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## **Does ‘Space’ Have a Say on Agricultural Households’ Income Choices?**

**S.J. Balaji and Suresh Pal\***

### **ABSTRACT**

In line with the first law of geography, employment diversification take place in clusters – as ‘*hot spots*’ and ‘*cold spots*’. Farm households organise themselves on economic activities in part based on their neighbourhoods’ preferences. In other words, neighbourhoods tend to be clusters of households with similar preferences. Part-time-farming approach, which is being felt across states in recent times, is no exception. In a farm-non-farm policy perspective, these ‘*hot*’ and ‘*cold*’ spots attract significant attention as specific agricultural/industrial policies can be brought out at these clusters than any aggregate levels. The study, of its first kind for the country, attempts to locate potential ‘*rural hot spots*’ where this ‘*priority shift*’ of farmers takes place, especially of the vulnerable small holder households who lack capital assets to sustain their farm based livelihood. Spatial econometric approaches are adopted and Global and Local Indicators of Spatial Association (LISA) are used in filtering out these ‘*hot*’ and ‘*cold*’ spots. Results reveal that high income households live in general at south Indian and selected parts of north and west Indian regions. Income clusters extend beyond states’ boundaries, and not all the districts within a state fall in any given income group. The ‘*hot spots*’ of income diversification lie in southern and western regions and the central Indian region is characterised with ‘*cold spots*’ rather than ‘*hot spots*’. The scenario holds true when marginal and small farmers alone are considered, but varies with exposure to vulnerability factors. In presence of vulnerability, the ‘*cold spot*’ clusters turn to be random, not confined to any given region. The results suggest for ‘*cluster approach*’ rather than ‘*state approach*’ in devising farm and non-farm policies for the farmers.

**Keywords:** Labour shift, Non-farm diversification.

**JEL:** Q12, Q16, J24, J43

### **I**

### **INTRODUCTION**

Rural Non-farm Employment (RNFE) has proved in recent times as the engine of rural growth. The sector roughly contributes one-third to one-fifth of rural earnings in developing world (Hagblade *et al.*, 2010). In the Indian context, the sector recorded expansion of output, employment and productivity growth during 1980s, but shrunk during the decade in terms of structural adjustment (Bhalla, 2000). Following a rural-to-urban capital relocation, development of new rural industries became less impressive (Start, 2001). The recent experiences indicate expansion, but signal increasing casualisation (Jatav 2010), quality deterioration and distress-driven expansion (Jatav and Sen, 2013).

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Albeit, the sector commands no less importance than the rural agriculture not just as it employs sizeable labour but on several welfare grounds. It contributes to falling poverty directly by employment expansion and indirectly through linkages with agriculture (Lanjouw and Murgai, 2009). Especially, the sector acts as an avenue of higher income, as a resort when agriculture fails (Cunguara *et al.*, 2011) and as a source that relax farm credit and capital constraints (Oseni and Winters, 2009, Bapatunde and Qaim, 2010). But then, neither the growth has been inclusive across space, nor the beneficiaries have been from different class of people. There had been considerable heterogeneity across geographies, productivity and diversity in farm environment, and rural-urban labour absorption processes. A recent study by the International Labour Office (ILO) portray that economically weaker sections of the rural society shift more than the rest to the rural non-farm sectors (Saha and Verick, 2016). One would find no traceable homogeneity in development, spread and causes of preference towards non-farm engagements. Policy interventions have been less developed, and has been at broader context.

Perceptions emerge out at this backdrop is that bringing in front the RNF sector to address rural woes demand policy frameworks to be filtered at contextual and regional levels since causes and consequences differ in different clusters. In line with Tobler's words, who states as first law of geography that '*everything is related to everything else, but near things are more related than distant things*', '*location matters*'. Preferences are bounded with geographic proximity. Farm households organise themselves on economic activities in part based on neighbourhoods' preferences. In other words, 'neighbourhoods tend to be clusters of households with similar preferences'. Externalities of spill over, be it of technology or of information, percolate faster within the clusters.

Possibly late, a striking feature observable among the rural farm households in India recently is a '*hybrid*' kind of income dependence. Not just the labour households shift their priorities as an '*off-the-farm*' mode by sharing labour services, but the cultivators as well are participating in a '*part-time farming*' based approach (Binswanger and Dsouza, 2012). The behaviour of diversifying farm households could not be an exception to the spatial concept. Efforts that deal with these '*diversification clusters*' - the '*hot spots*' and '*cold spots*' of diversification – are scarce in the Indian context. To our knowledge, literature is yet to emerge that locate potential rural non-farm diversification clusters with high spatial association at disaggregated geographical units. The present study, of its first kind for the country, attempts to locate potential '*rural hot spots*' where the '*priority shift*' takes place. It restricts its attention on farm households as a shift towards non-farm engagement have greater implications than the shift of rural labour. It also locates the marginal and small farmers' diversification behaviour in the presence and absence of vulnerability factors.

## II

## DATA, VARIABLES AND METHODOLOGY

The study uses household survey information provided in "Situation Assessment Survey of Agricultural Households" for the year 2013 conducted by the National Sample Survey Office (NSSO) of India for our enquiry. The survey gathers information from 35,200 agricultural households spread across 631 districts in the country. Each household is contacted twice a year (visit-1 and visit-2)<sup>1</sup> and different aspects of farming are recorded for each visit. For better understanding, we use information recorded in visit-1 alone.

We employ spatial correlation approach for our purpose, which precedes with proper choice of variable. Having stated that the present study attempts to isolate 'hot' and 'cold' spots of income diversification, especially for the vulnerable small farm households, we begin with defining the variable that proxy non-farm diversification and clarify vulnerable sections. (a) *Diversification*: We measure diversification as a ratio of non-farm earnings to the farm income earnings, realised either by offering labour services or acting as a self-employed individual in RNF sector. We use gross rather than net income in computing income shares as a meagre or negative net income in one occupation would greatly inflate the ratio. We consider animal rearing as part of the agricultural activity and include 'livestock income' as a component of farm income if performed in addition to crop cultivation. (b) *Vulnerability*: Distress factors alter farm households' income avenues, especially the households with meagre holdings. If not all, many households diversify their strategies of earnings in response to these factors, especially in when farming fails to be remunerative. Under bounded rationality, a vulnerable household would tend to sustain livelihood/maximise income through wage earnings by offering labour services in other agricultural and non-agricultural occupations in the vicinity. In present context, we define a farm household 'vulnerable' when cultivation is exposed to either to abiotic factors such as rainfall inadequacy, drought, flood, fire etc., or biotic factors like pests and diseases, damage due to animals, resulting in crop loss.

We use the concepts of spatial econometrics in exploring 'hot' and 'cold' spots. Global and local measures of spatial correlation are used for this purpose. The global index measures overall spatial connectedness among the spatially close regions in the given study area and summarises the variable of interest in a single value. We use the global Moran's index (Moran, 1948), called shortly as Moran's I for this purpose. The index is defined as

$$I = \frac{\sum_{i=1}^N \sum_{j=1}^N w_{ij} (y_i - \bar{y})(y_j - \bar{y})}{\frac{1}{N} \sum_{i=1}^N (y_i - \bar{y})^2 \sum_{i=1}^N \sum_{j=1}^N w_{ij}}$$

where  $y_i$  is the value taken by the variable of interest Y,  $\bar{y}$  is the mean and  $w_{ij}$  is the spatial weight matrix. The value of I ranges between -1 and +1. Under the null hypothesis of no global spatial autocorrelation, the expected value of I is

$$E(I) = -\frac{1}{N-1}$$

$I > E(I)$  indicates positive spatial autocorrelation, whereas  $I < E(I)$  other. The variable Y tend to have similar values in the former case, and exhibit dissimilar values in the latter. We use distance based approach rather than boundary based types in constructing spatial weight matrix, and use binary matrix as they are more appropriate for exploratory purpose. We adopt  $k$ -nearest neighbour type, defining  $k=4$ . Note that the global Moran's I measure the general tendency of clustering but does not identify specific spatial clusters. Since we focus to locate 'hot' and 'cold' spots, we use local indices of spatial correlation (LISA) to achieve our purpose (Anselin, 1995). We use local Moran's I, defined as

$$I_i = \sum_{j=1}^N w_{ij}^{std} \left( \frac{y_i - \bar{y}}{\sigma_y} \right) \left( \frac{y_j - \bar{y}}{\sigma_y} \right)$$

where  $\sigma_y$  denotes standard deviation in Y and  $w_{ij}^{std}$  denotes the elements of a row-standardised spatial weights matrix.

### III

#### RESULTS AND DISCUSSION

##### (a) *Rural Income and Employment Diversification*

We observe that cultivation remains as major source of income for around 70 per cent of agricultural households in rural India. Wage earnings, in both agricultural and non-agricultural activities, form next major income source. More than 20 per cent agricultural households depend on labour services alone. Animal rearing and non-farm enterprises serve just around 5 per cent of the respondents as major income providers respectively. But many of the households depend not just the primary occupation but diversify their income sources. To begin with, we portray different sources of income of the households surveyed in Table 1. The major income sources are represented in rows, and columns list additional activities carried out.

TABLE 1. OCCUPATIONAL DIVERSITY MATRIX (2012-13)

| Principal source of income<br>(1) | Activities carried out |                  |                                  |                                 |                           |
|-----------------------------------|------------------------|------------------|----------------------------------|---------------------------------|---------------------------|
|                                   | Cultivation<br>(2)     | Livestock<br>(3) | Other agri.<br>activities<br>(4) | Non-agri.<br>enterprises<br>(5) | Wage<br>employment<br>(6) |
| Cultivation                       | 100                    | 72               | 8                                | 11                              | 38                        |
| Livestock                         | 59                     | 100              | 9                                | 11                              | 38                        |
| Other agri. activities            | 89                     | 69               | 100                              | 15                              | 47                        |
| Non-agri. enterprises             | 84                     | 64               | 11                               | 100                             | 28                        |
| Wage employment                   | 82                     | 71               | 10                               | 10                              | 100                       |

Source: Authors' estimates based unit level data (SAS, 2012-13).

Note: (a) Figures reported are in per cent terms; (b) diagonal figures are base categories upon which other figures are derived; (c) multipliers provided in survey are used in arriving at the figures.

Cultivators earn additional incomes mainly through livestock rearing and wage receipts. Around 70 per cent of the cultivators carry out animal rearing, and 40 per cent engage in wage employment. The livestock based farm households as well prefer raising crops and offer labour services in farms, i.e., 59 per cent and 38 per cent respectively. Note that wage payments discussed here include both farm and non-farm sectors. Agricultural activities other than crop and livestock rearing, like growing of plantation crops, maintaining orchards, carrying forestry, logging, fishery activities, are described as 'other agricultural activities' and are carried along with crop cultivation most of the times (89 per cent). Again, animal rearing becomes an integral part of more than two-third of the times (69 per cent). The situation almost holds equal for non-farm enterprise and wage dependent households as well. More than 80 per cent of the non-farm dependents grow crops, and around 65 per cent of them rear livestock. Crop and livestock form around 82 per cent and 71 per cent of the wage dependents' next major income sources.

(b) *Small Farmers, Vulnerability and Diversification*

Marginal and small farmers together form 85 per cent of agricultural households, and hence become the largest among vulnerable groups. Abiotic forces form the basic cause of vulnerability, among others. Around one-fifth of the agricultural households report exposure to drought and rainfall inadequacy. An interesting observation emerge out is that size of land possessed and exposure to vulnerability appears to be correlated. Exposure to drought and rainfall inadequacy exhibit a linear trend; it increases with size of holding. While just 16 per cent of marginal farmers report exposure, it turns to 24 per cent for the small holder category. It increases further to 29 per cent, 35 per cent and 45 per cent respectively for the semi-medium, medium and large farmers respectively. Rather, this linear trend turns to be quadratic, a consistent increase till semi-medium category followed by a decline, for other factors. To note, the estimates report just exposure, not the impact or adaptive capacity of the exposed. On this front, it demands a detailed inquiry.

TABLE 2. EXPOSURE TO VULNERABILITY OF DIFFERENT CLASS OF FARMERS

| Farmer category<br>(1) | Frequency<br>(2) | Causes of crop loss and exposure to vulnerability (per cent) |                                |  |                      |
|------------------------|------------------|--|--------------------------------|--|----------------------|
|                        |                  | Inadequate rainfall/drought<br>(3)                           | Pests/diseases/ animals<br>(4) | Other natural causes (fire, flood etc.)<br>(5) | Others causes<br>(6) |
| Marginal               | 65.97            | 16.37  | 8.36                           | 5.63   | 1.39                 |
| Small                  | 18.77            | 24.19  | 9.45                           | 7.68   | 1.95                 |
| Semi-medium            | 10.68            | 28.77  | 11.06                          | 8.88   | 2.48                 |
| Medium                 | 4.11             | 35.15  | 9.11                           | 7.22   | 2.39                 |
| Large                  | 0.48             | 45.12  | 8.86                           | 7.76   | 1.49                 |
| All                    | 100.00           | 20.07  | 8.88                           | 6.44   | 1.66                 |

Source: Authors' estimates based unit level data (SAS, 2012-13).

Note: (a) Figures reported are in per cent terms; (b) multipliers provided in survey are used in arriving at the figures.

In Table 3, we provide income estimates in different activities across land holder categories. We provide the estimates separately for those reporting exposure to abiotic and biotic factors and for the unexposed, so as one could compare the differences in earnings. The table provide us a variety of information on the behaviour of agricultural households. As expected, crop income dominates in all sources, contributing 50 per cent to 60 per cent of total earnings. Surprisingly, the next major source is neither the wage income, nor the income earned through livestock. It is the non-farm businesses which stands as the first choice of diversification. Roughly, they contribute around 15 per cent of total income. The

TABLE 3. DIVERSIFICATION BEHAVIOUR OF FARM HOUSEHOLDS

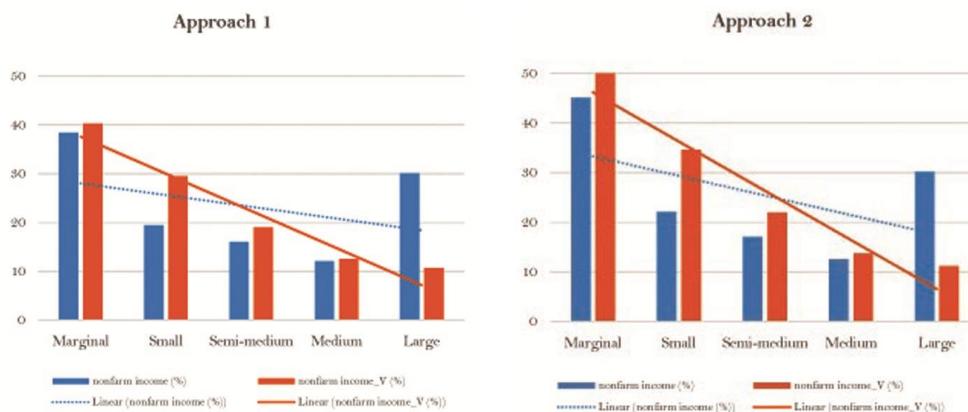
| Diversification activities<br>(1) | Household income (Rs./month)           |                                    |                   |
|-----------------------------------|--|------------------------------------|-------------------|
|                                   | Not exposed to<br>vulnerability<br>(2) | Exposed to<br>vulnerability<br>(3) | Difference<br>(4) |
| All                               |  |                                    |                   |
| a. Crop income                    | 7876                                   | 6290                               | 1586              |
| b. Livestock income               | 1637                                   | 1562                               | 75                |
| c. Non-farm – business income     | 2189                                   | 1967                               | 222               |
| d. Non-farm – wage income         | 1303                                   | 1243                               | 60                |
| e. Wage income (agriculture)      | 485                                    | 649                                | -164              |
| Marginal                          |  |                                    |                   |
| a. Crop income                    | 3291                                   | 2486                               | 805               |
| b. Livestock income               | 1228                                   | 1116                               | 112               |
| c. Non-farm – business income     | 1767                                   | 1546                               | 221               |
| d. Non-farm – wage income         | 1396                                   | 1373                               | 22                |
| e. Wage income (agriculture)      | 552                                    | 725                                | -173              |
| Small                             |  |                                    |                   |
| a. Crop income                    | 9964                                   | 6220                               | 3744              |
| b. Livestock income               | 2080                                   | 1687                               | 394               |
| c. Non-farm – business income     | 1922                                   | 2484                               | -562              |
| d. Non-farm – wage income         | 1093                                   | 1079                               | 15                |
| e. Wage income (agriculture)      | 410                                    | 624                                | -214              |
| Semi-medium                       |  |                                    |                   |
| a. Crop income                    | 19021                                  | 11158                              | 7864              |
| b. Livestock income               | 2400                                   | 2311                               | 89                |
| c. Non-farm – business income     | 3199                                   | 2246                               | 953               |
| d. Non-farm – wage income         | 941                                    | 1027                               | -86               |
| e. Wage income (agriculture)      | 269                                    | 517                                | -248              |
| Medium                            |  |                                    |                   |
| a. Crop income                    | 43982                                  | 24110                              | 19872             |
| b. Livestock income               | 4229                                   | 3189                               | 1040              |
| c. Non-farm – business income     | 4906                                   | 2782                               | 2123              |
| d. Non-farm – wage income         | 1751                                   | 1172                               | 579               |
| e. Wage income (agriculture)      | 251                                    | 376                                | -124              |
| Large                             |  |                                    |                   |
| a. Crop income                    | 109108                                 | 55791                              | 53317             |
| b. Livestock income               | 9300                                   | 4123                               | 5177              |
| c. Non-farm – business income     | 50704                                  | 6276                               | 44428             |
| d. Non-farm – wage income         | 328                                    | 935                                | -607              |
| e. Wage income (agriculture)      | 127                                    | 329                                | -201              |

Source: Authors' estimates based unit level data (SAS, 2012-13).

Note: (a) Estimates are based on households excluding landless; (b) Values reported are total (not net) earnings and are in current prices; (c) multipliers provided in survey are used in arriving at the figures.

other interesting point that emerge is the choice of non-farm business income stands common irrespective of the fact that whether one is exposed to vulnerability or not. Both the groups prefer non-farm enterprises as the best choice, and livestock rearing acts only as the next best. Further, within the non-farm sector, business income is higher than the wage income, indicating the preference of business-oriented shift than the wage-dependent shift. The choice of offering labour services as well skew in favour of non-farm sectors. Wage gains are relatively higher in non-farm sector, and at least double than that of farm wage earnings (2.7 times and 1.9 times for the unexposed and exposed groups respectively). Agricultural wage increases only in the presence of vulnerability factors. The average agricultural wage income raises from Rs.485 per month to Rs.649 per month. On the other hand, other earnings decrease on exposure.

Observing the estimates of different land holder categories indicate at first sight the fact that marginal and small farmers tend to diversify their income avenues more than the rest. Though the absolute incomes are smaller, relative compositions are large (Figure 1). For example, assuming non-farm income excludes crop, livestock and farm wage income (Approach-1), share of income earned through non-farm enterprises and wages account around 40 per cent of the marginal farmers' total income. For the small holder category, it falls by half, to 20 per cent. Under exposure to vulnerability, it stands at 30 per cent, a 10 per cent additional income earned than the unexposed, indicating vulnerability triggers non-farm earnings. Non-farm share falls continuously since then, reaching a 12-13 per cent for the medium size category irrespective of the status of exposure. The large farmers typically deviate from the trend. While the share of non-farm income continue to decline under vulnerability, it jumps to 30 per cent under non-exposure. It jumps by 10 times of what a medium farmer earns. Or only when crop and livestock earnings are considered as farm



Source: Authors' estimates based on SAS 2012-13.

Figure 1. Relative Share of Non-Farm Income across Farmer Categories (All-India, 2012-13).

income (Approach-2), the estimated figures turn higher, still, the observations remain the same. This clearly indicates entry of large farmers into high productive non-farm jobs. They act as monopoly earners in high productive business enterprises, whereas, on the other hand, marginal small farmers shifting to low productivity jobs. A further enquiry into kinds of enterprises they enter would reveal greater details, we restrict out the efforts for future.

### (c) The 'Hot' and 'Cold' Spots of Diversification

The lessons that emerge out from the above are manifold. These findings provide new insights into the traditional belief that a shift towards non-farm employment is not just a choice of rural labour, but the farm households as well. The implication of such preferences are beyond the purpose of current enquiry; still, it instruct us the scope for and benefits of developing new non-farm industries in rural areas. It portrays the preferences of agricultural households towards non-farm engagements, especially when they are experienced to abiotic and biotic factors affecting crop output. But as discussed, location matters. Diversification choices result from several factors, ranging from pull and push forces the household experience to industrial proximity, asset holdings, risk bearing capacity, literacy levels and others.

We explore the total and non-farm distribution of farm households and presence of spatial clusters. To start with, we consider farm households reporting agriculture as a primary income source, who constitute 72 per cent of the surveyed households. We lose around 8400 observations (28 per cent) in doing so. Such trimming becomes necessary as the study focus the diversification behaviour of 'cultivators' alone. A preliminary statistics justify our exclusion, showing notable differences in earnings among the 'cultivators' and the rest (Figure 2). Especially, one could find differences in the pattern of crop and non-farm earnings among them, necessitating to consider as

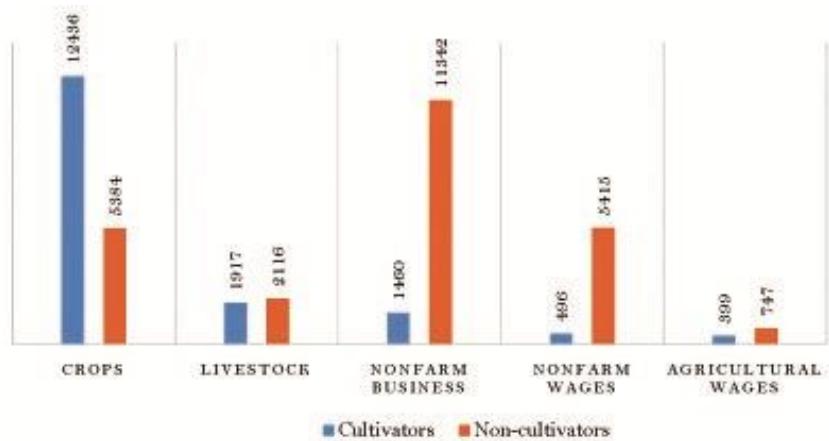


Figure 2. Farm and Non-Farm Earnings of Cultivators and the Rest (All-India, 2012-13).

separate groups rather than pooling. Next, we exclude the households reporting non-farm income as less than 5 per cent of total income in both the approaches. To recall, we define the measure of diversification as the ratio of income in non-farm earning using two different approaches. Approach-1 sums up wage and business earnings in agriculture and Approach-2 adds agricultural wages as well. Further, we attempt to observe spatial associations in the presence and absence of exposure to vulnerability factors.

Figure 3 shows total income distribution across the districts of India and Figures 4 and 5 show non-farm income measured in two different approaches as discussed earlier. One could observe at first glance the inter and intra state heterogeneity in farm households' earnings. Many of the high income households live in the districts of south India and selected regions in north India. In fact, the 'high income' categories appear in groups are not confined within any given state's boundary. Rather, they share their border of neighbouring states as well. Moreover, not all the districts within a state fall in any particular income group. These observations strongly reveal the need for '*cluster approach*' rather than '*state approach*' in devising and suggesting policies for the farmers. While notable patterns can be observed in total income levels, status of non-farm earnings depict a different picture. Irrespective of the measures we adopt, the study finds that diversification preferences are highly scattered, meaning that dominance of non-farm earnings of the farm

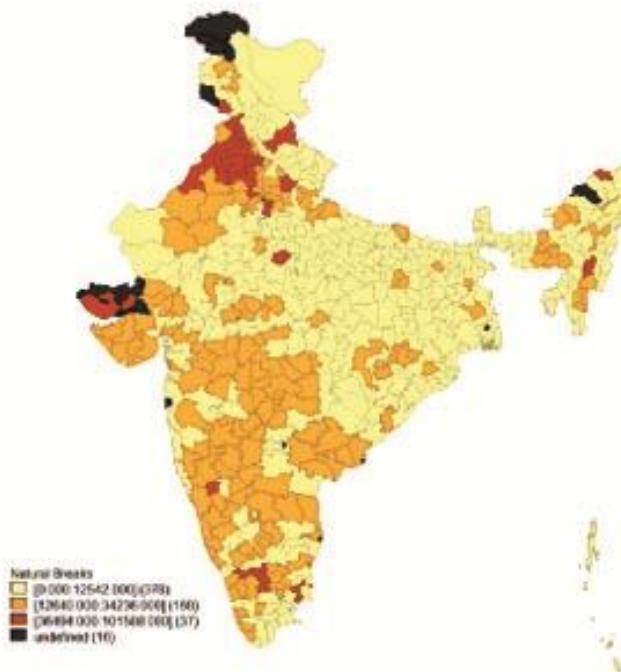


Figure 3. Household Income Distribution across Districts (Total Income, Rs./Rural Household).

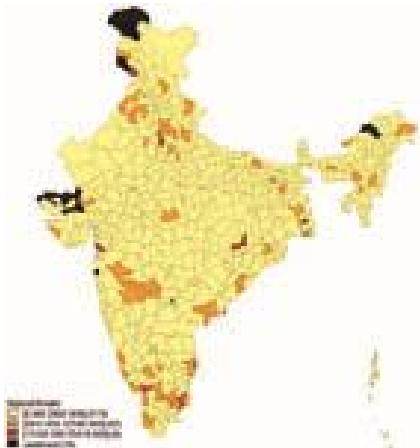


Figure 4. Non-Farm Income Distribution across Districts (Non-Farm Business and Non-Farm Wage Income, Rs./Rural Household).

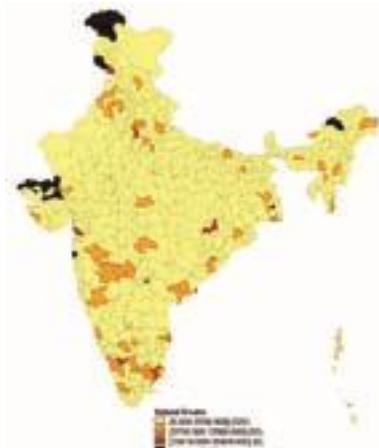


Figure 5. Nonfarm Income Distribution across Districts (Nonfarm Business, Nonfarm & Farm Wage Income, Rs./Rural Household).

households are uneven across space. While some preliminary observation can be made, one could find in general the low non-farm preferences in central Indian region. Further, many districts in this region are characterised with low total income levels. This urge us to study the causes the pattern, especially the farm productivity levels, localisation of non-farm industries and factors that control these both.

We describe in Table 4 different clusters and the number of districts falling under each type. As discussed above, we observe in general a low spatial association in nonfarm diversification, shown by an 'insignificant dependence' in 513 districts in the country (Approach-1) showing huge heterogeneity in diversification decisions of farm households. Given the vast geography, differences in climate, culture and relevant factors, the observed pattern is not of surprise. Rather, it provides us the directions with which region specific employment policies can proceed. For example,

TABLE 4. 'HOT' AND 'COLD' SPOTS OF NONFARM DIVERSIFICATION

| Diversification measure<br>(1) | Spatial association<br>(2) | Farm household group |                         |                                       |
|--------------------------------|----------------------------|----------------------|-------------------------|---------------------------------------|
|                                |                            | All<br>(3)           | Marginal + small<br>(4) | Vulnerable<br>marginal + small<br>(5) |
| Approach-1                     | High-High                  | 16                   | 12                      | 12                                    |
|                                | High-Low                   | 6                    | 11                      | 6                                     |
|                                | Low-High                   | 18                   | 19                      | 28                                    |
|                                | Low-Low                    | 30                   | 18                      | 33                                    |
|                                | Insignificant              | 513                  | 523                     | 504                                   |
| Approach-2                     | High-High                  | 36                   | 31                      | 24                                    |
|                                | High-Low                   | 15                   | 15                      | 7                                     |
|                                | Low-High                   | 18                   | 20                      | 18                                    |
|                                | Low-Low                    | 54                   | 51                      | 41                                    |
|                                | Insignificant              | 460                  | 466                     | 493                                   |

Note: Figures reported are number of districts identified.

the results show that just 16 out of all 583 districts exhibit high interdependence, falling under out '*hot spot*' purview. These '*hot spots*' are found in southern states, especially in northern districts of Tamil Nadu and Kerala (Figure 6). Other '*hot spots*' include parts of Gujarat and Rajasthan. The spillover effects would be relatively faster within these clusters, either of the information or of the non-farm policies targeting farm households. On the other end, 30 districts have low levels of diversification in itself and in their surrounding regions. The central and eastern Indian regions fall under this '*cold spots*' category. These districts would require special attention while policies are thought of to promote non-farm employment among the farm households as diversification decisions show no inter-dependence. Six districts have high diversification, but bordered by the districts with low diversification, and the converse in 18 districts. When farm wages are added with non-farm earnings (Approach-2), the number of '*hot spots*' doubles, still obeying with the major patterns observed above. Rather, the regions of focus vary. We observe new '*hot spots*' in central and eastern parts, and the '*cold spots*' shifts from central to northern and north-eastern clusters (Figure 7).

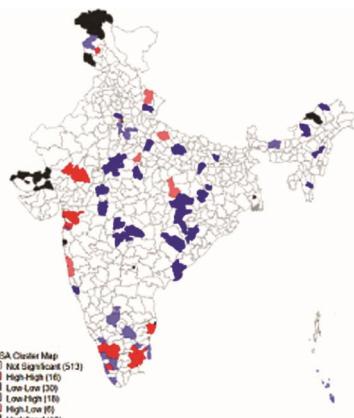


Figure 6. 'Hot' and 'Cold' Spots of Non-Farm Diversification (All Farmers, Approach-1).

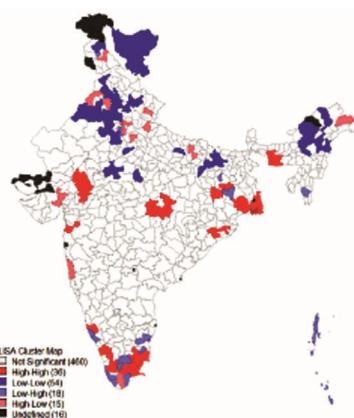


Figure 7. 'Hot' and 'Cold' Spots of Non-Farm Diversification (All Farmers, Approach-2).

When focusing on the behaviour of marginal and small farm households, while number of districts vary, the overall pattern remains unaltered. The number of districts in cluster decrease but the '*hot*' and '*cold*' spot regions remain fixed in both Approach-1 and 2 as observed for the 'all farmers' category (Figures 8 and 9). This provide us an important information that though the factors that drive households towards diversification vary between marginal and small farmers with the rest, the regions of change remain more or less similar. Under the exposure to vulnerability factors, an important deviation we observe from the previous patterns is that the regional phenomenon breaks down for the '*cold spot*' regions (Figures 10 and 11).

The '*hot*' and '*cold*' spot regions turn to be random, other than at the north-eastern regions, proving complexity in behavioural understanding.

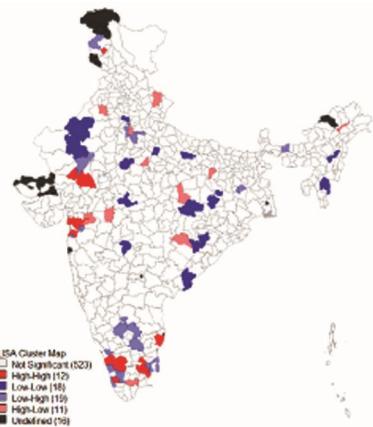


Figure 8. 'Hot' and 'Cold' Spots of Non-Farm Diversification (Marginal and Small Farmers, Approach-1).

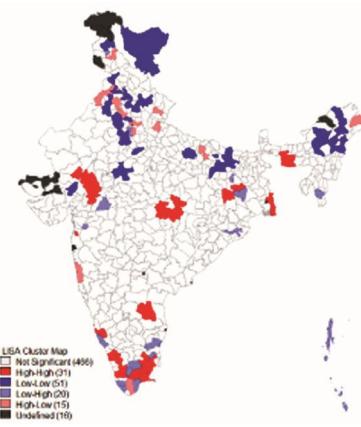


Figure 9. 'Hot' and 'Cold' Spots of Non-Farm Diversification (Marginal And Small Farmers, Approach-2).

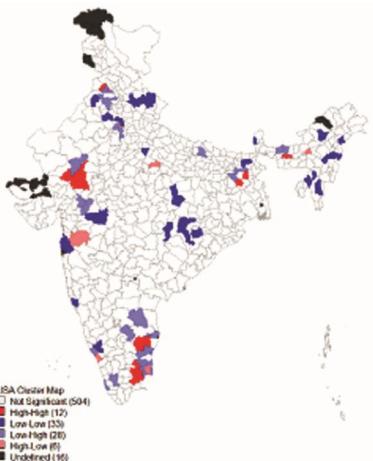


Figure 10. 'Hot' and 'Cold' Spots of Non-Farm Diversification (Vulnerable Marginal and Small Farmers, Approach-1).

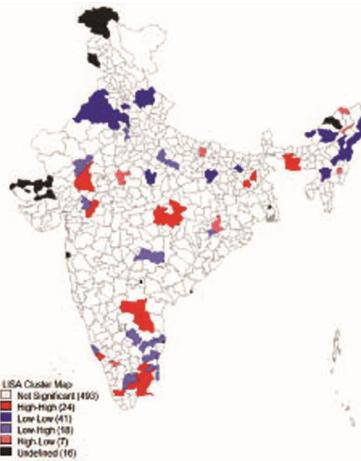


Figure 11. 'Hot' and 'Cold' Spots of Non-Farm Diversification (Vulnerable Marginal and Small Farmers, Approach-2).

#### IV

#### CONCLUSIONS

The present study attempted to explore '*hot*' and '*cold*' spots of non-farm diversification across districts in rural India. Especially, it studied the earning

behaviour of farm households in totality, and of the marginal and small farmers with and without exposure to vulnerability factors affecting crop output. The results add several interesting information to the existing non-farm literature. Many of the high income households live in the districts of south India and selected regions in north and west India. Income levels in central and eastern India are relatively less than their counter parts. Income clusters share their borders with neighbouring states, and are not confined within any state. Further, not all the districts within a state fall in a particular income group. Distribution of non-farm earnings, measured using two different approaches, depict a different picture. Diversification preferences are highly scattered, and dominance of non-farm earnings are uneven across space. We find low non-farm preferences in central Indian region, at which total households earnings are less.

The diversification '*hot spots*' lie in southern and western regions when business and wage earnings in non-farm sectors are considered as income diversification sources. The central Indian region is characterised with clusters of '*cold spots*'. It holds true when marginal and small farmers alone are considered, but varies with exposure to vulnerability factors. In the presence of vulnerability, clusters of '*cold spots*' turn to be random, not confined within any region. When farm wages are also added along with, new '*hot spots*' emerge at central and eastern regions, and the '*cold spots*' shift to the northern region. But changes observed in earlier approach remain unaltered when marginal and small farmers alone are considered in the presence and absence of exposure to vulnerability factors. Presence and distribution, and a shift in such clusters across regions strongly advise for '*cluster approach*' rather than '*state approach*' in devising and suggesting farm and non-farm policies for the farmers. Enquiring in detail the drivers at different clusters would not only help in suggesting non-farm policies alone, but in addressing relevant farm issues as well.

#### NOTE

1. Visit-1 falls between January and July 2013 and visit-2 is between August and December 2013 (Key Indicators – SAS, pp-2).

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