ASSET Series C (2007) 2 (1): 1-15

ASSET
An International Journal

GENDER IMPACTS OF FARM HOUSEHOLD RESOURCE ALLOCATION ON AGRICULTURAL COMMERCIALIZATION IN OYO STATE, NIGERIA

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ABSTRACT

The study tried to quantify the impacts of gender resource allocation on agricultural commercialization in South-western Nigeria. The logit model was employed in the analysis. The data used came from a sample survey of the area of study. Empirical evidence shows that farm size male farm-time, female farm time, land ownership, household income and livestock ownership have positive significant impacts on the process of commercialization. Male off-farm time and female off-farm time have negative significant continuous variables were found to increase by rank. The percent change effects of these variables decrease with rank. The variables thus impact differently on the odds that the household commercializes or not. Based on the results obtained, farm expansion, farm income improvement, effective and operational land redistribution and mixed -farming promotion policies were recommended. Policies that will encourage increased and improved farm -time and decreased off-farm time were also highlighted.

Keywords: Gender resource allocation, traditional crops, agricultural commercialization, multi-crop economy, Oyo State, Nigeria.

INTRODUCTION

Agricultural supply response issue has taken on renewed urgency in sub-Saharan Africa. Policy makers seek ways of reducing external payment imbalances caused largely by secular declines in the per capita food production and the concomitant reductions in marketed food surpluses (Goetz, 1992). Agricultural commercialization has become an important policy instrument for agricultural and rural development in many developing countries (Immink et al., 1995). The integration of the traditional smallholder agriculture into the exchange economy is believed to be part of a successful development strategy (von Braun et al., 1990). Agricultural commercialization thus seems to hold the key to economic growth and development in these countries.

It is expected to stimulate increased crop production and growth into marketable surpluses, improve income earnings and employment opportunities, and enhance nutritional status, health care and household welfare in general. It is also expected to create changes in gender roles, imbalances within the household and a shift in the allocation of the resources available within the household. These changes will affect males and females differently in terms of costs and benefits generated and the efficient utilization of the household resources. This necessitates the need for the incorporation of gender perspectives

ISSN 1595—9694

into development programmes. As, gender related differences are expected to influence commercialization, activity diversification and income generation in the household.

The process of agricultural commercialization is similar to that of innovation/ farming practice adoption. The adoption of this process is expected to lead to changes in the economic behaviour and social relationships of the smallholders. It can, by extension, thus have significant socio-cultural and economic implications.

The controversy on the possible impacts of agricultural commercialization ranges on in the literature (Gladwin, 1991; von Braun and Kennedy, 1994; Lusigi, 2001). There are two aspects to this controversy: one, what are the gender impacts of this process on the farm households in terms of household level effects on dependence on market conditions, availability of food for the household, income generation, household activity diversification, food security, nutritional status of children, health-care, access to education and inputs/resources? The idea here is to allow agricultural commercialization to explain its impacts on household welfare. Two, what are the impacts of household resource allocation on agricultural commercialization by gender? The emphasis here is on the household's resources, their utilization, the household economy in terms of activity - sectors and how they explain the level of agricultural commercialization of the small- holder farming system. In this context, the households` short-run decision will be to allocate total crop produced between home consumption and marketable surplus. It is therefore, faced by a two stage decision problem. The first decision is on whether or not to market its output depending on the fixed costs of market participation/commercialization. The second is on how much of the output to sell, conditional on the commercialization of its production system. The focus of this study is on the second aspect. The aim is to examine how resource allocation within the household on gender basis impacts on commercialization decisions.

Rationale for the study

The farm household is assumed to start with a given stock of resources. These include land, labour (time), capital (assets and wealth/money), human capital (education, animal stock etc. Household resource allocation derives from members' comparative advantage in the production of market and home goods and services. Hence, understanding the underlying economic considerations influencing resource allocation to the different household activities especially agriculture and its impacts on agricultural commercialization is of policy relevance in Nigeria.

Such a study will help to identify the key determinants of commercialization of smallholder agriculture, the rate of commercialization, policy relevant variables that will provide structural basis for policy formulation, policy options for eliciting a larger marketable surplus from the households and encouragement of gender equity within the household.

Most studies on agricultural commercialization concentrated on single crop (Berry, 1993; Kormawa, 2003). In a multi-crop agricultural economy, like Nigeria, all the

major crops and the simultaneous nature of production and consumption need be examined. How these crops are allocated between home consumption and market sales is an, important economic issue (Renkow, 1990), It has important implications for aggregate market supply, food disappearance patterns and the attendant nutritional consequences for rural and urban dwellers. There is a dearth of such studies in Nigeria.

In order to meet the stated objectives of this study, the following research questions are pertinent, and they guide the execution of the study:

(i) What is a farm household and what are the resources available to the household (i.e. household resource endowment)?
(ii) Which of the known household models (Nash, 1950; Sen, 1990; Osmani, 1998) best approximates the peculiar situation and characteristics of the study area?
(iii) How are the households` resources allocated to the different activity sectors and in meeting the households' objectives/goals by gender?
(iv) What is the nature of agricultural production in the area of study in terms of the agricultural economy?
(v) How do we conceptualize and operationalize the concept of agricultural commercialization with respect to the smallholder households?
(vi) How do we develop an index of agricultural commercialization given the agricultural profile of the area?
(vii) Are the smallholders market oriented sufficiently to warrant an investigation or are they still strictly subsistence in production?
(viii) How do we measure the gender impacts of household resource allocation on agricultural commercialization as may be conceptualized in this study and in the area?
(ix) Which resources on gender basis can have significant impacts on the process of commercialization of these smallholders, in what direction and how can they be selected?
(x) What are the impacts of gender allocation of household resources on agricultural commercialization? and
(xi) What are the policy implications and possible policy recommendations that can emerge from this investigation based on the empirical findings?
(xii) What are the possible interventions for effective agricultural commercialization in the area of study

Research Objectives

The broad objective of this study is to examine the gender impacts of the allocation of household resources on agricultural commercialization in Oyo State, Nigeria. The specific objectives of the study are to:

- determine the rate and level of agri cultural commercialization of small holder farm households in the study area.
- identify gender related factors and their impacts on commercialization by small- holders in the area of study
- quantify the unit and percentage effects of relevant policy variables

on the process of commercialization.
- assess the elasticity of agricultural commercialization with respect to the policy relevant resources.

METHODOLOGY

The farm household is assumed to be an important economic unit within which many allocative decisions are made and it is endowed with a stock of resources. These resources are allocated to a range of activities of which farming is one. The aim is to maintain the households` subsistence consumption and possibly to generate a surplus.

It can be conceived as an entity which is a complex of the farm - firm, the labour household and the consumer household in which decision making is based on utility maximization. Production activity within the household unit, is characterized by a remarkable division of labour based on gender (Jacoby, 1992). Here, social structure characteristics have major impacts on economic decision -making and the use of resources. Hence, it is conceived as one social and economic unit.

The household's economy is conceptualized as having three activity - sectors of farm, market and home work to which home and market resources are allocated. It is thus a producing unit of both use and exchange values. Use value covers activities carried out within the households to meet consumption requirements. The exchange value involves the production of goods and services that yield monetary income for the household. The household is assumed to be either monogamous or polygamous in terms of it set-up and with extended family system. The gender variables are measured with reference to this characteristic.

Two household model types are prominent in the literature. The neoclassical/unitary model is represented as a single entity with a single preference ordering. Implicit in this model is the argument that the household behaviour is motivated primarily by a collective concern for economic efficiency (Becker, 1981). It however ignores economic inequalities and does not account for the subordination of women in patriarchal societies. Apart from income pooling, it tends to suggest that household allocation of resources depends on the pooled income of the household rather than who controls which portion of the income (Chiappori, 1992; McElroy, 1992; Haddad et al., 1994).

Recent evidences however, contradict the unitary model (Pitt et al., 1990; Thomas, 1992). The bargaining model which sees the relationship between household's men and women as being characterized by both cooperation and conflict is recommended for empirical analysis. This model is ideally suited to derive the implications of cooperative - conflict for intra-household behaviour of members by gender (Osmani, 1998). Thus, access to resources and their uses within the household is conceptualized as a function of the bargaining power of the members. This power for a woman depends on her age, school attainment, and other attributes related to resource allocation (Agarwal, 1997). On the basis of these considerations the latter model is adopted for this study.

Agricultural commercialization is conceptualized as the ratio of the average value of output(s) market sales to the average value of total output(s) (von Braun and Kennedy,

1994). It embodies the concept of market orientation of the small- holders. It is used to determine and subsequently to classify the households as being market oriented/ commercialized or not. The income and nutritional effects of shift from subsistence to commercialization are likely to be place and time specific. Structural and other factors may mediate the effects among the small-holders/farmers. Such factors include: access to high quality land, ecological conditions, off-farm employment opportunities, market access and agricultural and price policies (De Walt et al., 1990).

Several potential risk factors which include market price variability over time for crops and agricultural inputs, crop failures, weak and inefficient marketing institutions, lack of infrastructure, high input requirements and lack of timely information about market condition may lead to inefficient allocation of household resources (Immink et al., 1995).

Description of Area of Research

The study focuses on Oyo State, Nigeria. It is located between latitudes 2^o 38' and 4^o 35' East of the Greenwich meridian and longitudes 7^o 5' and 9^o 10' North of the equator. The vegetation is derived savannah in the north and forest savannah in the south. Agriculture in the study area is rain-fed. Mixed cropping is the common farming system in the state. The farm sizes range from 2.5 to 3 hectares. Land clearing takes place in January/February while land preparation is done late in February or early March. Planting starts in late February with yams, followed with maize and vegetables in March/April depending on when the first rain stabilize.

Agricultural operations in the area consist of a planting season (February - April) and two harvest season (June - August when early yams or maize and melon are harvested and October - December, the time for the main yam harvest. Cassava is harvested 12-18 months after planting. Some species are harvested after 9 months. Vegetables; such as Okra, Cochorus, Amaranthus are harvested throughout the year. Two agricultural slack periods exist. The first is between April and May and the second is from September to October when not much agricultural activities are carried out.

The major crops grown are maize, yam and cassava. The minor ones are cowpea, sorghum, melon, groundnut, cocoyam, sweet potato and vegetables (Pepper, Okra and Leafy vegetables). Crop combination/ enterprises show a minimum of 3 and a maximum of 6 crops on the average farm.

Most of the households keep livestock on small scale. These include poultry, goats, duck, sheep, rabbit, pigs and cattle . Cattle-rearing is limited to very few households. The stocks are managed on a free-range basis. Some of the farm households also have tree crops that earn them income. These include mango, oranges, oil palm, cocoa, guava, and cashew.

Marketing constraints have been known to constitute major bottlenecks to sustained agricultural production in the state. According to Anthonio (1986), inadequate marketing infrastructure, poor rural road network and the lack of institutional support are some of the limiting factors to in-

creased food production in the area of study. The argument here is that, if farm households are able to sell their produce at a reasonable price, they are likely to produce more for the market.

The market outlets available to the household are of three types: the immediate village market. This is usually a daily affair but very narrow in its scale of operation. The second type is the periodic market. For the periodic markets, a 5, 7 and 9 days cycle is common. The 4-day market operates in some places in the study area. It is known that both males and females are engaged in the marketing of crops. However, for those crops that required a high level of processing, women are known to be dominant in their markets.

Data Collection

The primary data for this study were derived from a sample survey of 252 farm households located in 42 villages in Oyo State of Nigeria. The data, essentially cross sectional, were collected through the use of structured and open-ended questionnaire.

A multistage sampling technique was employed in selecting the sample. The whole state was divided into 8 sampling units based on the administrative zones of the state government. These are the Eruwa (Ibarapa), Iseyin, Kishi, Saki, Okeho, Oyo, Ibadan and Ogbomoso zones. This constituted the first stage of sampling.

As second stage of sampling, five villages each were randomly selected from the list of all villages in each zone. In the case of Ibadan and Saki zone, 6 villages were randomly selected based on Ibadan's large population and the geographical spread of Saki zone.

Within the already identified villages, 6 farm households were randomly selected as third stage of sampling. Thus, a total of two hundred and fifty two (252) households were sampled. Out of this, 205 observations were found usable and used in the subsequent analysis. The distribution of the villages and the farm households is contained in Table 1.

Data Analysis

Logit regression analysis was used to examine the impacts of gender related resource use and allocation variables on agricultural commercialization in the area of study. The use of this model follows from the nature of the index used to categorize the households. The advantage in using this model is that it uses information on both the commercialized and non-commercialized households in its estimation technique.

The left-hand size of equation (8) is the ratio of the probability of commercialization to that of non-commercialization by the farm households. SPSS Version 10.0 or Limdep version 7.0 can be used to estimate the model.

Dependent Variable

This is a dummy variable (Y). It is assigned a value of 1 if the household commercializes and 0 if otherwise.

Table 1: Distribution of Villages and Households

Zones	Villages and number of respondents	sub-total	Cumulative
Ogbomosho	Iregba (5), Iresa Adu (5), Oko (5), Aroje	25	25
Oyo	Akinmorin (5), Ilora (5), Fiditi (5), Fasola	24	49
Ibadan	Ido (6), Alabata (6), Egbeda (6), Iyanna-	36	85
Saki	Irawo (4), Ago-Are (4), Aha (4), Tede (4)	24	109
Oke-Iho	Ijio (5), Iganna (5), Oke-Iho (5), Iware	24	133
Eruwa	Eruwa (5), Lanlate (5), Igbo-Ora (5), Ai-	25	158
Iseyin	Iseyin (5) Okuku (5), Odo Ogun (5),	25	183
Kishi	Igboho (5), Kishi (5), Ologundudu (5),	22	205

Source: Field Survey, 2002

Model Specification

The model postulates that the probability (P_i) that a farm household commercializes its crop production is a function of an index (Z_i). This index is also the inverse of the standard logistic cumulative function. Hence,

$$P_i\ (Y = 1) = F(Z_i) \quad (1)$$

and

$$Z_i = F^1(P_i) \quad (2)$$

The index, in addition to this property, also summarizes a set of the farm, market, socio-demographic, individuals and household characteristic X_i's related to gender resource and time allocation within the household.

$$Z_i = Fb_o + \beta_1 X_1 + b_2 X_2 + \ldots.. + \beta_n X_n \quad (3)$$

The probability of commercialization is given by

$$P_i(Y=1) = \frac{1}{1+e^{-zi}} \quad (4)$$

Non-commercialization probability is

$$Q_i\ (Y=0) = 1 - P_i\ (Y=1) \quad (5)$$

$$1 - P_i(Y = 1) = \frac{1}{1 + e^{-zi}} \quad (6)$$

and

$$\frac{P_i(Y = 1))}{[1 - P_i(Y = 1)]} = e^{zi} \quad (7)$$

$$\textit{Therefore } \log_e \left(\frac{P_i(Y = 1))}{[1 - P_i(Y = 1)]_i} \right) = Zi \quad (8)$$

Explanatory Variables

The variables hypothesized as impacting on agricultural commercialization in this study are; cost of hired labour (X_1),farm size in hectares (X_2), cost of purchased inputs (X_3), male farm-time in hours (X_4), female farm – time sum of hours for all female participants in farming (X_5), male education in years (X_6), female education measured as the highest level achieved by any woman in the household in years (X_7), land ownership (X_8) which is a dummy variable. If owned = 1, otherwise = 0, household income as (X_9), household size (X_{10}) measured as number of members, male off-farm time in hours (X_{11}), female off-farm time measured as sum in hours for all female participants (X_{12}) and livestock owned (X_{13}) which is a dummy, if owned = 1, otherwise = 0. The selection of these variables is guided by previous studies, economic theory and suggestions by Immink et al. (1995).

RESULTS

The analysis here is based on the index of agricultural commercialization used. This indicated that 155 households commercialized while 50 did not. The average total output of staple food crops produced by the households in monetary terms was estimated at N136,399.70 for the season. Out of this, home consumption was calculated to be N61,884.20. This implies that about 45% of average production was consumed at home. In estimating home consumption, quantity actually consumed, used as payment in kind, set aside as seeds, gifts and all other net disposals were subsummed under this heading. The remaining 55% of the total output were assumed to have been sold. The results is presented in Table 2 and thus the first objective of this study was met.

The Pearson chi-square (χ^2) is used to test for the goodness-of-fit of the model. The χ^2 calculated, which is the same thing as the likelihood ratio is 286.7924. This value is greater than the tabulated values at 1% and 5% levels of significance, which are of 135.807 and 124.342 respectively. The model is found to be statistically significant at these levels. Another test of goodness-of-fit is conducted by using the default value (P). A default value $P < 0.15$ indicates lack of good fit. The P-value of 0.6531therefore signifies that the model displays a good fit.

Table 2: Percentages of Crops Consumed at Home and Marketed by the Households

Crops	Home Consumed %	Marketed %
Yam	42.3	57.7
E/Maize	45.8	54.2
L/Maize	44.4	55.6
Cassava (Raw)	45.2	54.8
Cassava (Garri)	42.5	57.6
Sorghum	43.7	56.3
Millet	50.2	49.8
Cowpeas	47.6	51.4
Melon	49.6	50.4
Vegetables	42.4	57.6
Average	45.4	57.6

Source: Rahji, 2002

The results indicate that farm size (X_2), female farm time (X_5), and household income (X_9) have positive significant influence on agricultural commercialization. They are significant at 1% level. The variables, male farm time (X_4) land ownership (X_8), and livestock owned (X_{13}), are positive and significant at the 5% level. However, male off farm time (X_{11}) is negative and significant at 1% level while female off farm time (X_{12}) is also negative but significant at 5% level.

On the over all, eight of the variables considered significantly influence commercialization. It should be noted that a positive sign on a parameter indicates that higher values of the variable tend to increase the likelihood of commercialization by the household. Similarly, a negative sign of a coefficient implies that higher values of the variable would decrease the probability of staple crop commercialization by the household. The alternative hypothesis that, collectively the variables significantly explain agricultural commercialization was accepted at the 1% and 5% levels. Second objective was therefore attained.

Of all the variables used, farm size (X_2), male farm time (X_4), female farm time (X_5), land ownership (X_8), household income (X_9), male off farm time (X_{11}), female off farm time (X_{12}) and livestock owned (X_{15}) appear to be of policy relevance. The antilogarithms of their coefficients that denote the amount by which the odds are multiplied for each unit change in the explanatory variable were calculated (Morgan et al., 1988). Following Amin et al. (1994), the percentage change in the odds associated with each unit change in the variable is calculated by subtracting one from the multiplicative coefficient and multiplying by 100. The absolute values of the coefficients are used in this case. It is possible also to rank the coefficient in terms of their magnitudes to indicate that one coefficient has a greater effect on the

Table 3: Results of the Estimated Logit Model

Variables	Units	Est. Parameters	t-Values
Cost hired labour (X_1)	Naira	-0.1218	1.2203
		(0.1244)	
Farm size (X_2)	Ha	0.5177***	2.8508
		(0.1816)	
Purchased inputs (X_3)	Naira	-0.2831	1.0956
		(0.2584)	
Male farm time (X_4)	Hrs	0.5260**	2.3651
		(0.2224)	
Female farm time (X_5)	Hrs	0.7538***	4.2732
		(0.1764)	
Male Education (X_6)	Yrs	0.2852	1.5003
		(0.1901)	
Female Education (X_7)	Yrs	0.1263	1.2655
		(0.0998)	
Land ownership (X_8)	Dummy	0.4932**	1.9626
		(0.5213)	
Household income (X_9)	Naira	0.7824***	3.6357
		(0.2152)	
Household size (X_{10})	No	0.3304	1.4272
		(0.2315)	
Male off farm time (X_{11})	Hrs	-0.6410***	2.5784
		(0.2486)	
Female off farm time (X_{12})	Hrs	-0.6378**	2.4115
		(0.2644)	
Livestock owned (X_{13})	Dummy	0.3458**	2.0035
		(0.1726)	
Constant (K)		1.6833	

Source Rahji (1996, 1999, 2002, 2003)

*** Significant at 1% ,** Significant at 5% ,* Significant at 10%
Pearson Chi square χ^2= 286.7924
Likelihood ratio = 286.7924
Default value (P) = 0.6531
$\chi^2_{0.01,191}$ = 135.807
$\chi^2_{0.05,191}$ = 124.342
Commercialized = 155,
Non-commercialized = 50

probability of commercialization than those ranked below it. (Turvey, 1991; Knopf and Schoney,1993). The results are contained in Table 4.

Table 4: Rank of the Coefficients, Unit and Percentage Changed in the Variables

Variables	Coefficients	Ranks	Units change	Percentage change
Farm Size (X_2	0.5177	6th	3.2938	48
Male farm time (X_4	0.5260	5th	3.3574	47
Female farm size (X_5	0.7538	2nd	5.6728	25
H/ income (X_9	0.7824	1ST	6.0590	22
Male off farm time (X_{11}	0.6410	3rd	4.3752	36
Female off farm time (X_{12}	0.6376	4th	4.3411	36

Source: Calculated from the Results in Table 2.

The coefficient of female farm–time is larger than that of male-farm time. According to Aboyade (1990), the opportunity cost of males farming effort is high. The pull of market work on the male is then expected to lead to male-female, female – hired labour substitution on family farms. Shortages of male labour within the household and the high cost of hiring farm hand may force farm females to assume additional farming duties. There is therefore the problem of over-utilization of women and gradual feminization of agricultural production with agricultural commercialization. (Suda,1996) The situation may become more pronounced.

Table 4 shows that the unit change effect on odds of commercialization is decreasing from the highest coefficient to the lowest. Similarly, the percentage change effect is increasing with decrease in the magnitude of the coefficients. The marginal contributions of female variables to the probability of commercialization are greater than for the males. The magnitudes of these variables confirm this assertion.

These results tend to suggest that females contribute more than their male counterparts to the likelihood of the household being commercialized or not at the margin. However, the percentage changes are in favour of the males. The male variables have the higher percentages in this instance. In this way, the third and the fourth objectives are achieved. The finding is that the variables impacts with different effects on the odds of being commercially or not and hence on the level of commercialization by the household in the study area.

POLICY RECOMMENDATIONS

As regards farm size, it is significant and positively related to commercialization. The implication is that an increase in the farm size increases the probability of commercializing by the households. A farm expansion policy that will make agricultural land available to households will impact positively on commercialization in the area of study. Since they are small scale producers, such a policy will take care of the need for them to expand their scale of operation so as to derive the benefits of economies of scale.

There is the policy need to promote mixed

farming in the area of study and within available environmental constraints. Livestock ownership, especially small ruminants is positively related to household level of commercialization of crops. The animals are readily sold in times of needs and thus constitutes insurance against hunger and the nutritional status of the households. This encourages agricultural livestock commercialization. Both males and females engage in the trade.

The households positively and significantly relate male farm time and female farm time variables to the probability of agricultural commercialization. The coefficient of female time variable is larger than that of the male. According to Aboyade (1990), the opportunity cost of a male's farming effort is high. The pull of off-farm work on the male is expected to lead to male-female and male-hired labour substitution on family hands. This may force farm females to assume additional farming duties. There may therefore be the problem of over-utilization of women and a gradual feminization of agricultural production (Suda, 1996). This situation may become more pronounced with commercialization.

Land ownership though a dummy variable indicates a positive and significant impact on the level of agricultural commercialization. There is the need for agricultural land redistribution policy in the rural areas. The land use act (1978) as it exists has not affected the traditional system of land ownership in these areas. Some farmers still find it difficult to obtain land while some have excess. The National Agricultural Land development Authority (NALDA) established in 1992 to promote and support optimum utilization of the nation's rural land resources for accelerated production of food and fibre and to expand the productive capacity in agriculture has not achieved much. This is because rights to this basic resource are poorly secured. According to von Braun (1995) some of the worst apparent failure of agricultural commercialization cited in the literature, such as evictions of farmer-tenants can be traced mainly to poorly defined land rights rather than to the process of commercialization. Secure land rights will significantly improve the prospects for the process. These can also increase the probability that farm households can recoup the benefits from long-term investment thereby increasing their willingness to make such investment. They can also act as collateral for loans and increase lenders willingness to offer credit leading to easier financing of purchased inputs and land improvements (Hazell and Rosegrants, 1994) which are prerequisites to agricultural commercialization.

Household income is positive and highly significant. The importance of income and liquidity in economic decision -making cannot be over stressed. It is the major determinant of many things including the decision to commercialize or not. A decline in farm income may encourage farm household members to look for alternative off-farm sources of income that may have adverse effect on agricultural commercialization. The result of this study therefore calls for farm household income improvement policy if the desired level of agricultural commercialization is to be attained.

CONCLUSION

The study deals with the determination of the impacts of gender allocation of household resources on the commercialization of staple food crops in a labour-intensive multi-crop economy in Oyo State, Nigeria. It approaches the issue in terms of the farm households marketable surplus. The households were found to be market-oriented though the variables tried impact differently on the probability of commercialization. This result has policy implications on commercialization and the drive for larger marketable surplus from the households.

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