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Effects of Income Sources on Inequality among Agricultural Households in North-east India

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ABSTRACT

The present study tries to assess the effect of income sources on the inequality among rural households of the North-east Indian states using large household-level data. The results indicate that as income level increases, farm households tend to shift from less remunerative economic activities, i.e., crop production towards higher value ones, i.e., non-farm business activities. Agriculture contributes highest to the income inequality in the region but has an inequality decreasing effect. The distribution of wages and salaries, livestock income and non-farm business income has an un-equalising effect on income distribution. Theil index estimates showed that intra-state, intra-district and intra-landholding size inequality is the main contributor to total inequality in the region.

Keywords: Income inequality, Gini coefficient, Decomposition, Theil index, North-east states

JEL: D13, J43, O13, O15

I

INTRODUCTION

For sustainable economic development, India's growth story needs to be inclusive. However, the North-Eastern Region (NER) of India, comprising eight states,[1] constituting about eight per cent of the geographical area and around four per cent of the total Indian population, has largely remained underdeveloped. The NER lags far behind the rest of India in terms of economic development, although it is endowed with vast natural resources and higher literacy levels (78.8 per cent literacy rate, compared to 74 per cent nationwide).

The economy of the NER depends primarily on agriculture and the allied sector. As per the 2011 Population Census, more than 81 per cent of its population is rural, and 51 per cent of the workforce is engaged in agriculture. The share of agriculture and allied sector in the total gross state domestic product (GSDP) has declined from 26.32 per cent in 2004-05 to 20.58 per cent in 2012-13 (at 2004-05 prices), though the dependence of population on this sector is still high. Its subsistence nature characterises the region's slow growth, low input-low output, and technologically lagged mixed farming system (Birthal *et al*., 2006; Kumar *et al*., 2007). The average cropping intensity increased from about 123 per cent to 141.2 per cent from 2001-02 to 2015-16. However, more than 75 per cent of the farm households are small and marginal (<2 ha) in the region. The average monthly household income of agricultural

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households in the NER is Rs. 9366, slightly higher than the all-India figure of Rs. 8931 (NABARD, 2018).

While the population living below the poverty line decreased by around 18 per cent, this decline is much lower than the national level average decline of about 41 per cent between 2004-05 and 2011-12. Even though the region's service sector has grown significantly, it has not created additional employment and income-generating opportunities (Srivastav, 2010). Industrial sector development is poor and the share of manufacturing activities is skewed towards Assam only.

Although there is a growing body of literature on income inequality among rural households in India, most of these are at the national and major states. To the best of our understanding, no such study has been carried out in north-east India using a household level representative dataset. For a national strategy for inclusive growth, it is vital to study the regional composition of income of agricultural households in this country. In this context, this study aims to examine the income distribution among agricultural households across the eight states and various land size categories. It further investigates how changes in a particular income source affect income inequality.

II

DATABASE AND METHODOLOGY

Data

This study is based on the household-level data from the 70th Round 'Situation Assessment Survey of Agricultural Households' by the National Sample Survey Office (NSSO), Government of India (GoI) pertaining to the agricultural year 2012–13. Data on agricultural income and its sources were compiled for the eight states of the NER of India, covering 86 districts and 5100 rural agricultural households.[2] Information on the income of agricultural households from various sources, viz. crop farming, livestock, wages and salaries, and non-farm business, were sourced from this dataset.[3] To estimate the effect of income sources on inequality, the net income from various sources was worked out by deducting total expenses from total receipts for each income source.

Method

There are several metrics for measuring income inequality. This paper employs two measures, viz., the Gini coefficient and the Theil index (Charles-Coll, 2011; Liao, 2016). Following Wagstaff (2005) and Gachet *et al*. (2016), vertical (i.e., between individuals and households) and horizontal (i.e., between groups) decomposition of inequality was performed. Lorenz curve and the Gini coefficient estimated vertical

decomposition while the Theil index overcomes its limitation of ignoring horizontal decomposition.

Gini Coefficient and Vertical Decomposition of Inequality

Total income (I) consists of income from *k* different sources. Hence, total income (I) for each household and also for the sample as a whole can be written as:

$$I = \sum_{k=1}^{k} I_k \quad \ldots. (1)$$

The Gini coefficient measures the extent of deviation in the distribution of wealth within a group from a perfectly equal distribution, with values from 0 to 1. The Gini coefficient can be estimated based on the representation of the Lorenz curve, plotting cumulative income vs. cumulative population. It can also be mathematically calculated as:

$$G = cov\ (y, F(y)\frac{2}{\bar{y}}) \quad \ldots. (2)$$

where *cov* is the covariance between income levels *y* and the cumulative distribution of the same income *F(y)*, and $\bar{y}$ is average income.

Lerman and Yitzhaki (1985) developed a method as an extension of earlier income decomposition theories (Kakwani, 1977; Shorrocks, 1982) to decompose the Gini coefficient as the sum of the inequality contributions of all income sources

$$G = \sum_{k=1}^{k} S_k\ G_k R_k \quad \ldots.(3)$$

S_k is the share of income source *k* in total income, G_k is the Gini coefficient of k-th source of income, and R_k is the correlation coefficient between income from source *k* and total income I. G_kR_k is known as the pseudo-Gini coefficient of income source *k* (Shorrocks, 1983).

The contribution of income from source *k* to total income inequality increases with the increase in the product of these three components. While S_k and G_k are always positive and less than one, R_k can fall anywhere in the interval (–1,1). When $R_k < 0$, income from source *k* is negatively correlated with total income and thus lowers the overall Gini coefficient (Leibbrandt *et al*., 2000).

Further, using the decomposition of Gini coefficient for total income, the partial derivative of the Gini coefficient for a percentage change *e* in income source *k* (e_k) is worked out to estimate the percentage change in total inequality resulting from a small percentage change in income source *k*:

$$\frac{\delta G}{\delta e_k} = S_k(R_k G_k - G) \quad \ldots. (4)$$

Then, the marginal effect of the income source relative to the overall Gini is obtained by dividing eq. (4) by the overall Gini coefficient (G):

$$\frac{\delta G/\delta e_k}{G} = \frac{S_k R_k G_k}{G} - S_k \quad \ldots. (5)$$

The marginal effect property is helpful in identifying the 'equalising' or 'unequalising' effect of each income source on total inequality (López-Feldman, 2006). For example, an increasing or unequalising effect may occur if the source of inequality favours the rich (R_k is positive and significant). In contrast, a decreasing or equalising impact may occur if inequality favours the poor. The robustness of the marginal effect was tested using bootstrapping techniques (Kimhi *et al*., 2014; Choudhary and Singh, 2019).

However, the Gini coefficient does not satisfy the properties of aggregativity and additive decomposability (Bourguignon, 1979). This restricts its ability to analyse inequality between and within population sub-groups overcome by the Theil index (Allison, 1978).

Theil Index and Horizontal Decomposition of Inequality

Theil (1967) proposed a decomposable measure based upon the Lorenz curve, allowing the comparison between-group and within-group inequality. The Theil is a specific case of the generalized entropy indices (Bellù and Liberati, 2006). Its lower value is zero (perfect equality), and it has no upper limit. The index is defined as:

$$T = \frac{1}{n}\sum_i \frac{y_i}{\bar{y}} \ln \frac{y_i}{\bar{y}} \quad \ldots. (6)$$

where y_i is the i-th observation and $\overline{y}$ is the average income.
Further, assuming m groups, the Theil index is decomposed as:

$$T = \sum_{k=1}^{m} \left(\frac{n_k}{n} \frac{\bar{y}_k}{\bar{y}}\right) T_k + \sum_{k=1}^{m} \frac{n_k}{n} \left(\frac{\bar{y}_k}{\bar{y}}\right) \ln \left(\frac{\bar{y}_k}{\bar{y}}\right) \quad \ldots. (7)$$

The first and second terms are within-group and between-group components, respectively. Similarly, the Theil index can also be decomposed by the source of income, following the expression for '*m'* sources:

$$T = \sum_{k=1}^{m} \frac{1}{n} \sum_{i=1}^{n} \left(\frac{y^k{}_i}{\bar{y}}\right) \ln \left(\frac{y_i}{\bar{y}}\right) \quad \ldots. (8)$$

In our study, the Theil index is used to decompose inequality within and between states, districts and landholding categories.

Negative Income

Inclusion of incomes taking negative values is another limitation of the Gini coefficient. The 'modified' Gini coefficient is no longer bounded between 0 and 1, making it inaccurate compared to populations or time. Further, the Theil index does not support non-positive values, as *ln(x)* is undefined for $x \leq 0$. Therefore, many researchers (Hao and Naiman, 2010; Mussini, 2013) adopted negative income. However, for the present study, the exclusion of households with negative or zero income is not reasonable as that would exclude a sizeable number of households. Following Bellù and Liberati (2006) and Vasilescu *et al*. (2011), the limitation of negative or zero values can be overcome by replacing zeros and negative income values with a minimal value, $\varepsilon > 0$. In this article, ε is taken as equal to 10^{-10}.

III

RESULTS AND DISCUSSION

The state-wise average annual net income from different sources is presented in Table 1. The average annual household net income in the region ranges from Rs. 65205 (Tripura) to Rs. 141426 (Meghalaya) with an average of Rs. 89270 for the NER as a whole. 'Agricultural income', i.e., income from crop cultivation and livestock production, contributed around 68 per cent in the total income. In contrast, the remaining is contributed by 'non-agricultural income', i.e., income from wages and salaries and non-farm business activities. Thus, the contribution of agricultural income in the total is higher than non-agricultural in all the states except Sikkim, where the non-agricultural component contributed about 59 per cent.

TABLE 1. INCOME SOURCES OF AGRICULTURAL HOUSEHOLDS IN NORTH EASTERN STATES

(*Rs./annum*)

State	Crop	Livestock	Nonfarm business	Wages & salaries	Total income
(1)	(2)	(3)	(4)	(5)	(6)
Arunachal Pradesh	75217	8627	10101	25102	119046
	(63.2)	(7.3)	(8.5)	(21.1)	(100)
Assam	50692	10401	3055	17160	81307
	(62.4)	(12.8)	(3.8)	(21.1)	(100)
Manipur	35053	21961	9320	45791	112124
	(31.3)	(19.6)	(8.3)	(40.8)	(100)
Meghalaya	75948	9440	10722	45316	141426
	(53.7)	(6.7)	(7.6)	(32.0)	(100)
Mizoram	50530	10461	292	43873	105155
	(48.1)	(10.0)	(0.3)	(41.7)	(100)
Nagaland	38216	10907	713	64718	114555
	(33.4)	(9.5)	(0.6)	(56.5)	(100)
Sikkim	19849	14036	12111	37361	83357
	(23.8)	(16.8)	(14.5)	(44.8)	(100)
Tripura	33307	3732	1941	26224	65205
	(51.1)	(5.7)	(3.0)	(40.2)	(100)
North East Region	50524	10456	3923	24366	89270
	(56.6)	(11.7)	(4.4)	(27.3)	(100)

Source: Unit Level Data on Situation Assessment Survey of Agricultural Households in India (2012-13), 70th Round of NSS.

Note: Figures in parentheses are percentages to total income.

The income sources for agricultural households by income quintile are listed in Table 2. The top 20 per cent of households have an average annual income of Rs. 329976 while the bottom 20 per cent, a mere Rs. 15741. In terms of per capita income, the corresponding figure is Rs. 18488 and Rs. 4108 for top and bottom quintiles, respectively. Crop cultivation, performed by around 97 per cent of the households, makes up about 66 per cent of the total income on average. Approximately 58 per cent of the households were engaged in livestock production but contributed only around 10 per cent to the total income. Wages and salaries contributed the second major share (20 per cent), with about 57 per cent of the agricultural households reporting it as an important income source. The non-farm business activities contributed the least (4 per cent) in the total income, and also, its accessibility was the lowest (15 per cent) among the agricultural households. The contribution to income by different sources across income quintiles showed a similar pattern, with crop cultivation having the highest income share followed by wages and salaries, livestock and non-farm business income. Further, the income share of crop cultivation (along with the number of households engaged in it) decreases on moving from the bottom to top quintile. In contrast, share of income from the other three income sources more or less increases. It is also noted that though agricultural households' participation in non-farm business activities improves with income level, their contribution to the total income does not exceed six per cent. Therefore, by and large, Table 2 shows that as income level increases, agricultural households tend to shift from less remunerative economic activities (crop production) towards higher value non-farm business activities. Cook (1998) and Kung and Lee (2001) corroborates these findings.

TABLE 2. INCOME SOURCES OF AGRICULTURAL HOUSEHOLDS BY INCOME QUINTILES IN NORTH EASTERN STATES

Quintile	Net income (Rs./annum)	Per capita income (Rs./annum)	Crop (per cent)	Livestock (per cent)	Wages and salaries (per cent)	Non-farm business (per cent)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bottom	15741	4108	76.5	8.2	11.6	3.7
			(94.9)	(47.9)	(36.6)	(11.6)
Second	39738	9680	69.5	8.6	16.9	5.0
			(97.7)	(53.4)	(60.4)	(11.5)
Third	69448	14811	63.0	12.6	20.9	3.55
			(98.1)	(60.4)	(59.3)	(17.0)
Fourth	120712	24036	62.3	11.4	22.4	3.9
			(97.6)	(64.0)	(57.7)	(14.9)
Top	329976	64431	43.3	13.1	37.9	5.7
			(95.7)	(64.5)	(72.4)	(20.4)
All	89270	18488	65.5	10.4	19.9	4.2
			(96.8)	(58.1)	(57.3)	(15.1)

Source: Unit Level Data on Situation Assessment Survey of Agricultural Households in India (2012-13), 70th Round of NSS.

Note: Figures in parentheses indicate the percentage of households performing the activity.

Another way of looking at the relative importance of an income source is through landholding size. Across different farm categories, the participation rate in crop cultivation is around 93-100 per cent (Table 3). Except for households with more than four hectares of land, livestock ownership increases with an increase in the size of landholding, suggesting that livestock-rearing is closely related to land ownership. On the other hand, participation in the labour market negatively affects the landholding size as households at the lower end of the land distribution are engaged more in non-agricultural activities. As landholding size increases, the share of agriculture income increases, and non-farm sources become less important. The income from agricultural sources contributes around 90 per cent to the total household income at the highest end of the land distribution (> 4.0 ha) and approximately 58 per cent at the lowest end (<1 ha). Consequently, the non-farm income comprises about 42 per cent and 10 per cent of the total household income for the marginal and medium and above category, respectively. This suggests that the non-farm sector and labour market can serve as potential entry points for smallholders to enhance their income levels (Birthal *et al*., 2014). Adams (2001) and Micevska and Rahut (2008) also observed an inverse relationship between non-farm income and landholding size.

TABLE 3. INCOME SOURCES OF AGRICULTURAL HOUSEHOLDS BY LANDHOLDING CATEGORY IN NORTH EASTERN STATES

Land category	Percentage of total households	Net income (Rs/hh/annum)	Crop (per cent)	Livestock (per cent)	Wages & salaries (per cent)	Non-farm business (per cent)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Marginal	41.4	68459	44.5	13.9	35.5	6.1
(< 1ha)			(93.0)	(54.1)	(63.8)	(16.2)
Small	32.6	116578	67.0	10.6	20.4	2.1
(1-2 ha)			(99.4)	(59.2)	(56.92)	(14.5)
Semi medium	23.6	152703	71.1	8.0	16.8	4.0
(2-4 ha)			(99.8)	(63.5)	(47.09)	(14.2)
Medium & above	2.4	366750	85.8	3.9	10.0	0.3
(≥ 4 ha)			(98.4)	(56.2)	(48.8)	(11.6)
All	100.00	89270	56.6	11.7	27.3	4.4
			(96.8)	(58.1)	(57.3)	(15.1)

Data Source: Unit Level Data on Situation Assessment Survey of Agricultural Households in India (2012-13), 70th Round of NSS.

Note: Figures in parentheses indicate the percentage of households performing the activity.

Contribution of Income Sources to Inequality of Income

The smallholders' diversification towards such income sources may be due to land constraints forcing them to seek compensating earnings in low-paid wage activities, animal husbandry and low investment non-farm business activities. de Janvry *et al*. (2005) also found that large farmers tend to remain in agriculture, while small farmers diversify towards non-farm activities.

As is evident from Tables 2 and 3, there is a contrast in the pattern of income distribution of income sources by farm size and income levels. For instance, the income share of crop cultivation (non-farm business activities) improves with decreasing

(increasing) income quintiles but rises (declines) with reducing (increasing) landholding size. Birthal *et al.* (2014) also supported such findings.

Understanding inequality and formulating policies need to inspect how changes in a particular income source affect overall inequality (Singh and Dey, 2010; Manero, 2017). For example, the decomposition result of the Gini coefficient by sources of income of agricultural households is depicted in Table 4. As there are agricultural households that do not earn income from all the four income sources, zero values reported from such sources magnifies the value of the Gini coefficient.

TABLE 4. DECOMPOSITION OF INEQUALITY BY INCOME SOURCES ACROSS NORTH EASTERN STATES

State (1)	Source (2)	Income share (S_k) (3)	Source Gini (G_k) (4)	Gini correlation (R_k) (5)	Share in total Gini ($S_kG_kR_k/G$) (6)	Marginal contribution to Gini (per cent) (7)
Arunachal	Crop	0.52	0.68	0.84	0.46	-0.07 (0.016)
Pradesh	Livestock	0.08	0.94	0.67	0.08	-0.003 (0.004)
	Wages and salaries	0.32	0.90	0.85	0.37	0.05 (0.016)
	Nonfarm business	0.08	0.97	0.84	0.10	0.02 (0.007)
	Total income		0.66			
Assam	Crop	0.67	0.61	0.86	0.64	-0.03 (0.02)
	Livestock	0.10	0.88	0.55	0.09	-0.01 (0.01)
	Wages and salaries	0.20	0.88	0.73	0.24	0.03 (0.013)
	Nonfarm business	0.03	0.97	0.60	0.04	0.002 (0.004)
	Total income		0.55			
Manipur	Crop	0.33	0.49	0.55	0.16	-0.17 (0.008)
	Livestock	0.22	0.94	0.88	0.33	0.11 (0.017)
	Wages and salaries	0.40	0.78	0.85	0.47	0.07 (0.017)
	Nonfarm business	0.05	0.92	0.48	0.04	-0.01 (0.005)
	Total income		0.56			
Meghalaya	Crop	0.54	0.55	0.82	0.52	-0.02 (0.023)
	Livestock	0.10	0.91	0.69	0.14	0.03 (0.014)
	Wages and salaries	0.29	0.64	0.61	0.23	-0.05 (0.018)
	Nonfarm business	0.07	0.96	0.77	0.11	0.04 (0.014)
	Total income		0.48			
Mizoram	Crop	0.49	0.59	0.77	0.40	-0.08 (0.02)
	Livestock	0.12	0.92	0.74	0.15	0.03 (0.013)
	Wages and salaries	0.39	0.76	0.83	0.44	0.07 (0.024)
	Nonfarm business	0.01	0.98	0.26	0.00	-0.004 (0.002)
	Total income		0.54			
Nagaland	Crop	0.39	0.54	0.63	0.23	-0.17 (0.026)
	Livestock	0.12	0.94	0.73	0.14	0.02 (0.017)
	Wages and salaries	0.47	0.84	0.91	0.62	0.14 (0.027)
	Nonfarm business	0.02	0.99	0.69	0.02	0.003 (0.006)
	Total income		0.59			
Sikkim	Crop	0.20	0.47	0.45	0.08	-0.12 (0.011)
	Livestock	0.12	0.65	0.38	0.06	-0.07 (0.009)
	Wages and salaries	0.54	0.74	0.88	0.66	0.13 (0.027)
	Nonfarm business	0.14	0.94	0.79	0.20	0.06 (0.024)
	Total income		0.53			
Tripura	Crop	0.63	0.57	0.84	0.59	-0.04 (0.018)
	Livestock	0.06	0.95	0.63	0.07	0.01 (0.007)

Contd.

TABLE 4. CONCLD.

State (1)	Source (2)	Income share (S_k) (3)	Source Gini (G_k) (4)	Gini correlation (R_k) (5)	Share in total Gini ($S_kG_kR_k/G$) (6)	Marginal contribution to Gini (per cent) (7)
	Wages and salaries	0.29	0.72	0.74	0.31	0.02 (0.016)
	Total income		0.51			
NER	Crop	0.52	0.60	0.78	0.44	-0.08 (0.011)
	Livestock	0.12	0.92	0.70	0.14	0.02 (0.005)
	Wages and salaries	0.31	0.82	0.78	0.36	0.05 (0.008)
	Nonfarm business	0.05	0.97	0.69	0.06	0.01 (0.003)
	Total income		0.55			

Bootstrapped standard error with 50 replications in parentheses.

Data Source: Unit Level Data on Situation Assessment Survey of Agricultural Households in India (2012-13), 70th Round of NSS.

The Gini coefficient of the household total income has been estimated to be 0.55 for NER. The non-farm business income is the most unequally distributed (G_k = 0.97), but its share in total inequality is the lowest (6 per cent), probably due to its least share in the total income (5 per cent). The low value of the Gini correlation of non-farm business activities with total income (R_k = 0.69) indicates the biasness of the income source towards the lower-income quintile (as also evident from Table 2). On the contrary, income from crop cultivation is the most equally distributed (G_k = 0.60), yet, being the major source of income (S_k = 0.52), it contributes maximum (44 per cent) in total inequality. Figure 1 depicts the magnitude of the disproportionate income distribution along with a 95 per cent confidence interval from all four income sources.

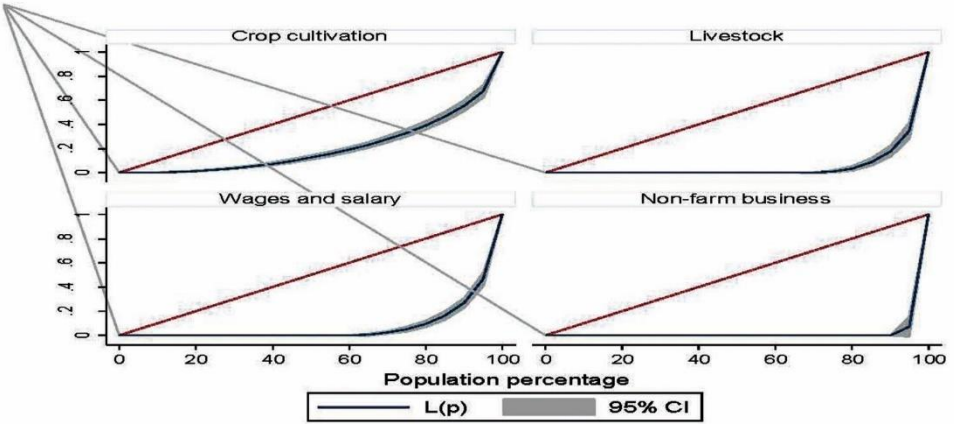

Fig 1. Lorenz Curves of Income Sources.

The high correlation of crop farming with total income (R_k = 0.94) indicates that households belonging to higher income strata derive more income from crop cultivation, hence contributing its share in total inequality. The inequality is also very high in the distribution of livestock income (G_k = 0.92). Still, because of the more significant participation of the poor in livestock production in the region, their

contribution to inequality is amongst the lowest (14 per cent). Wages and salaries are the second most equally distributed income source but, due to its high contribution in total income (S_k=0.31), its share in total inequality is high (36 per cent).

The income of households is most unevenly distributed in the state of Arunachal Pradesh (0.66) and Nagaland (0.59) (Figure 1). The distribution of income among households is comparatively more equal in Assam, Mizoram, Sikkim, Tripura and Meghalaya, which reported a lower Gini coefficient value than the average of NER (0.55) – lowest being in Meghalaya (0.48). The major source of income was crop cultivation in Arunachal Pradesh, Assam, Meghalaya, Mizoram and Tripura, which also reported this income source as the major contributor to total income inequality. Meanwhile, in the remaining states of Manipur, Nagaland and Sikkim, earnings from wages and salaries contributed the maximum to total income share and also to the total inequality. Non-farm business activities contributed the most negligible share in the total income in all the states except Sikkim and, by and large, contributed the least to the total inequality. Surprisingly, the percentage of income from livestock to the total income is low (6 per cent in Tripura to 22 per cent in Manipur), given that livestock forms an essential component of the farming system and livelihood in the NER (Priscilla and Chauhan, 2019). This may be due to its small-scale and subsistence nature characterised by a low-intensive production system.

The marginal effect is considered the more effective way to establish whether changes in an income component increase or decrease overall inequality. For all the states and NER as a whole, the marginal effect value of income from crop cultivation is negative, implying that this source has an inequality decreasing effect. For instance, a one per cent increase in income from crop cultivation will reduce inequality by 0.08 per cent *ceteris paribus*. Therefore, efforts to improve income distribution in the north-eastern states should increase income from crop production. However, Shariff and Azam (2009) noted that a marginal increase in agricultural income increases inequality.

In case of the other income sources viz., livestock, wages and salaries and non-farm business activities, marginal effect values were positive for the NER as a whole, while state-wise analysis showed some variations. Arunachal Pradesh, Assam and Sikkim have a negative marginal effect on livestock income, indicating that improvement in the livestock sector can contribute to the reduction in inequality in these states. Concerted efforts to improve income from livestock will go a long way in improving income distribution and augmenting the income level of agricultural households. In the case of income from wages and salaries, only Meghalaya reported a negative marginal effect indicating its inequality-decreasing impact in the state. Similarly, measures to augment income from non-farm business activities will equalise effect in Manipur and Mizoram. Choudhary and Singh (2019) also reported that income from non-farm activities increases income inequality. On the contrary, Vatta and Sidhu (2007) and Pavithra and Vatta (2013) reported that non-farm sources reduce the overall income inequality in Punjab.

Decomposition of Income Inequality Within and Between States, Districts and Landholding Category

Apart from decomposing inequality by income source, horizontal decomposition of inequality into within and between states, districts and landholding categories was also performed using the Theil index. Table 5 clearly illustrates that the 'within' value of the index is more than the corresponding 'between' values for all the sources and total income. This indicates that intra-state, intra-district and intra-landholding size inequality is the main contributor to total inequality.

TABLE 5. THEIL INDEX OF INEQUALITY

	State		District		Land category	
Income source	Between	Within	Between	Within	Between	Within
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop	0.05	0.77	0.02	0.80	0.18	0.64
Livestock	0.13	2.22	0.20	2.14	0.01	2.34
Wages & Salaries	0.07	1.36	0.09	1.34	0.01	1.41
Non-farm business	0.26	2.96	0.33	2.90	0.04	3.19
Total income	0.02	0.59	0.01	0.60	0.07	0.54

Data Source: Unit Level Data on Situation Assessment Survey of Agricultural Households in India (2012-13), 70th Round of NSS.

Table 6 depicts the state-wise household total income decomposition by district and landholding category. We find that the within-district inequality is higher than the between-district values in all the states. For the NER as a whole, it accounts for around 98 per cent of the average inequality indicated by the Theil index (0.61). In the case of Tripura, the within-district inequality accounted for about 99 per cent of the state's average inequality, while Manipur (68 per cent) and Arunachal Pradesh (74 per cent) reported the least. Similarly, the within-landholding size inequality is higher than it's between values in all the states. Mizoram recorded the highest (99 per cent) within value in this respect, while Assam and Tripura, the least (around 80 per cent). Therefore, policies aimed at eliminating income differences between the various states, districts and landholding sizes would not be effective. Instead, efforts should be directed to even out the income inequality of agricultural households within a state, district or landholding category.

IV

CONCLUSION AND POLICY IMPLICATIONS

The study examined the prevailing income inequality among agricultural households in the Northeast India and analysed the impact of different income sources on household income. There were considerable differences in the annual income of agricultural households amongst different states varying between Rs. 65205 in Tripura to Rs. 141426 in Meghalaya during 2012-13. Income from agriculture constitutes the largest source of all income classes. The higher income classes have relatively larger landholdings, other assets, education and skills which helped them to have more diversified income sources. As they had easier access to non-agricultural activities than

TABLE 6. STATE-WISE HOUSEHOLD INCOME ANALYSIS AND DECOMPOSITION BY DISTRICT AND LAND CATEGORY

State	Theil	District		Land category	
		Between	Within	Between	Within
(1)	(2)	(3)	(4)	(5)	(6)
Arunachal Pradesh	0.79	0.20	0.59	0.03	0.77
		(25.6)	(74.4)	(3.3)	(96.7)
Assam	0.71	0.06	0.65	0.14	0.56
		(8.3)	(91.7)	(20.1)	(79.8)
Manipur	0.56	0.18	0.38	0.03	0.52
		(31.7)	(68.3)	(6.0)	(94.2)
Meghalaya	0.40	0.05	0.34	0.03	0.37
		(13.4)	(86.6)	(7.6)	(92.4)
Mizoram	0.52	0.14	0.38	0.01	0.51
		(26.6)	(73.5)	(1.2)	(98.8)
Nagaland	0.63	0.07	0.55	0.05	0.58
		(11.7)	(88.3)	(8.7)	(91.3)
Sikkim	0.50	0.01	0.49	0.08	0.42
		(2.0)	(98.0)	(16.3)	(83.7)
Tripura	0.52	0.01	0.51	0.10	0.41
		(0.7)	(99.3)	(20.2)	(79.8)
North East Region	0.61	0.01	0.60	0.07	0.54
		(1.7)	(98.4)	(11.1)	(88.9)

Data Source: Unit Level Data on Situation Assessment Survey of Agricultural Households in India (2012-13), 70th Round of NSS.

Note: Figures in parentheses indicate percentage to average Theil value.

relatively lower income classes due to better education and skills, the income share from crop cultivation declined with an increase in income class. The gini coefficients reflected inequality reducing nature of agricultural income and inequality inducing character of non-agricultural income sources.

The study points to the need for policy measures which can not only enhance the income of agricultural households but may also reduce the income inequality. This will lead to a more egalitarian development strategy and it also fits well with the agenda of doubling of farmers' income of the Union Government. For enhancing agricultural income of the region there is need to promote high value crops in the rice fallow by using modern technologies and inputs. The non-farm income sources are inequality enhancing basically due to skewed distribution of skills and education required for engaging in such activities. Only the richer households possess the necessary skills and education to get access to non-farm activities which further raise their income and feed into inequality. It calls for special drive to enhance skills and education of the poor households to improve their access to non-farm income. It also calls for concerted measures for improvement of basic infrastructure - road, transportation, power, irrigation, storage facilities, processing facilities, finance and extension services with special focus on human resources and skill development for farm and non-farm sector and development of innovative market institutions. Further, the study finds that within-state, within-district and within-landholding inequality were higher than the respective 'between' values. This calls for policy intervention at state, district and landholding

categories for correcting the imbalances in income distribution among farm households that would lead to more inclusive and equitable development.

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NOTES

1) Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

2) An agricultural household for this survey was defined as a household receiving some value of produce more than Rs.3000/- from agricultural activities (e.g., cultivation of crops, animal husbandry, poultry, fishery, piggery, bee-keeping, vermiculture, sericulture etc.) and having at least one member self-employed in agriculture either in the principal status or in subsidiary status during last 365 days.

3) Income from the cultivation of various seasonal and annual crops constitutes income from crop farming. Income earned by a household from the sale of multiple products like milk, eggs and live animals makes up income from livestock farming. Wages and salaries are derived by various household members employed in labour outside their household. Income from wholesale and retail trade, manufacturing, transportation and storage, accommodation and food service, construction, and other services comes under non-farm business.

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