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SUBJECT II
AGRICULTURAL LABOUR, SKILL DEVELOPMENT, LABOUR PRODUCTIVITY AND EMPLOYMENT

Factors Affecting Migration of Labourers from Domestic Agriculture and Its Impact on Household Crop Income in Assam

Bodrul Islam and Pradyut Guha*

ABSTRACT

With the foundation of new economics of labour migration (NELM) theory the study has made an attempt to examine the influence of migration of labourers from domestic agriculture on household crop income using primary data collected from 224 farm (cultivator) households in Nagaon and Morigaon districts of Assam. Three stage least squares estimation technique was applied for jointly determining the factors influencing migration, remittances and their impact on crop income. The analysis of the data reveals that though outmigration of labourers from domestic agriculture significantly reduced household crop income, the inflow of remittance has helped in stimulating the earnings from the cultivation of crop. The migration in the study area is considerably influenced by household size, total value of assets holding, networking influence, proximity to commercial bank and flood proneness of the village while the number of migrants, dependents, and age of migrants emerge to be strong predictor of inflow of remittances. The findings of present study offer evidence in support of NELM theory.

Keywords: New economics of labour migration, Three stage least squares, Crop income, Labour migration, Remittances, Assam

JEL.: J43, J60,Q19

I

INTRODUCTION

Agriculture and allied activities are one of the largest sources of labour employment in Indian economy, providing livelihood for 54.60 per cent of the country's total workforce (Government of India, 2018). There are many issues and challenges faced by Indian agriculture over the years, but one of the major challenges faced by the sector in recent years is the scarcity of labour (FICCI, 2015). The share of agricultural labour in India has maintained declining trend over the years while the corresponding ratio in non-farm sectors has been opposite (Government of India, 1991; 2001; 2011). The employment shares in secondary and tertiary sectors have gradually increased with continuous outmigration of labourers from agriculture (FICCI, 2015).

*Research Scholar and Assistant Professor, respectively, Department of Economics, Sikkim University, Gangtok..

One of the predominantly agrarian states of North East India is Assam where agricultural sector contributed 19.34 per cent to Gross State Domestic Product during 2016-17 (Government of Assam, 2018) and provided employment and livelihood support to 50 per cent workforce as farmers and agricultural labourer, (Government of India, 2011). The share of agricultural workforce in Assam has declined from 67.32 per cent in 1991 census to 52.49 per cent in 2001 census and further to 49.45 per cent in 2011 census (Government of India, 1991; 2001; 2011). Though, the share of agricultural labourers has increased within agricultural workforce across the districts of Assam during last three censuses but the share of cultivator has rapidly decreased during reference period (Appendix Table A1).

The problem of outmigration of labourer from agriculture has been a subject of interest in the works of various scholars. Kuznets (1957) provided evidence in support of continuous decline of labour force engaged in agriculture eventually with increased share of labour force in the non-farm sector. The works of Lewis (1954), Chenery and Syrquin (1975), Ravallion and Datt (1996), Mundlak*et al*. (1997), Lanjouw and Lanjouw (2001), Bdul (2012) also claimed about outmigration labourers from agriculture. The decision to migrate from household agriculture is urged by higher wages in non-farm local job opportunity, low earnings, high unemployment rate, lack of employment security, poor job satisfaction, lengthy working hours, poor working conditions, seasonal nature of work, debt settlement issues, employment opportunity from MGNREGA[1], financing farm activities (Paris *et al*., 2005; Korra, 2011; FICCI, 2015). The available literature came up with mixed findings on the impact of labour migration from agriculture on crop income. Taylor and Wyatt (1996) found that inflow remittances from family migrants helped in stimulating household farm income indirectly by relieving credit and risk constraints on household-farm production. In this line Rozelle *et al*. (1999), Taylor *et al*. (2003), Tuladhar *et al*. (2014) established that migration negatively influenced agricultural output, though its effect on crop yields being non-negative with remittances partially offset some of these losses.

A study on farmer's income generation through cultivation of crops has important policy implications. The decision to migrate from domestic agriculture eased with prior knowledge about implications of family members quitting household agriculture on their crop production or income from crop cultivation. The novelty of present study is its preliminary attempt in jointly determining the factors influencing migration, remittances and their impact on crop income of farm households in Assam which has not been investigated so far in the works of earlier scholars.

II

THEORETICAL FOUNDATION

While migration affects crop income through the induced shortage of labour, remittances tend to relax household's credit and risk constraints, which affect

agricultural productivity in the long run (Lucas, 1987). The new economics of labour migration (NELM) theory states that wage differential alone does not determine an individual's decision to migrate rather it is a collective decision made by households and not by individuals (Stark, 1991). Hence, migration and remittances are endogenous to household income and yield (Rozelle *et al*., 1999; Taylor *et al*., 2003). The NELM theory asserts that household crop income (Y) is influenced by three factors, viz., migration (M), remittance (R) and household characteristics (X_Y) as specified in the following functional form;

$$Y = f(M, R, X_Y) \quad \text{.... (1)}$$

The data on crop income for this study has been estimated using Farm Business Income (FBI) generated by a household. The role of family migrants is to contribute in farm production by relaxing the credit constraint through remittances for the household facing investment constraint in high productive activity say agriculture at commercial basis. Let agriculture at commercial basis be high productive activity with FBI defined as;

$$FBI = [\text{TR earned from crops production} - \text{CC of the Crop}] \quad \text{.... (2)}$$

The cost of cultivation (CC) in agriculture has been well defined by the Commission for Agricultural Cost and Prices (CACP) in 1979. There are nine different types of cost for agriculture as identified by CACP, viz., A1, A2, A2+FL^2, B1, B2, C1, C2, C2*, C3. With regional differences in farming the CACP cost concept being used in works of Narayanmoorthy (2013), Goswami (2016), and Sharma and Guha (2018). With the various forms of cost, the estimation of FBI needs differentiating the figures of revenue from cost. The total revenue (TR) figures of farming household have been obtained by taking the product of average market price of a crop (rice season-specific in the present case) with the total rice output produced by the sample households. The present study considered specific market price for specific type of rice (ahu, sali and boro) whichever a farm household had produced during the preceding farming season of the survey period. In addition, many households produced multiple varieties of rice, therefore, we have used variety-specific market price of the preceding farming season. Since, the market prices are different across geographical locations, for normalisation and better comparability the study has considered the variety-specific average market price of the sampled locations of the study. The reason for considering the market price is two-fold, viz. it is unrealistic to assume perfect competition in the market for agricultural products; secondly, prices are expected to vary across geographical locations. Though there are variations in price of a specific variety of rice across locations of Assam, however, such variations are not likely to be so high to substantially overstate or understate the value of rice in the study area. Also, it is expected that the regions where the price of rice is slightly higher, the rental rates of the services of capital goods, wage rate of

labour, cost of seeds, fertiliser are likely to be higher. This actually cancels out the price effect. Nevertheless, in this study, we have considered the average of prices and rental rates at the village level to minimise the effects of variations in prices and rental rates on FBI, if not to eliminate it. The farmers in the study area failed to provide the information on interest value of owned capital assets (excluding land). Therefore, present study has used only three cost concepts, viz.,$A1^3$, $A2^4$ and A2+FL while measuring FBI. The FBI in the present study has been considered as income from crop cultivation.

III

STUDY AREA, DATA AND THE SAMPLE

The present study is carried with primary data collected using multi stage random sampling method during May-October, 2019. In the first stage two districts, namely, Nagaon and Morigaon of Assam were selected for their relative importance in terms of percentage share of cropped area out of the total land utilised area in the state.[5] In the second stage seven non-contiguous community development (CD) blocks were purposively selected from each district. In the third stage from each CD block minimum of two villages were selected. Finally, from each of the sampled village eight household were selected with a break up of 4 farm households experiencing migration[6] of unskilled labourer from household agriculture and another four household with no reported case of outmigration of unskilled[7] labourer from indigenous agriculture. In this way, a sample of 224 farm (cultivator) households from 28 villages was selected for conducting field survey. The primary survey gathered information on household characteristics, farm characteristics, migrant's characteristics, village characteristics and enabling factors from the paddy farming households. Paddy being a dominant crop in terms of share in gross cropped area in both the sampled districts[8] was the reason for selection of the crop in the study.

The summary statistics of the variables of the study being reported in Table 1, it is evident that, mean years of schooling of household head is seven years with average family size of seven members. The household head in the study area are middle-aged adults with average age of 49 years. Average land holding of the households was 1.45 hectare with 1.27 hectare being devoted for paddy farming. The

TABLE 1. SUMMARY STATISTICS

Variables (1)	Units (2)	Mean (3)	Std. Dev (4)	Min (5)	Max (6)
Years of schooling household head	Year	7	4	0	15
Household size	Number	7	3	2	20
Age of household head	Year	49	10	21	68
Land holding per household	ha	1.45	0.80	0.54	7.63
Area under paddy	ha	1.27	0.78	0.33	7.36
Migrant	Number	1.34	0.65	1	5
Crop income[9]	INR	51,033	44,800	3,060	4,11,500
Remittances received	INR	78,840	92,982	0	6,00,000
N = 224					

Source: Authors estimation based on Field Survey Data, 2019.

average crop income of the sampled farm household in the study area was INR 51,033. On an average 1.34 person reported to migrate from the sampled households with remittances received from them was INR 78,840 during the previous farming season.

IV

ECONOMETRIC MODEL AND ESTIMATION STRATEGY

With the thrust of the study being to jointly determine the factors influencing migration, remittances and their impact on income from crop output, the following set of simultaneous equations were formulated;

$$\ln Y_i = \lambda_0 + \lambda_1 \ln M_i + \lambda_2 \ln R_i + \lambda_3 \ln Z_i + \lambda_4 \ln F_i + \lambda_5 V_j + \varepsilon_Y \quad \text{....(3)}$$

$$\ln M_i = \delta_0 + \delta_1 \ln Z_i + \delta_2 V_j + \delta_3 \ln T_q + \delta_4 D + \varepsilon_M \quad \text{.... (4)}$$

$$\ln R_i = \gamma_0 + \gamma_1 \ln M_i + \gamma_2 \ln Z_i + \gamma_3 V_j + \gamma_4 \ln T_q + \varepsilon_R \quad \text{....(5)}$$

With ε being the well-behaved error term in crop income, migration and remittances equations respectively; 1, 2… 224 ϵ i-th farm households; 1, 2….. 28 ϵ j-th village; 1, 2……112 ϵ q-th farm household with reported migration outside domestic agriculture during six or more than six months preceding to survey period. The description of the variables used in the study and their anticipated relationship is reported in Table 2.

TABLE 2. DESCRIPTION OF THE VARIABLES

Variable (1)	Description (2)	Anticipated Relationship (3)
Y_i	Crop income	
M_i	Number of migrants	+/-
R_i	Remittances received	+
Z_i	Vector of household characteristics	+/-
F_i	Vector of farm characteristics	+/-
V_i	Vector of characteristics of the village	+/-
T_q	Vector of socio demographic characteristics migrants	+/-
D	Network influence encouraging migration	+/-

There are several standard estimation techniques available for simultaneous equation models; some are called single equation methods[10] while there are other system equation methods[11]. After successive rounds of simulation and diagnostic tests of the primary data, it was decided to use Three Stage Least Square (3SLS) estimation technique as proposed by Zellner and Theil (1962) in the present study. The suitability of 3SLS for present study is two-fold firstly, the fitted set of simultaneous equations (3-5) qualified the over identification status via order and rank conditions (refer Appendix Table A2). Secondly, the simultaneity behaviour of

migration, remittance, and crop income makes the disturbances term across the equations as interrelated, therefore, to deal such endogeneity problem 3SLS has preferred over 2SLS (Rozelle *et al*., 1999; Taylor *et al*., 2003; Tuladhar *et al*., 2014). The endogeneity in present case was tested via Wu-Hausman test (Hausman, 1976) as reported in Appendix Table A3. Usually, 3SLS gives consistent estimates with greater asymptotic efficiency than 2SLS (Kmenta, 1997).

V

RESULTS AND DISCUSSION

The 3SLS estimates of fitted set of simultaneous equations (3-5) have been reported in Table 3. The estimated result reveals that except number of migrants, the coefficient of the household characteristics such as remittances, household size, land per capita, and total value of assets holding have turned out as significant with positive elasticity in crop income equation. Farm inputs such as seeds, insecticides and pesticides also have shown positive and significant relationship with crop income. Hence, an incremental use of these inputs helped in enhancing the income of the sampled farm households in the study area.

TABLE 3. DETERMINANTS OF MIGRATION AND REMITTANCES AND THEIR EFFECTS ON HOUSEHOLD CROP INCOME

Variables/Constant/others	Crop Income	Migration	Remittances
(1)	(2)	(3)	(4)
Farm characteristics and enabling factors			
Number of migrants (Number)	-0.68(.28)**		4.06(.79)***
Remittances received (INR)	0.02(.007)**		
Household size (Number)	1.10(.17)***	0.24(.07)***	-0.38(.52)
Number of dependent (Number)	-0.15(.09)	-0.05(.04)	0.71(.33)**
Square of age of household head (Years)	0.01 (.084)		
Year of schooling of household head (Years)	-0.01 (.06)	-0.01(.03)	-0.03(.18)
Land per capita (ha)	0.75(.11)***	0.06(.05)	0.43(.30)
Total value of assets holding of household (INR)	0.09(.04)**	0.11(.02) ***	-0.34(.12)***
Family income (INR)		-0.18(.02)***	
Year of schooling of migrant (Year)		0.001(.06)	0.22(.45)
Age of migrant (Year)		0.01(.04)	2.96(.33)***
Migration network (=1 if yes)		0.14(.04)***	
Distance to pucca road from village (km)		0.05(.03)	
Distance to bus stand from village (km)		-0.02(.03)	
Distance to weekly market from village (km)		-0.04(.03)	
Distance to bank from village (km)		0.06(.03)*	
Distance to fertiliser store from village (km)	0.57(.42)		
Distance to farm fuel store from village (km)	-0.37(.41)		
Wage rate in village (INR)	0.18(.14)		
Exposure of flood (=1 if yes)	-0.01(.07)	0.07(.04)*	0.25(.22)
Farm inputs			
Cost of hired labour (INR)	-0.04 (.009)***		
Maintenance cost of own machinery (INR)	-0.08(.012)***		
Cost of hired machinery (INR)	0.01(.02)		

Contd.

TABLE 3.CONCLD.

Variables/Constant/others (1)	Crop Income (2)	Migration (3)	Remittances (4)
Cost incurred in seeds (INR)	0.36(.07)***		
Cost of insecticides and pesticide (INR)	0.17(.08)**		
Cost of fertiliser (INR)	-0.07 (.023)**		
Irrigation charges (INR)	-0.09 (.02)***		
Land revenue (INR)	-0.003(.02)		
Rent paid for leased land (INR)	0.02 (.01)		
Others expenses incurred in farming (INR)	-0.07(.03)**		
Constant	6.13(1.26)***	0.53(.26)**	4.39(1.47)***
Number of observations =224			
R-squared	0.675	0.402	0.914
Chi^2	514.73	151.91	2477.08
(p-value)	(0.00)	(0.00)	(0.00)

Source: Same as Table 1.
Notes: *** p < 0.01; ** p < 0.05, *p < 0.10. Figures in parentheses are the standard error.

The negative significant coefficient of number of migrants in crop income equation implies that migration of an unskilled labourer from domestic agriculture lowered the income of the farm household by 0.68 percentage points. Possible explanation of such result may be the fact that absence of household labourer in domestic agriculture insists the farm household to depend on hired labourer for continuation of farming activity thereby raising the total production cost. However, the positive significant coefficient of remittances in crop income equation implies that incremental inflow of remittances by an unit has raised the crop income of the farm household by 0.02 percentage points. The farm households in the study area invested 30.55 per cent of their remittances in domestic agriculture,[12] which might have helped in the realisation of higher output and income from crop cultivation. The present results are consistent with the findings of Rozelle *et al*. (1999), Taylor *et al*. (2003) and Tuladhar *et al*. (2014). The findings of the present study offer evidences in support of the predictions of NELM theory, that migration is associated with lost-labour effects and remittances loosen capital constraints on farm production in general.

With reference to the determinants of migration in the study area, it has been observed that the coefficient of household size, total value of assets holding, information networking, distance to commercial bank from village, and exposure of flood in the village have turned out to be positively significant. Plausible explanation for such findings could be the fact that household with larger family size has less difficulty in releasing the additional family members from domestic agriculture for engaging in gainful and remunerative occupation outside domestic agriculture. Interestingly, information networking by a predecessor migrant might have worked as a signalling mechanism in pulling the labourer of the farm household to migrate from agriculture to non-farm activities for financial security in the study area. The distance of commercial bank from village has significantly encouraged migration of labourers from domestic agriculture. Increased financial literacy and access to small loan under

the wave of financial inclusion programme has helped them in engaging in self-employed business activity such as grocery store, vegetables store, hardware store, rice mill, electronic repairing shop.[13] The crop damage by flood in the preceding farming season forced the household member(s) to migrate outside domestic agriculture. However, aggregate family income from all sources seen to have significant inverse relationship with migration outside agriculture. Families with larger farm size managed to earn larger income from crop cultivation thereby able to maintain a decent standard of living and retain their family members in indigenous farming activities.

The number of migrants, number of dependents and age of migrant has turned out positive and significant determinant of remittances in the study area (Table 3). Remittance in the present case is treated as cost of migration, as it works as a compensation of lost labour that has left domestic agriculture. The estimated results reflect that outmigration of an additional member from domestic agriculture increased the inflow of remittances by 4.06 percentage points while remittances stimulate crop income by 0.02 percentage points in the study area (Table 3). The household with larger dependency ratio urges greater financial need for their families insisting migrant labourers to remit more money towards their family. It seemed that maturity in age and experience of the migrant labourer contributed towards higher earning capacity thereby enabling them to send greater remittances to their families.

VI

CONCLUSION

The present study was undertaken for jointly determining the factors influencing migration, remittances and their impact on crop income of farm households in agriculturally two important contiguous districts in central Brahmaputra valley of Assam. The analysis of data reveals that migration in the study area significantly determined by household size, total value of assets holding, networking influence, and proximity to the commercial bank, flood proneness of the village. The inflow of remittances towards the farm households is strongly influenced by the number of migrants, dependents, and age of migrants. The migration of labourer from domestic agriculture in the study area has negatively influenced the household crop income though it has not reduced crop yield. The present set of analysis corroborate the argument that inflow of remittances sent by migrant labourers partially compensate for the lost labour effects, contributing to household incomes directly and indirectly by stimulating crop production or crop income. The findings of the study offer evidences in support of the NELM theory, that labour migration adversely affected household crop income, in terms of rising cost of cultivation while remittances received have compensated the households by reducing the credit and insurance constraints.

NOTES

1) Mahatma Gandhi National Rural Employment Guarantee Act.

2) FL stands for imputed value of family labour.

3) A1=All actual expenses incurred in production by owners which includes value of (i) hired human labour, (ii) hired bullock labour, (iii) owned bullock labour, (iv) maintenance of owned machinery, (v) hired machinery, (vi) seeds, (vii) manures, (viii) fertilisers, (ix) plant protection chemicals, (x) irrigation charges, (xi) depreciation on farm buildings and implements, (xii) interest on working capital, (xiii) insurance premium, (xiv) land revenue, and (xv) miscellaneous expenses.

4) A2=A1+ rent paid for leased in land.

5) The Nagaon and Morigaon stands second and fourth position among the districts of Assam by sharing 85.66 and 84.16 per cent of crop area out of total utilised land of the districts respectively during 2016-17 (Government of Assam, 2017).

6) The present study has considered a farm household member or members as migrant, who is or are absent for at least six preceding months in household agricultural activities with specific reference to Sali paddy or Boro paddy or Ahu paddy.

7) Unskilled labourer are those types of workers in agriculture who are involved in sowing, harvesting, weeding, ploughing, winnowing and threshing including helper on agricultural field.

8) With 58 per cent and 69 per cent area under paddy out of gross cropped area in Nagaon and Morigaon districts respectively (Ministry of Agriculture and Farmers Welfare, Government of India, 2016-17).

9) Reported income being estimated using cost A2 to understand the variation in income with absence of family labour for migrant household.

10) Ordinary Least Square, Instrumental Variable, Indirect Least Square, and 2SLS.

11) 3SLS, Full Information Maximum Likelihood, and Limited Information Maximum Likelihood, Seemingly Unrelated Regression.

12) As per field survey the sampled farm households on an average invested INR 24092.86 in domestic agriculture which was 30.55 per cent of total remittances received during the previous farming season.

13) The field survey figures reveals that 23.21 per cent of migrants were engaged in business activity like hardware store, fishery business, rice mill, grocery store, electronic repairing shop, etc.

REFERENCES

Bdul, J. (2012), "Modelling Income Inequality and Openness in the Framework of Kuznets Curve: New Evidence from China", *Economic Modelling*, Vol.29, No.2, pp.309-315.

Chenery, H.B. and M. Syrquin (1975), *Patterns of Development, 1950-1970*, Oxford University Press, London.

FICCI (2015), *Labour in Indian Agriculture: A Growing Challenge,* Federation of Indian Chambers of Commerce and Industry (FICCI).

Goswami, B. (2016), "Farm Business Income across Land-size Classes and Land Tenure Status: A Field Study in Assam Plains", *Agricultural Economics Research Review,* Vol.29, No.1, pp.1-14.

Government of Assam (2014), *Area, Average Yield and Production of Nine Principal Crops in Assam since 1951-52 to 2013-14,* Directorate of Economic and Statistics, Guwahati, Assam.

Government of Assam, (2017), *Agriculture Contingency Plan for Nagaon and Morigaon Districts Report,* Ministry of Agriculture, Guwahati, Assam.

Government of Assam (2018), *Economic Survey, (2017-18),* Directorate of Economic and Statistics, Guwahati, Assam.

Government of India, (1991), Office of the Registrar General and Census Commissioner, India.

Government of India (2001), Office of the Registrar General and Census Commissioner, India.

Government of India (2011), Office of the Registrar General and Census Commissioner, India.

Government of India (2018), *Agricultural Statistics at a Glance 2018*, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture and Farmers'Welfare, New Delhi.

Hausman, J.A. (1976), "Specification Tests in Econometrics", *Econometrica,*Vol.46, No.6, pp.1251-1271.

Kmenta, J. (1997), *Element of Econometrics*, University of Michigan Press, New York, U.S.A.

Korra, V. (2011), "Labour Migration in Mahabubnagar: Nature and Characterstics", *Economic and Political Weekly,* Vol.46, No.2, 8 January, pp.67-70.

Kuznets (1957), "Quantitative Aspects of the Economic Growth of Nations, Industrial Distribution of National Product and Labour Force", *Economic Development and Cultural Change*, Vol.4, No.1, pp.110-137.

Lanjouw, J.O. and P. Lanjouw (2001), "The Rural Non-Farm Sector: Issues and Evidence from Developing Countries", *Agricultural Economics*, Vol.26, No.1, pp.1 -23.

Lewis, W.A. (1954), "Economic Development with Unlimited Supplies of Labour", *The Manchester School,* Vol.22,No.2, pp.139-191.

Lucas, R.E.B. (1987), "Emigration to South Africa's Mines", *American Economic Review*, Vol.77, No.3, pp.313-339.

Mundlak, Y.; D.F. Larson and A. Crego (1997), *Agricultural Development: Issues, Evidence, and Consequences,* Working Paper No. 1811, The World Bank, U.S.A.

Narayanamoorty, A. (2013), "Profitability in Crops Cultivation in India: Some evidence from Cost of Cultivation Survey Data", *Indian Journal of Agriculture Economics,* Vol.68, No.1, January-March, pp.104-120.

Paris,T.; A. Singh, J. Luis and M. Hossain (2005), "Labour Outmigration, Livelihood of Rice Farming Households and Women Left Behind: A Case Study of Eastern Uttar Pradesh", *Economic and Political Weekly,*Vol.40, No.25, 18 June, pp.2522-2529.

Ravallion, Martin and G. Datt (1996), "How Important to India's Poor is the Sectoral Composition of Economic Growth?" *World Bank Economic Review*, Vol.10, No.1, pp.1-26.

Rozelle, S.; J.E. Taylor and A. de Brauw (1999), "Migration, Remittances and Agricultural Productivity in China", *The American Economic Review,* Vol.89, No.2, pp.287-291.

Sharma, Y. and P. Guha (2018), "Productivity and Farm Income Differences of Ginger Cultivation in Sikkim", *Productivity*, Vol.59, No.1, pp.37-45.

Stark, O. (1991), *The Migration of Labour,* Cambridge, MA: Basil Blackwell.

Taylor, J.E. and T.J. Wyatt (1996), "The Shadow Value of Migrant Remittances, Income and Inequality in Household Farm Economy", *Journal of Development Studies,* Vol.32, No.6, pp.899-913.

Taylor, J.E.; S. Rozelle and A. de Brauw (2003), "Migration and Incomes in Source Communities: A NewEconomics of Migration Perspective from the China", *Economic Development and Cultural Change,* Vol.52,No.1, pp.75-101.

Tuladhar, R.; C. Sapkota and N. Adhikari (2014), *Effects of Migration and Remittance Income on Nepal Agriculture Yield*, ADB South Asian Working Paper Series,No.27, pp.1-18.

Zellner, A. and H. Theil (1962), "Three-Stage Least Squares: Simultaneous Equation of Simultaneous Equations", *Econometrica,* Vol.30, No.1, pp.54-78.

APPENDIX

TABLE A1. DISTRICT WISE PERCENTAGE SHARE OF TOTAL CULTIVATORS AND AGRICULTURE LABOURERS OUT OF TOTAL WORKFORCE IN ASSAM DURING LAST THREE CENSUS

District/Year	1991	2001	2011	District/Year	1991	2001	2011
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kokrajhar	65.80	43.12	45.95	Karbi Anglong	77.00	59.68	58.16
	(16.27)	(22.61)	(16.51)		(6.93)	(13.99)	(15.90)
Dhubri	52.71	37.44	30.65	Dima Hasao	60.00	48.06	52.31
	(21.93)	(23.94)	(25.55)		(2.87)	(4.48)	(5.67)
Goalpara	57.55	36.97	34.90	Cachar	39.03	22.84	19.79
	(18.84)	(18.32)	(20.91)		(18.49)	(13.32)	(11.29)
Barpeta	59.98	40.87	36.53	Karimganj	44.27	24.92	23.63(16
	(17.61)	(15.95)	(17.61)		(17.34)	(15.00)	.79)
Morigaon	72.00	52.96	44.88	Hailakandi	48.00	35.30	30.65
	(11.84)	(19.88)	(21.64)		(17.90)	(14.45)	(14.59)
Nagaon	58.38	38.48	35.31	Bongaigaon	59.00	37.63	32.61
	(16.05)	(19.92)	(20.02)		(17.38)	(17.19)	(18.53)
Sonitpur	51.96	33.87	32.32	Chirang	0	0	41.42
	(11.45)	(12.96)	(14.91)				(18.17)
Lakhimpur	74.68	68.54	55.66	Kamrup	39.75	24.72	29.54
	(5.73)	(7.03)	(10.21)		(9.61)	(9.06)	(15.82)
Dhemaji	83.40	73.92	73.21	Kamrup (M)	0	0	5.14
	(4.81)	(7.38)	(6.05)				(3.46)
Tinsukia	39.34	31.06	26.82	Nalbari	53.06(20.	39.12	21.69(13
	(6.56)	(6.15)	(8.57)		81)	(14.38)	.07)
Dibrugarh	36.07	29.17	24.11	Baksa	0	0	36.70
	(7.66)	(7.63)	(10.92)				(23.25)
Sivasagar	49.64	35.87	28.43	Darrang	67.04	45.63	39.85
	(6.67)	(7.01)	(9.98)		(12.08)	(15.44)	(25.13)
Jorhat	48.37	37.51	29.25(1	Udalguri	0	0	36.17
	(5.86)	(7.75)	0.66)				(21.08)
Golaghat	57.79	44.20	39.71(1	Assam	54.75	39.21	33.93
	(9.68)	(10.07)	3.88)		(12.57)	(13.28)	(15.42)

Source: Author's computations based on data collected from Office of the Registrar General and Census Commissioner, India.

Notes: Figures off the bracket are cultivators and agricultural labourers in the bracket.

TABLE A2.RESULTS OF IDENTIFICATION TEST

		Equations		
Conditions		(iii)	(iv)	(v)
(1)	(2)(2)	(3)	(4)	(5)
Order condition	(A - B) ≥ (G - 1)	8 >2	14 >2	20 >2
Rank condition	ρ(Δ) = (T - 1)	2	2	2

Source: Same as Table 1.

Notes: A is number of predetermined variables in the model; B is number of predetermined variables in a particular equation; G is number of endogenous variables in a particular equation; Δ is the matrix of excluded variables at the rest of the equation of the system equations; T is the number of endogenous variables in the model (Kmenta, 1997).

TABLE A3. RESULTS OF ENDOGENEITY TEST (WU-HAUSMAN)

Variables	Crop income
(1)	(2)
Migration	3.439 (0.065)
Remittances	0.0789 (0.08)

Source: Same as Table 1.

Figures in off bracket are Chi^2 and p value in brackets. H_0= the variable is exogenous.