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Non-Farm Income as an Instrument for Doubling Farmers' Income: Evidences from Longitudinal Household Survey

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Abstract

The study has analysed different sources of income for the rural households in Semi-Arid Tropic (SAT) region of India using the longitudinal household level data for the period 2009 to 2014. The results indicate that the share of non-farm income is substantial and increasing even for the large farm households. The non-farm income is imperative for the landless and smallholders. This paves the way for securing livelihood of landless and smallholder households by diversifying towards non-farm activities. The study has emphasized on higher agricultural credit and irrigation infrastructure for medium and large farmers. This will provide remunerative income opportunities from agriculture so that this group will continue to remain in farming activities which will help in increasing the agricultural production and will not jeopardize the ultimate goal of food security. Two important inferences drawn from the study are: (i) to make farming attractive enough, transformative changes are required, particularly for creating market for the produce, and (ii) adequate push is needed to promote secondary agriculture, like primary processing, value addition, etc. along with other non-farm activities in the rural areas.

Key words: Agricultural income, non-farm income, farmers, social category

JEL Classification: Q12, Q 19, R 33

Introduction

The agrarian structure of India has been undergoing a process of reduction in size of farms and increase in marginalization of holdings for the past several decades. During the period 1960-61 to 2002-03, the proportion of marginal holdings went up from 39.1 per cent to 69.8 per cent. The proportion of medium and large holdings declined from 38.3 per cent to 13.8 per cent, the percentage of operated area by marginal farmers increased markedly (from 6.9% to 22.0%) and area under smallholdings increased significantly (from 12.3% to 20.0%) at all-India level (Dev, 2012). The small land base of the Indian farmer is one of the major factors contributing to rural poverty. The analysis of NSS data has shown that rural poverty is related to land ownership. In 2004-05, the poverty ratio for all farmers was estimated to be 15.2 per cent, with 22.0 per cent among landless farmers, 20.0 per cent among sub-marginal farmers, 18.1 per cent among marginal farmers, 14.8 per cent among small farmers and 9.8 per cent among medium and large farmers (Chadha, 2008).

The marginal and small holdings, even if having high productivity levels, are not able to generate sufficient income to sustain the farm households. The *Situation Assessment Survey of Farmers* (NSS, 2003) has found that the net income from all sources of a marginal farmer was ₹ 1659/month and of a small farmer was ₹ 2453/month. The majority of these

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households are deficit households with expenditure exceeding income (Bhalla,2008). In a recent study, Chand *et al.* (2011) have reported that if agriculture were to the sole source of income for small landholders, the majority of them would have remained poor. A number of studies from developing countries have suggested that diversification of rural economy towards non-farm activities has considerable potential to augment farmers' income and reduce rural poverty (Adams and He,1995; Adams, 2001; Reardon *et al.*,1998; 2007; Barrett *et al.*, 2001; Lanjouw, 1999; de Janvry *et al.*, 2005). Diversification towards non-farm activities overcomes the land constraint to income growth, enables the farmers to cope up with the shocks of crop failure and enhances their capacity to invest in productivity-enhancing agricultural inputs and technologies (Collier *et al.*, 1986; Reardon and Taylor, 1996).

The nonfarm income diversification in China has been found to reduce income inequality and poverty (de Janvry *et al.*, 2005). The studies from Rwanda (Dabalen *et al.*, 2004), Jordan (Adams, 2001), Burkina Faso (Reardon and Taylor, 1996) and Tanzania (Collier *et al.*, 1986), on the other hand, have found that non-farm income has un-equalizing effect on income distribution. In a recent study in selected countries of Asia, Africa and Latin America, Davis *et al.* (2007) have reported un-equalizing effect of most non-farm income activities on income distribution.

One of the important features of a developing state is the increasing contribution of non-farm activities to the income of its subjects in countries like India where a majority of the population lives in rural areas, and diversion towards non-farm activities will help not only in decreasing pressure on the land but also has potential to increase per capita income of the rural households (Ranganathan *et al.,* 2016) The fast increasing population in India calls for distribution of income in favour of non-agricultural sources as the parity between non-farm and agriculture wages/income is in favour of non-farm sources of income (Coppard, 2001).

This paper has examined the dynamics of changes in the sources of income of rural households and has identified the factors which help in distribution of income among various sources. This study will help in formulating suitable policy prescriptions facilitating gradual shift of Indian farm households towards sources which provides reasonable remuneration to them.

Data and Methodology

The Data

For the study, the longitudinal household survey data collected under the Village Dynamics Studies in South Asia (VDSA) project by the ICRISAT, Hyderabad, has been used. The data were collected for the period 2009 to 2014 in 12 villages across 6 states (Andhra Pradesh, Telangana, Karnataka, Maharashtra, Madhya Pradesh and Gujarat) in Semi-Arid Tropics (SAT) region of India. The household data pertain to 40 households in each village comprising 10 large farmers, 10 medium farmers, 10 small farmers and 10 landless households. The high frequency information has been collected by the resident field investigators from these households continuously for the study period under the project.

The income of households was classified according to four sources, viz. agriculture, agricultural wages, livestock and non-farm income which included work in other industry, construction activities and wage employment, as well. The 'value of output' from an activity was considered as income from that activity (Birthal *et al.*, 2014). The income sources were defined as follows:

(i) Agriculture — It included income from the cultivation of cereals, pulses, oilseeds, fibres, sugarcane, fruits, vegetables, floriculture, spices, medicinal and aromatic plants and plantation crops.

(ii) Agricultural wages- These included the wages received from working on other fields in village or nearby village.

(iii) Livestock — It included value of output from the dairy, poultry, sheep and goats.

(iv) Non-farm income — It included income from manufacturing, hotels & restaurants, construction, mining & quarrying, repairing, and other services

Methodology

To estimate annul income from different sources, the average income of the households for period 2009-2014 was calculated. The mean income has been

presented state-wise, farm size-wise and social category-wise. The per-capita per-day income was also calculated for different sources.

Determinants of Income Sources: SURE Model

Zellner (1962) developed the Seemingly Unrelated Regression Estimator (SURE) for estimating models with $p > 1$ dependent variables that allow for different regressor matrices in each equation (e.g. $X_i 3 = X_j$) and account for contemporaneous correlation, i.e. $E(\varepsilon_{it}\varepsilon_{jt})$ 3= 0. In order to simplify notation, all equations are stacked into a single Equation (1):

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_p \end{bmatrix} = \begin{bmatrix} x_1 & 0 & 0 & 0 \\ 0 & x_2 & 0 & 0 \\ 0 & 0 & \ddots & \\ 0 & 0 & 0 & x_p \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_p \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_p \end{bmatrix} \quad \ldots(1)$$

Equation (1) can be re-written as $Y = X\beta + \varepsilon$, where $Y = (y'_1, y'_2, ..., y'_p)'$ is a vector of all stacked dependent variables, X is a block diagonal design matrix with the i^{th} design matrix X_i on the ii^{th} block, $\beta = (\beta'_1, \beta'_2, ..., \beta'_p)'$ is the vector of stacked coefficient vectors of all THE equations, the total number of parameters estimated for all p sub-models is $K = \Sigma_{i=1}^{p} k_i$, and $\varepsilon = (\varepsilon'_1, \varepsilon'_2, ..., \varepsilon'_p)'$ is the vector of stacked error vectors of all the equations.

The same estimates as by separate single-equation OLS estimations can be obtained by an OLS estimation of the entire system of equations, i.e. $\beta^{OLS} = (X^0X)^{-1}X^0y$. The SURE estimator that accounts for interrelations between the single sub-models can be obtained by $\beta^{SUR} = [X'\Omega^{-1}X]^{-1}\ [X'\Omega^{-1}\ Y]$, where Ω^{-1} is a weighting matrix based on the covariance matrix of the error terms Σ. This covariance matrix $\Sigma = [\sigma_{ij}]$ has the elements $\sigma_{ij} = E\ [\varepsilon_{in}\varepsilon_{jn}]$, where ε_{in} is the error-term of the n^{th} observation of the i^{th} equation. Finally, the inverse of the weighting matrix can be calculated by $\Omega = \Sigma \otimes I_N$, where I_N is an $N \times N$ identity matrix and $\otimes$ denotes the *Kronecker* product. However, as the true error-terms ε are unknown, they are often replaced by the observed residuals, e.g. obtained from OLS estimates, i.e. $\hat{\varepsilon}_i = y_i - X_i\beta_i^{OLS}$ so that the elements of the covariance matrix can be calculated by Equation (2):

$$\hat{\sigma}_{ij} = \frac{\hat{\varepsilon}_i'\hat{\varepsilon}_j}{N} \quad \ldots(2)$$

Thus, a SURE model is an application of the Generalized Least Square (GLS) approach and the unknown residual covariance matrix is estimated from the data.

Models for Income Share

The OLS estimates are obtained while ignoring any correlation between the error-terms of different equations. However, if the error-terms are contemporaneously correlated, the estimation procedure should take this into account. In this case, the SURE estimator leads to efficient parameter estimates (Yahya *et al.*, 2008).

Our base model for income share equation consists of three single equations to simultaneously predict the income from agriculture, agricultural wages and livestock sources. The combined model is presented in Equation (3):

$$\omega_i = \alpha_{i0} + \alpha_{i1}FS + \alpha_{i2}SLH + \alpha_{i4}Edu + \alpha_{i5}Cred + \alpha_{i6}Irri + \alpha_{i7}SC + \alpha_{i8}OBC + \alpha_{i8}\ Gen + \alpha_{i9}AP + \alpha_{i10}GJ + \alpha_{i11}KR + \alpha_{i12}\ MH + \alpha_{i13}\ TS + \varepsilon_1 \quad \ldots(3)$$

where i=1, 2, 3 and denotes the shares of income from agricultural, agricultural wages; and livestock sources

FS = Family size
SLH = Size of landholding (ha)
Edu = No. of years of education of head of the family
Cred = Access to credit (Yes/No)
Irri = Access to irrigation (Yes/No)
SC = Scheduled caste (dummy)
OBC = Other backward caste (dummy)
Gen = General caste (dummy)
AP = Andhra Pradesh (dummy)
GJ = Gujarat (dummy)
KR = Karnataka (dummy)
MH = Maharashtra (dummy)
TS = Telangana (dummy)

In this model, α_j, β_j, and $\gamma_{j,\ j}$; $j \in \{0,1,2,3\}$ are the regression coefficients to be estimated and ε_i; $i \in \{1,...,3\}$ are the error-terms in the models for the share of agriculture income (SAI), share of wage income (SWI), and share of livestock income (SLI), respectively. Furthermore, our analysis includes derivation of a fourth equation from the additive

Table 1. Share of income of farm household from different sources during 2009-2014

(in per cent)

State	Income from agriculture	Income from agricultural wages	Income from livestock	Non-farm income	Total income*
Andhra Pradesh	20.60	16.23	14.00	49.18	100 (₹ 2,38,998)
Gujarat	35.52	11.20	23.47	29.82	100 (₹ 1,58,063)
Karnataka	20.80	19.32	8.99	50.89	100 (₹ 1,98,419)
Madhya Pradesh	34.59	12.36	6.72	46.33	100 (₹ 1,52,821)
Maharashtra	31.84	17.10	9.55	41.51	100 (₹ 1,92,936)
Telangana	18.50	10.91	17.48	53.11	100 (₹ 1,70,213)

Note: *Figures within the parentheses indicate average total annual income of the households in ₹ during 2009-2014

contained in the SURE Model. The Caste dummy was used keeping Scheduled Tribe (ST) as base dummy; while the State dummy was used with Madhya Pradesh state as base dummy.

Results and Discussion

Income of Rural Households from Different Sources

The concept of farm income has been used differently by different scholars. While questioning the validity of income estimated through CCS data, Chand *et al.* (2015) have argued that farm income should include income from the livestock sector as well. The other puzzle which refuses to die down in the debates is whether the farm income of the irrigated region is higher than that of less-irrigated region. It is an established fact that the productivity of any crop cultivated under irrigated region is higher than that of the less-irrigated or un-irrigated region. Although the issue of farm income has been discussed by researchers and policy makers extensively over one decade in India, the performance of various states in terms of farm income has not been adequately covered, possibly because of data constraints. What is happening at the country level might not be the same across different states due to variations in cropping pattern, irrigation coverage, adoption of modern technologies, procurement policies, market arrangements, etc. It is always believed that the states with more area under commercial crops can generate higher farm income than the states with larger area under food grain crops. But, this issue could not be answered convincingly due to data constraints so far. The VDSA has data at farm level from six states and includes the income of households from agriculture, wages, livestock and non-farm income. The Household income from different source in six states is given in Table 1.

In this paper, we have divided the total income received by the household into four separate items, viz. income from agriculture, income from agricultural wages, income from livestock and non-farm income. Table 1 shows that household income was highest in Andhra Pradesh and lowest in Madhya Pradesh. The same is true regarding non-farm income, which was the highest in the Andhra Pradesh (₹1,17,540), followed by Karnataka (₹1,00,966) and Telangana (₹90,287). The highest livestock sector provided around 7-23 per cent income in these states, and as expected was highest in Gujarat state. The agricultural wages constituted around 10-20 per cent of the annual household income in these states. The agricultural income was highest in the Maharashtra state (₹61,400), followed by Gujarat (₹56,000). The year-wise income from different sources in the selected states are given in Appendix-I. As per Situation Assessment Survey data (NSSO, 2005), about 40 per cent of the farmers were reportedly willing to quit agriculture because of poor returns from farming.

Table 2. Social category-wise share of income sources in VDSA households: 2009-14

(in per cent)

Social category	Income from agriculture	Income from agricultural wages	Income from livestock	Non-farm income	Total income*
Scheduled Tribe Caste	26.52	17.46	19.68	36.34	100.00 (₹ 1,53,328)
Scheduled Castes	12.49	21.76	5.66	60.08	100.00 (₹ 1,28,637)
Other Backward Castes	27.97	15.68	13.26	43.10	100.00 (₹ 1,74,066)
General Castes	37.46	8.34	12.85	41.36	100.00 (₹ 2,63,164)

Note: * Figures Within the parentheses indicate average total annual income of the households in ₹ during 2009-14

The income from crop cultivation is not enough even to meet the annual cultivation expenditure in many states. The non-farm jobs undertaken by the rural households could be permanent or casual in nature, covering both the secondary and tertiary sectors of employment (Salter, 1991).

A number of studies from developing countries have suggested that diversification of rural economy towards non-farm activities has considerable potential to augment farmers' income and reduce rural poverty (Adams and He, 1995; Adams, 2001; Reardon *et al.*, 1998; 2007; Barrett *et al.*, 2001; Lanjouw, 1999; de Janvry *et al.*, 2005). Diversification towards non-farm activities overcomes the land constraint to income growth, enables the farmers cope up with the shocks of crop failure and enhances their capacity to invest in productivity-enhancing agricultural inputs and technologies (Collier *et al.*, 1986; Reardon and Taylor, 1996).

Social Category-wise Income of Farm Households

Historically, the socioeconomic progress in India continues to suffer from the inflexibility of a rigid caste system and caste based discriminations (Deshpande, 2000; Omvedt, 2013). However, for the political and developmental planning and policy perspective, the Constitution of India classified traditional caste groups into four broad categories: Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes (OBC) and General Castes (Srinivasan, 1986; 1996). It would be interesting to know about the income source of various categories in VDAS households.

As expected, the household's total income for general caste category was the highest (around ₹2.63 lakh per annum), followed by OBC category (₹1.74 lakh), ST category (₹1.53 lakh) and SC (₹ 1.28 lakh), respectively The general category households have highest share of income from agriculture as compared to other social categories. The general category households had lowest share (8.34%) income from agricultural wages because due to social status they do not work in others' farms. The SC category earns only 12.49 per cent income from the agriculture and 5.66 per cent income from the livestock. Since emergence, this caste category has been a determining factor of access to productive resources such as land, education and health as well as discrimination in the labour market. A strong link has been identified between caste and economic status (Goli *et al.* 2013; Goli and Apollo, 2014; Singh, 2014). Another recent study by Singh (2014) has demonstrated that the root cause of inequality among the caste groups is grounded in hierarchy of land rights, and political power and is driven by religious and secular ideology but lacks supports to the argument based on empirical evidence.

Farm Income by Holding-size

The annual income of farm households from different sources by respondents' categories is depicted in Table 3. During 2009-2014, the annual income from agriculture and allied activities has been estimated to be ₹1,16,112 for labour households, ₹1,46, 975 for small farmers, ₹ 1,89,461 for medium farmers and ₹ 2,96,096 for large farmers. A significant difference has

Table 3. Farm-size- wise share of income sources for different categories of households: 2009-14

(in per cent)

Farm Size	Income from agriculture	Income from agricultural wages	Income from livestock	Non-farm income	Total income*
Labour	5.80	19.98	9.78	64.44	100.00 (₹ 1,16,112)
Small Farmers	25.49	12.52	12.32	49.67	100.00 (₹ 1,46,975)
Medium Farmers	37.98	7.22	16.64	38.16	100.00 (₹ 1,89,461)
Large Farmers	51.61	2.36	14.06	31.98	100.00 (₹ 2,96,096)

Note: * Figures within the parentheses indicate average total annual income of the households in ₹ during 2009-14

Table 4. State-wise per capita per day income (₹) from different sources: 2009-2014

(₹/day)

State	Income from agriculture	Income from agricultural wages	Income from livestock	Non-farm income	Total income*
Andhra Pradesh	47.28	16.99	21.68	74.12	160.07
Gujarat	27.65	5.08	15.23	28.07	76.03
Karnataka	35.28	10.81	9.43	49.42	104.94
Madhya Pradesh	40.37	4.41	4.71	25.54	75.03
Maharashtra	41.04	9.33	13.27	42.93	106.57
Telangana	26.79	7.48	24.97	54.51	113.74

been observed across sources of the income in different farm-size categories. The small farmers have been found to earn only 25.49 per cent from agriculture, the proportion goes up to 51.61 per cent for large farmers. The livestock contributes 16.64 per cent to medium farmers and 14.06 per cent to large farmers. This shows that as land-size increases, agricultural income increases while income from agricultural wages decreases. Income from agricultural wages also contributes much larger share of income in case of labour and small farmers as compared to medium and large famers.

The non- farm income has more than half share in the case of labour households and small farmers. This share reduces with increase in farm-size. The agriculture and livestock together contribute 65.67 per cent to the total household income of large farmers. Based on a survey of 520 rural households in the hill regions of West Bengal and Sikkim, Micevska and Rahut (2008) have also observed an inverse relationship between non-farm income and landholding size. This pattern of income diversification is as per expectation. The smallholders due to acute land constraint are forced to engage themselves in the low-paid wage activities, animal husbandry and low investment non-farm business activities.

Per-capita Household Income in SAT Region

The per-capita household income from agriculture and non-agricultural sources for the sample farms in different states has been shown in Table 4. The per-capita income from all the sources varied from ₹ 75 in Madhya Pradesh households to ₹160 in Andhra Pradesh. It was interesting to note that the share of agriculture in per capita income was the highest in percentage terms in Andhra Pradesh, which was around 47.28 per cent of the total income. In other states, the agriculture contributed less than 42 per cent of the total per capita income.

The income from non-farm activities was highest in Andhra Pradesh (74.12%), followed by Telangana (54.51%) and Karnataka (49.42). In Gujarat,

Table 5. Correlation coefficient of income share (%) with per capita landholdings and per-capita income

Income sources	Per capita landholding	Per capita income
Agriculture	0.463	0.220
Agricultural wages	-0.236	-0.247
Livestock	0.040	0.593
Non-farm	-0.255	0.322

Teleangana and Andhra Pradesh, the contribution of dairying is significant which was more than 15 per cent of per capita income of the households. Gujarat Operation Flood created a strong network in the state which provides doorstep marketing facilities to farmers.

In Gujrat and Madhya Pradesh the per capita income of all the farm households was less than the minimum wages announced by the Government of India; these were ₹ 91 per day during September 2014 (GoI). Given the inadequacy of agricultural income to meet the household expenditure, all the farmers have to opt for any other livelihood strategy for their survival.

The correlation coefficient of income share with per capita landholding and the per capita income has been given in the table 5. It depicts an inverse relationship between income share and non-fam income and per capita landholdings. It shows that per capita landholding increase it well gives more income from the agriculture and also helps to raise the per capita income in selected states. The livestock is an integral part in the rural India and the correlation coefficient has been found to be significant in the income share and per capita landholding. Since, the livestock can be reared on the residual parts of crops, and it could add to total income of the households in all the selected states.

The non-farm business income has been found to be positively correlated with the total income, but has a negative relationship with landholding-size The wages and salaries are negatively correlated with both. On the other hand, the relationship of agricultural income is positive with and holding size, and negative with income level. The non-farm sector and labour market can serve as the potential entry points for land-constrained farm households to enhance their income level (Birthal *et a.;* 2014). de Janvry *et al.* (2005) have also found that in China large farmers tend to remain in agriculture, while small farmers diversify towards non-farm activities.

Determinates of Household Income from Different Sources

The parameters of SURE model explain that if landholding increases by one unit, then the agricultural as income increase by 0.03 unit. It is expected that landholding size increases, the farmers will not go for wage employment and also will not migrate for work as shown by the coefficient of non-farm income with respect to size of landholdings. Family-size has been found to be negatively related with farm income and agricultural wages income, but is, positively related with non-farm income. It means that extra person of the family migrates to the nearby cities for employment in non-farm sector. It is not surprising to see that education has a strong effect on income diversification.

The income from nonfarm business is relatively positively and significantly related with all the levels of schooling, suggesting that non-farm sector being heterogeneous has potential to engage workers with varying skills and schooling years. Those with lower level of formal education, have a lower share of wages and salaries in their income portfolio. This is because more educated individuals often seek opportunities in the regular salaried activities rather than getting engaged in low-paid wage activities.

The income from agriculture and livestock is negatively associated with education. These findings suggest that with educational attainment the farmers tend to diversify towards non-farm-income-generating activities. The access to credit seems to be an important factor in farmers' choice for an income-generating activity. The SURE estimates for credit suggest that farmers having access to credit (for crop as well as livestock production) are less likely to diversify towards non-farm activities. Access to credit is positively related to agricultural income, if one unit of credit increases then the contribution of agricultural income increases by .05 units and livestock by 0.01 units. The households having access to credit will concentrate on agriculture and livestock and will remain in the farming, one-unit increase in the credit will reduce 0.12-unit non-farm income of the households. Irrigation is an important part in the agriculture and it has positive relation with agricultural as well as livestock income. Similar to credit, irrigation

Table 6. Determinants of income as identified through SURE model

Explanatory variable	Agriculture income	Agri-wages income	Livestock income	Non-farm income
Intercept	0.1343	0.2671	0.1314	0.467
Family size	-0.0020 NS	-0.0080	0.0002NS	0.010
Size of landholding (ha)	0.0303	-0.0087	0.0010 NS	-0.023
No. of years of education	-0.0012 NS	-0.0099	-0.0037	0.015
Access to credit	0.0528	0.0155 NS	0.0187	-0.087
Access to irrigation	0.1657	-0.0920	0.0475	-0.121
Social group[1]				
SC	-0.0245 NS	0.0163	-0.1300 NS	0.138
OBC	0.0470	-0.0029	-0.0747 NS	0.031
General	0.0540	-0.0503	-0.0751	0.071
State dummy[2]				
Andhra Pradesh	-0.1182	0.0325	0.0681	0.018
Gujarat	0.0339	0.0181 NS	0.1406	-0.193
Karnataka	-0.1138	0.0544	0.0143 NS	0.045
Maharashtra	-0.0554	0.0869	-0.0064 NS	-0.025
Telangana	-0.1772	-0.0368	0.0881	0.126
Observation	4938	4938	4938	-
Mean square of error	0.0402	0.0278	0.2389	-

Notes: [1]social group ST category is control group
[2]Madhya Pradesh state is kept as control group, having the lowest per capita income
NS: Non-significant

access also reduces non-farm income of the household. As expected the agricultural income share is positively associated with OBC and general category households and is negatively associated with agri-wages income. Due to social status, the general category and OBC category will not works in other farms. In Andhra Pradesh, Telangana and Gujarat, the income from livestock is significant, while in Karnataka and Maharashtra, it is non-significant.

Conclusions and Policy Implication

Using data collected under VDSA project for the period 2009 to 2014, the study has examined the changes in the sources of income of rural households and has attempted to identified their determinants. It has found that non- farm income is dominant for all farm households in the selected states where it contributes 41 - 53 per cent to the household income, except in Gujarat. The share of non-farm income is declines as the landholding-size increases, but at the same time it has a positive relationship with total income. The preceding statement also justifies higher dependence of landless labour households as well as smallholders on non-farm income. This suggests that the non-farm sector and labour market can serve as a leading source of income for landless and smallholder households.

The concern of declining landholding size and dependence of a large section of population on agriculture, which ultimately is increasing the pie of economically-vulnerable section of the society, can be overcome by way of giving more thrust on non-farm sector and promoting rural non-farm enterprises. The government focus on skill India programme can be a major booster for providing non-farm income to the landless households and smallholders and it may also reduce the burden of high population dependence in agriculture. The access to agricultural credit and area under irrigation are the crucial factors in determining the agricultural income of households. The government initiatives towards these in the form of financial inclusion and Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) will boost the household income from agriculture and also secure the livelihood of the households' dependent on agriculture.

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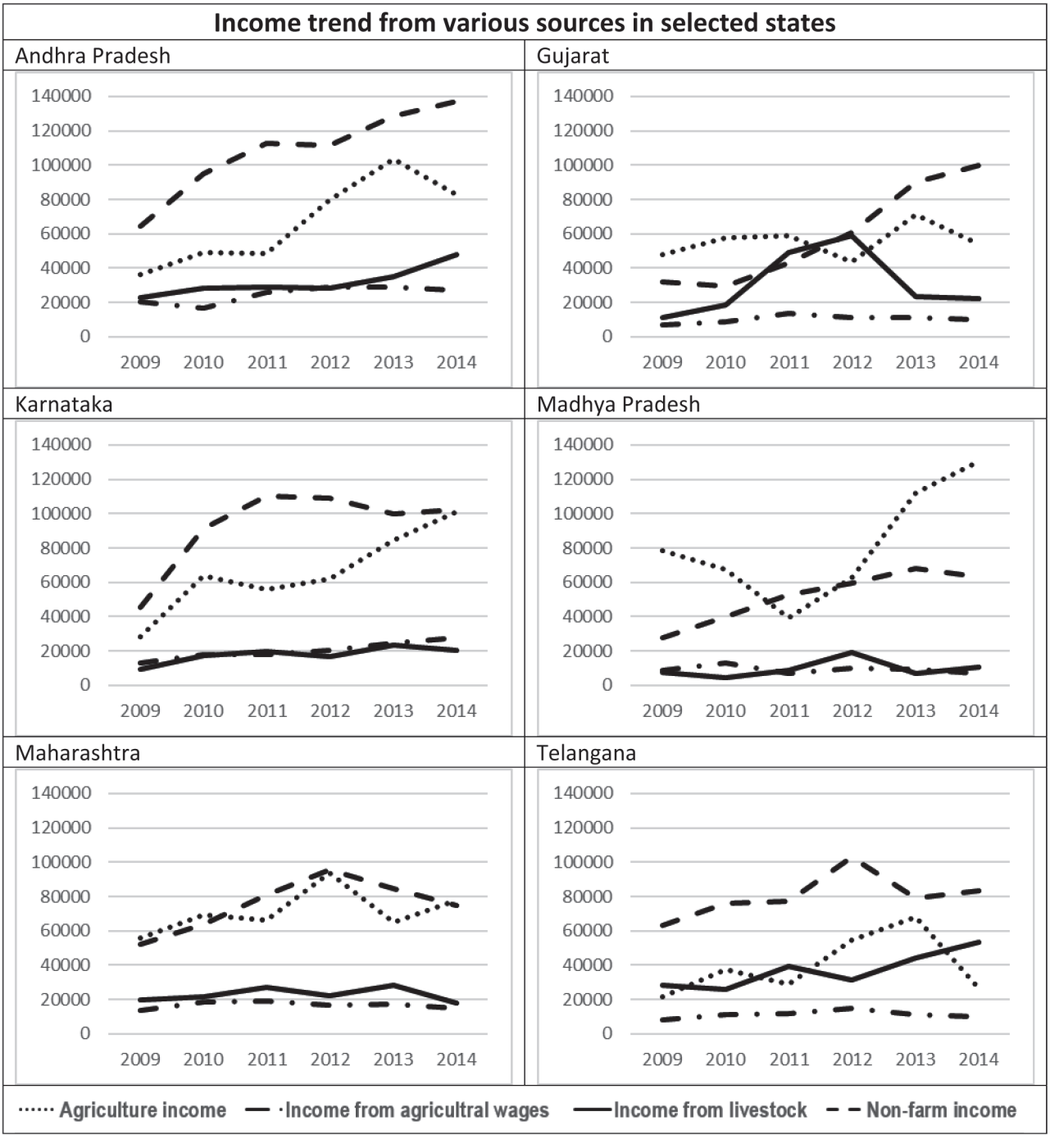
Appendix I


Income trend from various sources in selected states
Andhra Pradesh
Gujarat
Karnataka
Madhya Pradesh
Maharashtra
Telangana
140000
120000
100000
80000
60000
40000
20000
0
2009
2010
2011
2012
2013
2014
Agriculture income
Income from agricultral wages
Income from livestock
Non-farm income