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Does Labour Migration Affect Land Renting Behaviour of Farm Households? Heckman Selection Approach

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ABSTRACT

Using primary data collected from 284 households in four districts of Assam and by applying the Heckman two step method, this study examines the impact of migration on the land renting behaviour of farm households. The findings of the study show that migrant households, due to a shortage of labour in the family, lease out their land to other farm households. It has also been observed that as the economic condition of farm families improves, the households start leasing out their farmland. This study also jointly examines the various determinants of migration of rural households.

Keywords: Migration, Heckman two step procedure, Land renting behaviour, Assam

JEL codes: C35, J61, O15, Q15, R23

I
INTRODUCTION

Large disparities in income and living standards between rural and urban areas are often cited as some major reasons for increased rural urban migration in recent times in developing countries. According to economists such as Fei and Ranis (1964) and Harris and Todaro (1970), migration is a process by which surplus labour from the traditional agricultural sector moves to other non-agricultural sectors to supply inexpensive labour. The New Economics of Labour Migration (NELM) theory views migration somewhat differently from the other theories. According to the NELM theory, migration, rather than being an individual decision, is a collective decision taken by all members of a family to maximise family welfare (Stark & Bloom, 1985). Even though people migrate in search of better livelihood opportunities, the effects of migration vary depending on the location. The impact of migration on agriculture can be either favourable or bad, depending on how each migrant household allocates its resources. While migration may lower agricultural productivity by resulting in labour shortage initially, this loss, however, can be countered if productivity can be boosted through an impact on the land rental market. If migrant households face shortages of labour on their farm, they may reallocate their land to neighbouring households or keep it uncultivated (Xu *et al.*, 2019). The impact of labour migration on land reallocation among households depends mainly on the internal division of labour in the family (De, et al 2013). If other members of the migrant household start increasing their working hours on the farm to compensate for the initial labour loss, then this will not affect the land rental market. There is a possibility that the migrant's family would hire labour for agricultural operations

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rather than participate in the rental market. If migrant households are unable to manage the labour shortages, they will enter the land rental market.

Quite a few studies have examined the impact of labour migration on land rental behaviour in rural China empirically (Ji *et al.*, 2018; Carter & Yao, 2002; Kung, 2002; Xu *et al.*, 2020). These studies have reported that labour migration has a significant negative impact on households renting in land and a positive effect on households renting out land in rural areas. Existing literature, however, has observed that the effect of temporary and permanent migration on land renting behaviour is not the same. Wen *et al.*, (2023) observed that the temporary migrant households are less likely to rent out their land vis-à-vis the permanent migrant households. Feng and Heerink (2008) studied the interdependence between labour migration and the land rental behaviour of migrant households in rural China. They found that both were simultaneously determined and there was a negative relationship between land leased-in and migration decision. Small and marginal farmers in India are found to be unable to earn their livelihood from their tiny plots of land, and they are often found to be leasing out their land and migrating to the cities (Sengupta, 2013). Studies have also observed that the number of household members of NSSO-SLLH (Surveys of Land and Livestock Holdings) engaged in off-farm activities is an important determinant of the land leasing decision of the households (Goswami & Bezbaruah, 2013). A higher number of participants of a family in off-farm activities often results in leasing out of farm land signifying lesser importance of farming in income generating process.

The land rental market in India has been observed to have extended over time as a result of numerous land reform initiatives in recent times. Tenant share of rural households in India increased from 8 percent in 2002–03 to 10.3 percent in 2012–13 at the national level. Roughly 6.7 percent of the entire operational holding area was leased in 2002–03; by 2012–13, that percentage had risen to 11.1 percent. In 2012-13, the share of leased in area in operational holding was the highest ever recorded in the last five rounds of NSSO.

Assam in north-eastern part of India is not normally a big migrant-sending state compared to states like Bihar, Uttar Pradesh, Kerala, etc. However, the situation has changed considerably in recent years. A large number of people in the state are reported to have migrated in recent years, with rural-urban migration being a significant aspect of the process. The growth rate of rural-urban migration in the state, relative to its rural population is found positive (i.e. 0.42%) between the 2001 and 2011 censuses. This reflects an upward trend in rural-urban migration in the state. A significant portion of such migration is inter-state migration wherein rural youths from the state are found to have migrated to different big cities in the country such as Delhi, Mumbai, Bengaluru, Chennai, etc. in search of their livelihood. Youths from Assam are found to have migrated due to various reasons, including natural calamities, such as flood, sand deposition, erosion, etc. on one hand and lack of regular and decent job opportunities in the state, on the other.

While Assam is predominantly an agrarian state, the average farm size in the state is very small as is the case with the country as a whole. As per the agricultural census 2010-11, the average farm size of Assam is 1.10 hectare as against 1.15 hectare for the country as a whole. Agricultural practice in Assam is dominated by the incidence of tenancy and almost half of the farmers are found to be tenants (either partially or fully). Recent statistics from the state show that about 80 percent of the lessors are from the three quintiles of households (NSSO-SLLS, 2012-13). The state has witnessed a declining agricultural workforce in last few decades. As per statistics, the share of the agricultural workforce to the total workforce declined from 67.32 percent in the 1991 census to 52.49 percent in the 2001 census and further to 49.45 percent in the 2011 census (Government of India 1991, 2001, 2011). This declining agricultural workforce may be attributed to the out-migration of rural labourers which may have an impact on the land renting behaviour of farm families.

Availability of workforce at home can be an important factor in deciding whether to lease-in or lease-out cultivable land. While the out-migration of rural youth is found to have a direct impact on the available workforce in the villages, not many studies are found to have examined the issue of the impact of migration on the land rental market in the case of states like Assam. Given this, the present study is taken up to examine the impact of migration on land renting behaviour in Assam.

The rest of the paper is organised as follows. While the second section outlines the methods used in the study, the third section of the paper presents and discusses the results. The fourth section sums up the discussion and concludes the paper.

II

MATERIALS AND METHODS

2.1 Data and sampling design

The study is entirely based on primary data as reliable and up-to-date secondary data on migration from the state are not available in the public domain. The primary data have been collected through a survey conducted in four districts of Assam with the help of a structured questionnaire. The four districts included in the study are- Morigaon, Barpeta, Bongaigaon, and Goalpara (see Figure 1 for the location of the districts). The selection of sample districts is based on a few considerations. These include district-wise share of cultivators in the total workforce, district-wise contribution of agriculture, and allied sectors in district Gross Domestic Product (GDDP) and district-wise percentages of migrant households. Migrant households, here, are defined as those households which have at least one migrant member in the last six months. Out of these three indicators, the first two are related to agriculture as the study examines the impact of migration on the land rental behaviour of migrant households. Based on the data on these indicators, ranks were assigned to all the districts of the state on each of these indicators. Finally, sample

districts were selected from those having a rank of 10 or less in all three indicators. These are the districts where agriculture is a dominant economic activity, but at the same time, large-scale migration is also taking place from these districts. The details of the selection of sample districts are provided in Appendix 1.

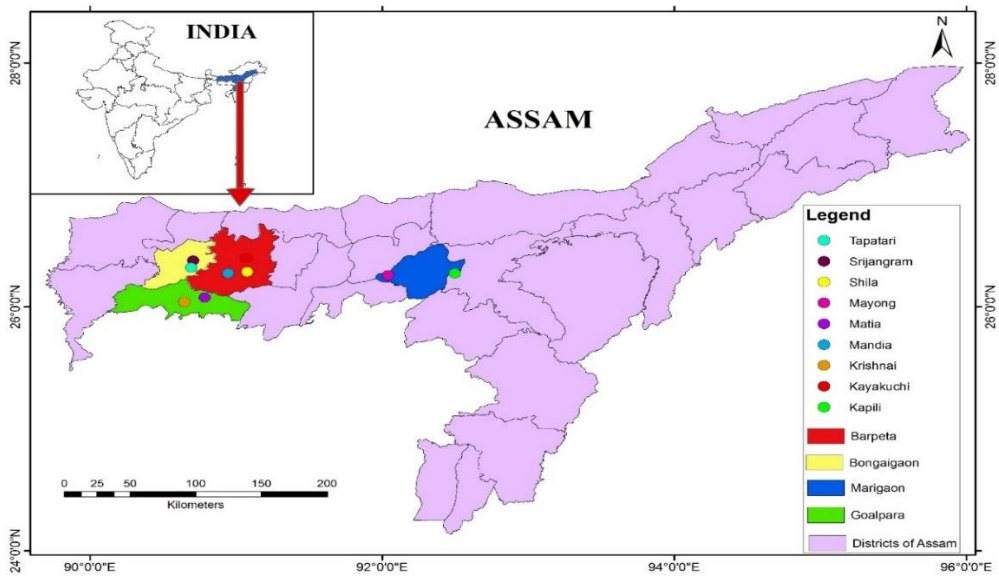

Figure 1: Map showing the sample districts and surveyed community development blocks

After the selection of the districts, the snowball sampling technique was used to identify the villages to be included in the sample. The villages were selected through key informants who have first-hand knowledge about the places from where a large majority of people have migrated to other places for work. As it is difficult to locate potential participants in the migration study, the snowball sampling technique has been used in the present study, as is done in many previous studies. The sample size for the study is 284 out of which 142 respondents are from migrant households whereas the rest 50% are non-migrants. Becasue there was no data to identify a migrant beforehand, and we had to rely on snowball sampling, this sample size can be considered adequate and generalisation of the findings can be made for the entire population.

2.2 Methodology

The study examines the impact of migration on the leasing decision of the household. The leasing decision is expressed here with the help of the extent of a tenancy. However, the absolute value of tenancy can't correctly specify the intensity of the tenancy arrangement (Goswami & Bezbaruah, 2013). For example, if a large land-holder rents in only a small amount of land compared to his land, he may be

regarded as a pure tenant from the view of absolute value criteria, although he is predominantly an owner operator. So, to obtain a standardised factor of the extent of the tenancy it is necessary to relate the extent of land leased in/out to its total land holding or the total size of the operational holding. However, there may be another issue. If the absolute amount of tenancy is divided by land owned, the value will become infinite for a pure tenant. Again, if the amount of tenancy is divided by operational holding, then the value becomes infinite for a pure lessor. To overcome this, we have used the standardised factor for tenancy following Goswami & Bezbaruah (2013). Thus,

$$\text{Extent of tenancy (Y)} = \frac{Operational\ holding - land\ owned}{Operational\ holding + land\ owned}$$

Here the value of Y ranges from -1 to +1. It takes the value -1 for pure lessor, or for pure owner, and +1 for pure tenants.

The dependent variable in the study is the leasing decision of farm households, which is bounded between -1 to +1. Application of the OLS method is not considered appropriate under such circumstances. Also, there is a possibility of the occurrence of selection bias in the model. Using regression analysis to evaluate the impact of a programme on an outcome variable can result in biased estimates if the selection problem for the project is not properly accounted for in the empirical framework. This is because that the estimated effect of the programme may be overstated or understated if participants differ from eligible non-participants in unobservable ways- such as having a greater or lesser ability to benefit from the programme (Zaman, 2001). In the present case, the selection of the sample is non-random. The households themselves decide whether or not to participate in migration due to different resource endowments, so they self-select to participate or not. To get unbiased results one needs to correct these sample selection biases at the time of estimation. One solution to this problem in econometrics is the application of the Heckman Two-step Procedure. It is considered an appropriate tool to test and control for selection biases (Wooldridge, 2002). Therefore, to evaluate the impact of migration on the land renting behaviour of farm households, the present study has made use of the Heckman Two Step Procedure. Again, as migration and land rental decisions may have the reverse causality issue, the issue of endogeneity needs to be looked into.

In the case of Heckman Two-Stage model (1976), the outcome variable (i.e. the extent of tenancy) is observed for both the migrant and non-migrant households. In the present study, the Heckman Two Step procedure involves two equations. The first equation (selection equation) attempts to estimate the probability of take the migration decision with the help of the probit model. This equation is used to construct a selectivity term known as the Inverse Mills Ratio, which is used as the independent variable in the second equation. The second equation estimates the

extent of tenancy after controlling for Inverse Mills Ratio which reflects the degree of sample selection bias.

The first step of the model can be expressed with the help of equation (1) which is usually a probit model.

$$M_i = \alpha_0 + \alpha_1 X_i + \mu_i \quad (1)$$

Where

M_i = dummy variable which takes value 1 for a migrant household and zero otherwise.

X_i = vector of control variables which includes household level characteristics and farm specific variables. Household level characteristics include household head's age, education of the household head, ratio of active age population, etc. and the farm level characteristics include variables such as the share of irrigated land, number of livestock units possessed, own crop land area, etc.

α_0 = constant term and α_1 is the coefficient to be estimated in the model.

ε_i = error term of the model.

In the first stage of the Heckman Two Step Procedure, the selection equation is estimated with the help of the probit model. Although both probit and logit models can be used in such situations, the two models assume different functional forms. For example, the logit model is based on the assumption of log normality whereas the probit model is based on the assumption of normality. Since the Heckman estimation relies on the assumption of bivariate normality, the probit model is used in the first stage.

The identification criterion requires at least one variable which can influence the participation decision of migration but not the extent of the tenancy. The variable, migration network, has a direct influence on migration decisions but does not have a direct influence on the extent of the tenancy variable. Therefore, an additional covariate, 'migration network', is incorporated in equation (1) to minimise the problem of unobserved heterogeneity.

The substantive equation can be specified as:

$$Y_i^* = \beta_0 + \beta_1 M_i + \beta_2 X_i + \varepsilon_i \quad (2)$$

Where Y_i^* represent the latent variable which is used to indicate land renting behaviour.

β_1 measures the effect of migration on land renting behaviour. If the value of the coefficient of migration is negative ($\beta_1<0$), this implies that the household rents out its land. If the coefficient of migration is positive ($\beta_1>0$) then the household is considered to rent in land from other households.

Here, the disturbances term μ_i and ε_i follow a bivariate normal distribution with a zero mean, variance σ_u and σ_ε respectively.

The Inverse Mills ratio (denoted by λ) is generated to correct the self-selection bias and added as an additional explanatory variable. The formulation process of inverse mills ratio is given as

$$\lambda = \frac{\phi(-\alpha_1 iX)}{1-\varphi(\alpha_1 X)}$$

where ϕ and φ are the normal probability density function and cumulative density function respectively of the standard normal distribution. α_1 is the estimated coefficient of the selection equation. Adding Inverse mills ratio (IMR) to equation (2), we can express the substantive equation as-

$$Y_i^* = \beta_0 + \beta_1 M_i + \beta_2 X_i + \beta_3 IMR + \varepsilon_i \quad (3)$$

Here β_3 is the estimate of the inverse mills ratio. The statistically significant value of the inverse mills ratio implies the presence of selection bias. Adding the inverse mills ratio as an explanatory variable in the model implies that the result will be unbiased. Here identification is provided by inclusion of a variable in the selection model that is not found in the outcome equation. In our study, we have included 'migration network' as the identifying variable. A migration network is defined as a network of households with a migrant who can provide information on job opportunities, wages, amenities, etc. in the places of destination. A positive information network with a previous migrant has a pulling effect on labourers through the provisioning of information on various aspects of employment opportunities, amenities, etc. This variable is treated as a dummy variable based on whether a household is able to access information about the places of destination or otherwise. One can access this information from their friends, relatives, etc.

One major issue in this model is the issue of endogeneity which is expected to arise due to the problem of reverse causality. Here the problem of reverse causality is expected between the variables, migration and land renting decision. This problem is checked with the help of a regression-based endogeneity test as given by Hausman. The test is a two-stage procedure in which in the first stage, one of the dependent variables, migration is regressed to all the independent variables (known as the reduced form equation), and the predicted residual value is obtained from this. In the second stage, this predicted residual is included in the equation for the extent of tenancy as an explanatory variable along with other determinants. The variable, migration status is also included in the equation as an explanatory variable. The significant error variable indicates that migration is an endogenous variable while an insignificant coefficient of the variable implies that it is exogenous. In our study, we could not find the presence of endogeneity issue as the variable, migration residual has come out insignificant (see Appendix 2).

2.3 Description of the Variables:

Description of different variables included in the model is provided in Table 1.

TABLE 1. DESCRIPTION OF VARIABLES AND THEIR ANTICIPATED RELATIONSHIP

Variables	Description of Variables	Anticipated Relationship
Dependent Variable		
Leasing Decision	Extent of land leasing	
Independent variables		
Migration	Those households which have at least one migrant member in the last six months	-
Age_hhd	Age of the household head in years	-
Age^2_hhd	Square of the age of the household head	-
Highest_edu	Highest education qualification of the members in the household. It is expressed as the number of years spent in school.	+/-
Active_people	Ratio of people aged between 15-64 to total number of members in the household.	-
Own Crop land	Amount of crop land owned by the household in hectare	-
Livestock	It is a standardised unit for livestock possessed. It is expressed as LSU=1.5 (number of buffalo) + 1 (number of cow/bull) + 0.6 (number of pig) + 0.4 (number of sheep/goat) + 0.2 (number of poultry).	+
Irrigated land	Share of irrigated land to gross cropped area	-
Plot_distance	Distance of the cultivated plot from the household	-
Extension_Service	Dummy variable takes value 1 for those household who are able to access extension services and zero otherwise	+
Machinery	Expressed as a dummy variable which takes value 1 for households who are able to access and use farm machinery and zero otherwise	+
Flood	Represents flood proneness of the village. Represented by a dummy variable which takes value 1 for flood affected villages and zero otherwise.	-
MPCE	Monthly Per capita consumption expenditure of the household (in rupees)	-
Migration Network	Dummy variable which takes value 1 for those households who already have information about the migrant's destination and zero otherwise.	+

2.4 Descriptive Statistics

Descriptive statistics of the continuous variables with mean differences across migrant and non-migrant groups included in the model are provided in Table 2.

TABLE 2. DESCRIPTIVE STATISTICS OF EXPLANATORY VARIABLES (CONTINUOUS) ACROSS MIGRANT AND NON-MIGRANT GROUPS IN LAND RENTING BEHAVIOUR MODEL (MEAN)

Variables	Non-migrant (142)	Migrant (142)	Total (284)	t-test (two-tailed)
Age	50.56 (0.91)	52 (1.15)	51.27(0.73)	-1.44**
Age^2_hhd	2872.58(113.71)	2689.47(90.20)	2781.03(72.65)	-1.26
Highest_ education	10.69(0.31)	7.40(0.27)	9.05(0.23)	8.009***
Active_people	0.72(0.01)	0.76(0.02)	0.74(0.01)	-1.901**
Own Crop land	0.58(0.03)	0.83(0.04)	0.71(0.03)	4.71***
Livestock	3.35(0.30)	4.20(0.24)	3.78(0.19)	2.27**
Irrigated land	0.35(0.09)	0.35(0.04)	0.35(0.03)	-0.06
Plot distance	1.70(0.07)	1.83(0.08)	1.77(0.05)	1.18
MPCE	2182.41(94.69)	1307.70(66.67)	1748.13(63.50)	7.54***

Source: Authors' estimation based on field survey data
Significant * at 10%, ** at 5% and *** at 1% probability level
Figures in the parentheses represent standard errors.

It is evident that among the continuous explanatory variables, age of the household head, Highest Education of the Household member, Ratio of the people of active age group, livestock unit, own crop land area, and Monthly Per Capita Consumption Expenditure are found to be statistically different between the two categories of respondents. While the variables, Highest Education of the Household member, own crop land, and Monthly Per Capita Consumption Expenditure are found significantly different between the two groups at 1 percent probability level, the other variables are found significantly different at 5% level of significance. The highest education of the non-migrant households is found to be 10.69 years whereas it is 7.40 years for migrant households. The variables, land size and livestock units represent the wealth status of the households. The Monthly per capita consumption expenditure and livestock unit are higher for non-migrant households than the migrant

households. This indicates that migration is higher in the case of households with lower economic status than those with higher economic status. Again, the mean ratio of the active age group members of the households of migrant workers is higher than those of non-migrant households, implying that migrant households have more labour.

The basic statistics of the categorical variables included in the model are presented in Table 3.

TABLE 3. DIRTRIBUTION OF SAMPLE HOUSEHOLDS BY EXPLANATORY VARIABLES (CATEGORICAL)

Variables	Character	Migrant	Non-migrant	Total	Pearson chi^2 value
Extension services	Yes	16	7	23	2.68
	No	126	135	261	
Machinery	Yes	78	122	200	32.94***
	No	64	20	84	
Flood Proneness	Yes	76	57	151	5.07**
	No	66	85	133	
Migration network	Yes	122	06	128	191.32***
	No	20	136	156	

Source: Authors' estimation based on field survey data
Significant * at 10%, ** at 5% and *** at 1% probability level

It is clear from the table that for the variables, flood proneness, access to agricultural machinery, and migration network, there is a statistically significant difference between the two categories of respondents.

III
RESULTS AND DISCUSSION

Table 4 represents the estimated results of the impact of migration on land renting behaviour of migrant households with the help of Heckman Two Step procedure. The inverse mills ratio is found positive and statistically significant at 1 percent level which indicates that the two-stage treatment effect model is appropriate to remove the problem of treatment bias.

The first column of the table presents the estimated coefficients from the selection equation [equation (1)] for migration while the average marginal effects are reported in the second column. The selection equation, here, has been estimated with the help of a probit model rather than a linear regression model, and as such the average marginal effects are estimated separately.

TABLE 4. IMPACT OF MIGRATION ON LAND RENTING BEHAVIOUR OF MIGRANT HOUSEHOLDS

Variables	Selection Equation		Outcome Equation
	Parameters Estimates (Migration)	Average Marginal Effects	Parameter Estimates (Extent of Tenancy)
Migration			-0.287 (0.069)***
Age_hhd	0.234(0.069)***	0.093	0.004 (0.011)
Age^2_hhd	-5.239 (1.563)***	-2.081	-.058 (0.241)
Highest_edu	-0.134 (0.047)***	-0.053	-.003 (0.007)
Active People	2.483 (0.849)***	0.986	-.031 (0.111)
Own Cropland	.078 (0.059)	0.031	-.080 (0.007) ***
Livestock	-0.127 (0.053)**	-0.051	0.001 (0.007)
Irrigated Area	0.100 (0.530)	0.034	-0.107 (0.069)
Plot Distance	-.291 (0.249)	-0.116	-0.068 (0.032)**
Extension Services	-1.68 (0.865)**	-0.505	-0.087 (0.100)
Machinery	-.960 (0.356)***	-0.381	0.059 (0.029)**
Flood	0.633 (0.362)*	0.247	0.059 (0.046)
MPCE	-0.893 (0.272)***	0.355	-0.086 (0.045)**
Network	3.056 (0.399)***	0.861	0.170 (0.057)
Inverse Mills Ratio			1.666 (1.408)***
Constant	34.534 (8.819)***		14.37***
N	284		

Source: Authors' estimation from the data collected through field survey
Note: ***P<0.01; **P<0.05; *P<0.10.
Figures in the parentheses represent robust standard error.

It is evident from the table that variables, namely, age of the household head, square of the age of the household head, highest education of the household, ratio of economically active age group members, livestock index, availability of extension services, flood proneness, access to machinery, monthly per capita consumption expenditure and migration network have come out as statistically significant determinants of migration decision. For the positive and significant coefficient of the variable, the age of the household head, with an increase in the mean age of the household head by one year, the probability of migration of the family members goes

up by 9.3 percent. The age of the household head can be considered as the experience of the household head. The square term of the variable, age of the household head reflects the life cycle effect of age of the household head on migration. Here it is found that this variable is negatively significant which implies that even when members of families headed by elderly people have greater incentives to migrate, these incentives start declining as people get older.

The effect of the ratio of the people of active age groups in the household is positively significant. As the mean of the ratio of active age group increases by one point, the probability of migration of family members increases by 98.6 percent. This implies that a family with a higher ratio of active age group people might be in a better position to release some of its members from agriculture to get absorbed in meaningful work outside agriculture. This is in line with the results reported by available literature (Rozelle *et al.*,1999; Mendola, 2008; Throat *et al.*, 2011; Li *et al.*, 2013; Shi, 2018; Islam & Guha, 2021).

The positive and significant coefficient of the variable, migration network, indicates that a positive information network with a previous migrant has a pulling effect on labourers through the provisioning of information on various aspects of employment opportunities, amenities, etc. in the place of migration. If the household has positive migration network, the probability of migration of family members increases by 86.1 percent.

The probability of migration is found higher among flood affected households because migration is considered as a coping strategy for natural calamities. For those households with proneness to flood, migration is a way out to minimise the loss of agricultural production and find out an alternative source of living. The highest educational qualification of a household member has a significant negative impact on the migration decision of the household. The variables, access to agricultural machinery, and presence of extension services are found to have negative relationship with migration decision. Again, livestock assets and Monthly Per Capita Expenditure of the household also represent the economic status of farm households. Negatively significant values of both variables indicate that relatively well-off farm households do not normally decide to migrate.

In the second stage of this model, the outcome equation is estimated by using the estimated migration equation. The estimated coefficients of the outcome equation are presented in column 3 of Table 4. It is found from the table that the coefficient of the variable, migration is negative and statistically significant at 1 percent level. This implies that with migrant members in the family, farm households start leasing out their agricultural land to other farm households. The probability of migrant households to rent out their land is found to be higher than the non-migrant households by 28.7 percent. This result is consistent with the results of the studies by Kung & Lee (2001), Shi *et al.*, (2007) and Che (2016). Out-migration of a member in

a farm family leads to reallocation of workload among the left behind family members. Migration can lead to labour shortage of farm households in the short run. Faced with labour constraints, migrant households start leasing out their agricultural land in a bid to optimise farm production.

Amongst the control variables, the amount of own crop land, distance to the plot from the household, and monthly per capita consumption expenditure are found to be negative and significant while the variable, access to farm machinery is found positively significant.

The negatively significant coefficient of the variable, the amount of owned crop land, implies that the probability of renting out is higher among the large land owners compared to the small land holders. One hectare increase in the amount of own crop land increases the probability of renting out among the farmers by 8 percent. Physical distance to the plot of land from the household is also an important determinant of the extent of tenancy. In this study, the coefficient of the variable, the distance of the plot from the household, is found to be negative and statistically significant. Thus, the probability of renting out cropland is higher among those households whose plots of land are far from their houses which seems to be obvious. The partial probability is found to be – (0.068) which implies that when the distance of farmers' plots from their house increases by one kilometre, the likelihood to rent out their land will increase by 6.8 percent. The monthly per capita consumption expenditure of a household indicates its economic condition. As the economic condition improves, the farm households start leasing out their farm land because with improved economic condition, dependence on cultivation gets reduced.

On the other hand, the probability of renting in is higher among those households who are able to access the farm machinery at the time of cultivation from their own sources or by renting in it. The probability to lease in land is 5.9 percent higher among those households who are able to access agricultural machinery compared to those households who are not able to manage it.

IV

CONCLUSION

The present study has been carried out to examine the impact of migration on land renting behaviour taking the case of Assam in north-east India. With the help of primary data collected from selected farm households in four districts of Assam and by applying the Heckman two step method, the study has found that migrant households are more likely to rent out their land to other farm households compared to non-migrant families. This phenomenon has a direct link with the availability of the working population at home. The tendency of renting out farm land is found higher among relatively large land owners and rich farmers. Probably, with the

improved economic condition of the households, dependence on cultivation gets reduced.

This study also jointly examines the determinants of migration. Variables such as the age of the household head, square of the age of the household head, highest education of the household, ratio of economically active age group members, livestock index, availability of extension services, flood proneness, access to machinery, monthly per capita consumption expenditure and migration network have come out as statistically significant determinants of migration decision. It is clear from the results that for the state of Assam, flood has remained a significant determinant of out migration of people of farm households. The positive and significant coefficient of the variable, migration network indicates that a positive information network with a previous migrant has a pulling effect on the labourer through the provisioning of information on various aspects of employment opportunities, amenities, etc. in the place of migration.

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APPENDIX I

DISTRICT WISE PERCENTAGE OF MIGRANT HOUSEHOLDS, CONTRIBUTION OF THE INCOME OF AGRICULTURE AND ALLIED SECTOR TO DISTRICT GROSS DOMESTIC PRODUCT (2019-20) AND SHARE OF CULTIVATORS IN TOTAL WORKFORCE (2011 CENSUS)

District	Percentage of migrant household 2007-08 NSSO data	Rank	Contribution of the income of agriculture and allied sector on district gross domestic product (2019-2020)	Rank	Share of cultivators out of total workforce (2011 census)	Rank
Dhemaji	4.49	20	0.36	1	0.73	1
Karbi Anglong	8.94	14	0.32	2	0.63	2
Morigaon	12.90	10	0.25	6	0.52	3
Lakhimpur	5.24	18	0.30	3	0.52	3
Dimahasao	4.55	19	0.21	10	0.52	3
Kokrajhar	12.31	11	0.23	8	0.51	4
Baksa	-	-	0.30	3	0.45	5
Darrang	4.34	21	0.25	6	0.43	6
Barpeta	13.44	9	0.28	4	0.42	7
Goalpara	16.51	8	0.24	7	0.41	8
Golaghat	39.68	2	0.20	11	0.40	9
Nagaon	9.69	13	0.19	12	0.39	10
Dhuburi	22.87	6	0.26	5	0.36	11
Kamrup	8.24	16	0.06	16	0.20	19
Bongaigaon	13.44	9	0.26	5	0.40	9
Sonitpur	3.88	22	0.21	10	0.35	12
Hailakandi	6.23	17	0.24	7	0.34	13
Jorhat	24.12	5	0.14	14	0.29	14
Karimganj	8.76	15	0.17	13	0.27	15
Nalbari	17.98	7	0.22	9	0.26	16
Tinsukia	40.35	1	0.08	15	0.25	17
Dibrugarh	35.10	3	0.08	15	0.22	18
Sivsagar	31.44	4	0.08	15	0.22	18
Cachar	10.63	12	0.17	13	0.22	18

Source: 64th round, NSSO, Assam Economic Survey 2019-2020 and Census of India 2011.

APPENDIX II

ENDOGENEITY TEST OF MIGRATION

Variables	Estimated Coefficient
Migration	-0.120 (0.082)
Age_hhd	0.001 (0.012)
Age^2_hhd	-0.023 (0.268)
Highest_edu	-0.009 (0.007)
Active_people	-0.036 (0.123)
Owned_cropland	-0.081 (0.007)***
Livestock	0.003 (0.007)
Irrigated_land	-0.093 (0.069)
Plot_distance	-.072 (0.033)**
Extension service	-0.114 (0.107)
Machinery	0.051 (0.038)
Flood	0.0589 (0.049)
MPCE	-0.068 (0.049)
Migration residual	-0.019 (0.024)
Constant	1.232 (1.597)
Number of Observations	284
R-square	0.41

Source: Authors' estimation from the data collected through field survey.
Note: ***P<0.01; **P<0.05; *P<0.10.
Figures in the parentheses represent robust standard errors.