GOLDEN RESEARCH THOUGHTS

DO FLOODS AFFECT THE LIVELIHOOD STRATEGY CHOICES OF HOUSEHOLD HEADS? – EVIDENCE FROM A SEVERELY FLOOD AFFECTED DISTRICT IN ASSAM, INDIA

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ABSTRACT
Literatures show that natural disasters affect the livelihood strategy choices of people in various ways. Among natural disasters, flood is claimed to be the most frequently occurring disaster on earth which affects millions of lives every year. The present paper is an attempt to examine the choice of 'farming' as principal economic activity by the heads of flood affected households. The study is based on a sample of 296 households: 151 flood prone households, 45 flood free households and 100 permanently displaced/migrated households – drawn from 13 villages and 2 inhabited forest areas belonging to two development blocks of Dhemaji district of Assam, India. The survey was conducted during July-August, 2016. Binary LOGIT estimation shows that floods have significantly negative impact on the choice of 'farming' by household heads.

KEYWORDS: Dhemaji District, Farming, Livelihood Strategy, Flood Affected Households.

1.1 INTRODUCTION
Assam, one of the north-eastern states of India, has long been suffering from flood disasters, which paralyze the normal life in many of its districts almost every year. The Dhemaji district, which is the area of the present study, is bordered with the Indian state of Arunachal Pradesh, and lies on the north bank of the Brahmaputra River. In terms of socio-economic development indicators, it is among the poor performing districts of the state. The Dhemaji district ranks poorly in terms of Human Development Index (HDI), occupying the 21st position in the state when placed in descending order. While HDI value for the state as a whole is 0.557, the district value is lower at 0.507. Similarly, Inequality Adjus - ted Human Development Index (IAHDI) value of the district is 0.370 as against the state figure of 0.391. In terms of Employment and Livelihood Index (ELI) too, the district ranks poorly at 25th with ELI value of 0.09 as against the overall state

value of 0.34 (HDR, 2014).[1]

Geographically, the district is in the upper Brahmaputra valley and the eastern Himalayan Zone, and it is one of the severely flood-affected districts of Assam. Besides the two big rivers - the Brahmaputra and the Subansiri - the district is run through by many tributary rivers. The district has also many low lying flood plains and wetlands, which add to the longevity and frequency of flood, thus affecting the life and livelihoods of people in the district. According to Assam Flood Hazard Atlas (2011), 46.50% of the total land areas of the district are flood hazard area. Frequent floods have severe consequences on the life and livelihoods of people. In particular, floods have devastating effects on the lives of the farming households of the district. This forces many people to abandon farming activities and results in labour mobility from farming to non-farming.

The present study attempts to examine if floods affect the choice of 'farming' as principal activity of the household heads. The term 'farming' is used to mean crop cultivation and/or animal husbandry including livestock and poultry. The term 'flood affected households' is used to mean flood-prone households and/or flood-induced permanently displaced/migrated households.

1.2 OBJECTIVE & HYPOTHESIS

The principal objective of this paper is to examine if floods have significant impact on the household heads' choice of farming as principal economic activity. Besides, it tries to find the other possible determinants of such choices.

Based on the above objective, the hypothesis that this study tries to test is that 'floods do not have any significant impact on household heads' choice of farming as their principal economic activity'.

1.3 DATA SOURCE & ANALYTICAL TOOL

The study is based on a sample of households drawn from 13 villages: 10 'flood-prone' and 3 'flood-free' villages. These sample villages belong to two development blocks of Dhemaji district – Murkong Selek Tribal Development Block and Sissiborgaon Development Block. The flood prone villages are drawn from the flood prone Gaon Panchayats (GPs) as identified in the District Disaster Management Plan (DDMP) of Dhemaji. On the other hand, the three flood free villages belong to three different Gaon Panchayats under Murkong Selek Development Block. 10% of the village households have been drawn for sample subject to a minimum of 15 households from each village. On this basis, the total number of sample households from the 13 selected villages is 196 of which 151 households are from 'flood-prone' villages, and the remaining 45 households are from 'flood-free' villages. Besides, the study also includes a sub-sample of 100 flood-induced 'migrated households' drawn from two forest areas where they are sheltered. Thus, the total number of sample households for the present study is 296.

For analysis, binary LOGIT estimation procedure has been employed. This estimation method produces log-odds of probability of a certain event or choice. In binary LOGIT model, the dependent variable y can take either of the two values: 1 or 0. For the present case, we assume $y = 1$ if the household head chooses 'farming' as his/her principal activity and $y = 0$ otherwise.

[1] The index is constructed based on the: a) proportion of workers having regular salaried employment; b) percent of workers in non-agricultural sectors; and c) average per capita income from different sources. These three components are combined to arrive at the Employment and Livelihood Score for each district. After that, these scores are converted to ELQI using the goalpost method (HDR, Assam, 2014)

Theoretically, the choice can be defined in terms of a latent unobserved variable y_i^* which is linked to the observed variable y_i. The latent variable y_i^* can be formulated as –

$$y_i^* = \mathbf{X'_i\beta} + \varepsilon_i$$

The link of this latent variable y_i^* with y_i can be expressed as-

$$y_i = 0 \text{ if } y_i^* \leq 0$$
$$y_i = 1 \text{ if } y_i^* > 0$$
$$\text{Therefore, } p(y_i = 1) = p(y_i^* > 0) = p(\varepsilon_i < \mathbf{X'_i\beta}) = \mathbf{F(X'_i\beta)}$$

If the cumulative distribution of the error term i.e. $\mathbf{F(X'_i\beta)}$ is logistic, we have LOGIT model. This model produces log-odds of probability. In this model, the probability p_i is defined as-

$$p_i = \frac{e^z}{1 + e^z}$$

$z = \mathbf{X'_i\beta}$, where **X** = vector of predictor variables, **β** = vector of unknown parameters

Hence, we have $1 - p_i = \frac{1}{1+e^z}$

Therefore, odd-ratio $\frac{p_i}{1-p_i} = e^Z$ or log odd-ratio $\ln\left(\frac{p_i}{1-p_i}\right) = Z = \mathbf{X'_i\beta}$, which is linear in **X** and **β**. But the probability p_i is not linear in **X** or **β**. The set of variables in **X** is discussed in the latter paragraphs.

The econometric investigation of choice of 'farming' by household heads employs predictor variables that explain - (a) individual characteristics (b) household characteristics and (c) village or location characteristics. They are outlined below.

The variable 'Education' or EDU is empirically found to be negatively correlated with 'farm' activity (e.g. Willmore et. al, 2012). This looks logical in that with more schooling people look for employment in non-farm works. Educational level attained by an individual can be thought of as the degree of preparation, which is fundamental for performing some labour activities (Poveda, 2007). More educated people, except those acquiring degrees on agriculture, have more skills to do other non-farm works than the non-educated ones which enhances their employability in the non-farm labour markets, which are facilitated by the growth of industrial and service sectors, in particular. However, in the absence of such growth in the non-agricultural sector people with higher education may be more inclined to farming works. This is because, ceteris paribus, farming may give higher return to the more educated farmers. In this paper, the education level attained by an individual is coded from 0 to 5; while 0 indicating no-schooling or illiterate, education level equivalent to post-graduate and above is coded as 5.

The variable Farm Size (FS) has the potential for increased probability of a household being in farming which reduces member mobility in search of employment in non-farm sector, other things being equal. Thus it is more likely that the members, including head, of a household having adequate cultivable land get engaged in agriculture, while those having marginal or no cultivable land will have more tendencies to out migrate as in Kuhn (2005) or stay in other non-farm activities.

Possession of bullock (BULL) is considered to be important for farming household in the

rural areas in particular. Possession of bullock helps even a landless household to be in farming activity, which is made possible through sharecropping or leased-in land. Thus, we can expect a positive coefficient for BULL on the choice of farming by the household heads.

Besides the above predictor variables, two household dummies have been used in the regression model – Migrated Household Dummy (MIGHD) and Flood Prone Household Dummy (FPHD). Flood free households are set as reference category. MIGHD takes value 1 if the household is a migrated household and 0 otherwise. Flood Prone Household Dummy (FPHD) takes value 1 if the household is in flood prone area, and takes 0 otherwise. From the available literature, we can expect negative effect of FPHD and MIGHD on 'farming' (FARM) choice.

1.4 RESULTS AND DISCUSSION

As stated in the preceding sections, the dependent variable 'FARM' can take two values: 1 if 'Farming' is the principal economic activity of the household head, and 0 otherwise. Thus, activities other than 'Farming' constitute the reference category. Though the model initially had more predictor variables, some of them have been dropped from the final model because they were found highly insignificant. The final model includes only five independent variables – MIGHD, FPHD, FS, EDU and BULL. The model is found to have a good predictive power with Wald Chi-square (at 5 degrees of freedom) = 78.67 and $p < 0.0001$ (Table-1). The log pseudo-likelihood ratio and pseudo R-squared of the model are -115.95 and 0.4317 respectively. The regression result shows the log odds as well as odd ratio and the marginal effects. The link test was conducted for possible specification error. The test is overall significant with LR chi^2 (2) =178.35 and $p < 0.0001$. The coefficient of the squared predicted values is, as desired, found statistically insignificant at conventional 5% level. This suggests that the model is overall correctly specified.

Table-1: Binary LOGIT Regression Result of Farming Choice by Household Heads

Number of observations = 296
Wald chi2(5) = 78.67; Prob > chi2 = 0.0000
Log pseudo-likelihood = -115.95 ; Pseudo R2 = 0.4317

	B.	Robust Std. Err.	z	P>|z|	EXP(B)	dy/dx
MIGHD	-2.988251	.6041429	-4.95	0.000***	0.05	-.5933206
FPHD	-1.183625	.4539459	-2.61	0.009***	0.31	-.2858147
EDU	.2756889	.1538206	1.79	0.073*	1.33	.0683968*
FS	.2928421	.1178244	2.49	0.013**	1.34	.0726524**
BULL	.8007287	.5152326	1.55	0.120	2.23	.1973208
CONSTANT	-.0990874	.4881831	-0.20	0.839	---	---

*, **, *** represent significance at 10%, 5% and 1% respectively

Binary LOGIT regression shows that flood prone households (FPHD) and migrated household

(MIGHD) heads are associated with lower odds for opting 'FARM' as their principal economic activity. This may be due to higher risk of flood damages and consequent lower productivity in farming activities, primarily in agriculture. Land damages or loss of operational holding is another factor for less preference for FARM by the heads of these households. On the other hand, the non-agricultural FARM activities are also characterised by low productivity in the flood prone areas. This is due to loss of poultry and livestock due to various kinds of water borne diseases during and after flood events. The odds for being in 'FARM' by migrated household and flood-prone household heads are lower by about 69% and 95% respectively compared to their counterpart flood free household heads. Education (EDU) and Farm Size (FS), on the other hand, are associated with higher odds for farming relative to other activities.

1.5 CONCLUSION

This paper has discussed the choice of farming as the principal economic activity by the household heads. The study finds that the heads of 'migrated/displaced' and 'flood-prone households' have lower odds for opting farming as principal activity than their counterpart 'flood free' household heads. Besides flood effects, other variables such as education (EDU) and farm size (FS) are also found to have statistically significant impact on the choice of farming as livelihood strategy.

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