0.047)	(0.051)	(0.185)
Plot value (log)	0.0864196	0.0020091	0.1807098
	(0.056)	(0.061)	(0.223)
Shina	4.464846***	2.488049***	5.810494***
	(0.439)	(0.481)	(1.746)
Avoana	4.264563***	3.20312***	5.454455***
	(0.497)	(0.544)	(1.976)
Kuhar	4.035139***	2.760828***	5.69443***
	(0.472)	(0.516)	(1.875)
F	11087.69	3025.05	1424.66
R^2	0.9976	0.9914	0.9819
Adj R^2	0.9975	0.9911	0.9812
No. of observations	191	191	191
No. of households	49	49	49

* significant at 10 % level, ** significant at 5 %, *** significant at 1 %

6. Conclusion

In this paper we presented empirical evidence using a data set collected from three rice producing kebeles in Fogera district. We first analyzed the factors that affect incidence of share tenancy and then the difference in input and output intensities between owned and sharecropped land. The results indicate that the decision of the farmers to share-in, share-out, or opt for autarchy is determined by the following explanatory variables: relative size of adult family labor, relative number of ox ownership, female headship, age of household head, credit access, disability status of adult family members and the perceived value of the plot. Specifically, the decision to share-in land is positively influenced by the size of household labor relative to the size of own land but negatively influenced by sex of the household head and the perceived value of farm plots. Similarly, the decision to share-out land is positively influenced by sex of the household head, age of the household head above some threshold point, and access to credit whereas it is negatively affected by number of oxen owned relative to the size of own land, age of the household head up to some threshold point, perceived value of farm plots, absence of disabled adult in the household.

Results suggest that land rental markets are strongly interlocked with other important factor markets (such as oxen, human labor and credit), which are incomplete or missing particularly in the study areas and in Ethiopia in general, which suggest that farmers use land rental markets as a substitute for those incomplete factors' markets. Thus, farmers who face shortage of oxen relative to the size of own farm land and those who are constrained to get access to credit, share out land in exchange accordingly while those who possess sufficient adult family labor relative to land during the peak farm season would engage in share tenancy to ensure the timely availability of labor.

As an important part of this study, it was also investigated if operator owned plots differ from sharecropped ones in terms of rice yield and selected inputs (family labor, drought power, and seed). The results show that there is no significant difference between owned plots and sharecropped plots in regards to rice yield and the major inputs. Thus, the results do not provide support for the Marshallian argument against sharecropping; they are rather in favor of the monitoring approach which argues that sharecropping doesn't hamper the realization of technical efficiency in agricultural production.

Furthermore, the results suggest that sharecropping emerges not only to share risk as most of the markets for other important factors are missing but also

to enhance productivity by transferring land from less to more resource owners, from older to younger households and from relatively abundant land holders to landless households that enables them to fully utilize their labor. Even those households (pure landlords) who share-out their land are better off as the land that otherwise would not be cultivated is put into operation and benefit through output sharing. A caveat is in order at the end: only a narrow inference can be made from the results because of narrow geographical coverage of the study and small sample size.

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