Income Sources of Farm Households in India: Determinants, Distributional Consequences and Policy Implications

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Abstract

This paper has examined farm households' access to different income-generating activities, and their impact on income distribution using data from a nationally representative large-scale survey. The analysis has shown that, as against the common perception of agriculture being the dominant source of income for farm households, these households earn close to half of their income from non-farm activities. The non-farm income is more important for the households at lower end of land distribution. The poor households diversify more towards low-paid, low-return non-farm activities. Small landholdings, low agricultural productivity and surplus labour force the farm households to diversify their income portfolio towards non-farm activities. The non-farm income sources are accessible to a small proportion of farm households and have un-equalizing effect on income distribution. Nevertheless, non-farm sources are positively correlated with the total income. This contrast in income sources between income level and farm size suggests that non-farm sector can serve as potential entry points for land-constrained farm households to enhance their income level.

Key words: Income diversification, non-farm sector, inequality, farmers, India

JEL Classification: Q12, R33, C21

Introduction

Over the past three decades, Indian agriculture has grown at an annual rate of around 3 per cent. This has helped improve farm incomes and reduce rural poverty (Datt and Ravallion, 1996; Warr, 2003). However, of late, the farm sector has come under stress — the growth therein being decelerated to 2.7 per cent per annum during 1995-96 to 2009-10 from 3.2 per cent per annum during 1980-81 to 1994-95. But, the more worrisome is the continuance of excessive employment pressure on agriculture, despite a significant decline in its share in the national income. The sector engaged 52 per cent of the country's workforce in 2009-10,

compared to 69 per cent in 1983, while its share in the gross domestic product (GDP) declined from 40 per cent to 15 per cent during this period. Further, the Indian agriculture is dominated by small landholdings, and the average size of landholding has shrunk to 1.16 ha in 2010-11 from 1.84 ha in 1980-81. Given these trends, there arises a basic question: how far farm households would survive on such tiny pieces of land? 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

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(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). Further, a growing rural non-farm sector can absorb surplus labour from agriculture, reduce rural-urban migration, narrow down rural-urban disparities and promote farm-nonfarm linkages.

India's rural economy has undergone a gradual shift towards the non-farm sector with its share in rural income increasing from 35 per cent in 1980-81 to 62 per cent in 2004-05 (GoI, 2010), and in rural employment from 22.3 per cent to 31.5 per cent (Lanjouw and Murgai, 2008). Nonetheless, we do not know much about its distributional impacts. The evidence is scanty and inconclusive. Lanjouw and Shariff (2002) have found the non-farm income to be neither inequality-increasing nor inequality-decreasing. Lanjouw and Stern (1993), on the other hand, had reported a strong un-equalizing effect of non-farm income on rural income inequality. Sen (1994) too had indicated that an increase in non-farm income can lead to worsening of income distribution due to lower barriers for the rich in transiting from farm to non-farm sector. The rural non-farm sector is quite heterogeneous in India, and its distributional consequences are likely to vary depending on whether an income source is accessible to the rich or the poor. Birthal and Singh (1995) had reported that non-farm wages have an equalizing effect on income distribution, while non-farm business, salary and transfer incomes have an opposite effect. Lanjouw and Shariff (2002) have observed the distribution of wages to be skewed towards the poor, and salaries towards the rich.

Evidence from other countries is also mixed. Reardon *et al*. (1998) have reported myriad types of relationship of non-farm income with landholding size and household income. Adams and He (1995) in Pakistan and Adams (2001) in Egypt have found inverse relationships between non-farm income and land ownership as well as household income. The non-farm 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.

Nevertheless, in the land-scarce, labour-surplus countries like India, the importance of non-farm income sources to the poor cannot be undermined. From an extensive review, Coppard (2001) has concluded that 'non-farm diversification is important for the landless and small landholders, and a growing non-farm sector can reduce rural poverty, but may be accompanied by worsening income distribution because of differential access of the poor and the rich to non-farm income sources.'

In this paper, we have examined farm households' access to different income sources, their determinants and effects on income distribution.

Analytical Approach

The Data

The study has used household-level data from a nationally representative survey conducted by the National Sample Survey Organization (NSSO), Ministry of Statistics and Programme Implementation, Government of India (GoI, 2005) in 2003. This survey covered 51770 farm households[1] spread over 6638 villages throughout the country. The survey reports a number of income-generating farm and non-farm activities. We have classified these activities into four broad categories, viz. agriculture (crop production), livestock, wages and salaries, and non-farm business.

The data were scrutinized for errors and outliers. There were a number of households that had no access to land, owned or leased, but had reported income from cultivation. Some households had also reported unusually low or high income from cultivation which was not in relation to their landholding size. These observations were excluded from the analysis.

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[1] A farm household is the one engaged in one or another agricultural activity during the survey period.

The 'value of output' from an activity was considered as income from that activity. 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) **Livestock** — It included value of output from the dairy, poultry, sheep and goats.

(iii) **Wages and Salaries** — These covered farm and non-farm wage earnings, and salaries.

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

There are some limitations also of this data set. First, the survey does not report income from sources such as remittances and transfers. Second, it does not report farm and non-farm wages separately. Salaries are clubbed with non-farm wages. Third, the survey focuses only on farm households, excluding landless rural households, who obtain a sizeable share of their income from non-farm sources. Due to these limitations the share of non-farm sector in household income could be an underestimate.

Methodology

Decomposition of Inequality

A number of methods are used to measure economic inequality.[2] We have used Gini index which is a widely-used measure of inequality because of its certain desirable properties, such as Pigou-Dalton transfer sensitivity, mean-independence, symmetry, population homogeneity, and decomposability[3]. The Gini index is a summary statistic and is bound by zero and 1. The higher is the value of Gini index, the higher is the inequality in distribution. The Gini coefficient, G, of total income is calculated by Equation (1):

$$G = 2\operatorname{cov}[y, F(y)]/\bar{y} \qquad \ldots (1)$$

where, y is the total income, $F(y)$ is its cumulative distribution and $\bar{y}$ is the mean income of the sample.

Following Lerman and Yitzhaki (1985), the Gini coefficient of total income can be decomposed by income sources. If there are K income sources for a household i, then we have

$$G = 2\sum_{k=1}^{K}\operatorname{cov}(y_k, F)/\bar{y} \qquad \ldots (2)$$

In Equation (2), $\operatorname{cov}(y_k, F)$ is the covariance of an income source k with cumulative distribution of total household income. Multiplying and dividing Equation (2) by $\operatorname{cov}(y_k, F_k)$ and $\bar{y}_k$ provides estimates of income inequality by source.

$$G = \sum_{k=1}^{K}[\operatorname{cov}(y_kF)/\operatorname{cov}(y_k, F_k)][2\operatorname{cov}(y_k, F_k)/\bar{y}_k][\bar{y}_k/\bar{y}] \qquad \ldots (3)$$

Equation (3) can be summarized as:

$$G = \sum_{k=1}^{K} R_k G_k S_k \qquad \ldots (4)$$

where, R_k is the Gini correlation[4] between income source k and total income, i.e. $\operatorname{cov}(y_k, F)/\operatorname{cov}(y_k, F_k)$, G_k is the Gini coefficient of income source k, and is given by the expression $2\operatorname{cov}(y_k, F_k)/\bar{y}_k$, and S_k represents the share of income source k in the total income, $\bar{y}_k/\bar{y}$. The larger is the product of these components for a source, the larger is its contribution to income inequality.

The Gini decomposition can be further extended to obtain the marginal effect of an equal change in an income source k, for all households on total inequality. If income from source k increases by some factor, e_k, then the partial derivative of Equation (4) with respect to e_k yields:

$$\partial G/\partial e_k = S_k(R_k G_k - G) \qquad \ldots (5)$$

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[2] Cowell (1995) lists 12 measures of inequality.

[3] These properties are: (i) the *Pigou-Dalton transfer sensitivity* which implies that if there is a transfer of income from rich to poor, the inequality must decline, (ii) the *mean-independence* suggests that the measure of inequality is invariant to proportional changes in income, (iii) the *symmetry* requires the level of inequality to remain unchanged when households switch places in income order, (iv) the *population homogeneity* means that similar changes in population across income groups would leave the level of inequality unaffected, and (v) the *decomposability* allows inequality to be portioned over income sources or sub-populations. For details, see Shorrocks (1982) and Paul (2004).

[4] The property of Gini correlation resembles those of Pearson and rank correlations. It takes the value between -1 and +1 and measures the extent to which an income source is correlated with total income.

On dividing Equation (5) by G, the marginal effect of a source on overall inequality can be obtained, and can be written as the contribution of a source to inequality minus the share of the source in total income, i.e.

$$(\partial G/\partial e_k)/G = (R_k G_k S_k /G) - S_k \qquad \ldots(6)$$

Determinants of Income Sources

To identify the factors influencing farm households' access to different income sources, truncated regressions (truncated at upper limit) were estimated with income share of the source in total income (in natural log) as dependent variable. The truncated regression equation is (Greene, 1993):

$$y_i = x'_i\beta + u_i \qquad u_i \mid x_i \sim N(0, \sigma^2)$$
$$y_i \mid x_i = N[x'_i\beta, \sigma^2]$$

where, y_i is the dependent variable. Since $y_i < a$ (point of truncation), distribution of y_i is truncated. The β represents a vector of parameters, and x_i contains a vector of explanatory variables. Errors are assumed to be identically and independently distributed as $N(0, \sigma^2)$ is conditional on x_is.

The income share equations were estimated using seemingly unrelated regression (SUR) framework :

$$y_i = X_i\beta + u_i \qquad i = 1,2,3,4$$

This formulation combines parameter estimates and associated var-covariance matrices into a single parameter vector; thus, the simultaneous var-covariance matrix takes care of the contemporaneous correlation. This leads to an improvement in efficiency of the parameter estimates as more information is now contained in the simultaneous var-covariance matrix.

Results and Discussion

Income Sources and their Contribution to Inequality in Income

Income Sources

The income sources for farm households are listed in Table 1. 'Agriculture' (crop production) has been found to be the biggest source of income for farm households — 91 per cent of the households have reported having income from agriculture, and it makes up 41.4 per cent of the total income on an average. The non-farm business activities, with a share of 24.4 per cent in the total income, comprise the second largest income source after agriculture. These, however, are accessible to only a small proportion (14.2%) of the farm households. The two-thirds of total farm households are engaged in animal production, but on average, animal production contributes only 14.4 per cent to the total household income. The wages and salaries contribute about one-fifth to the total household income and comprise an important income source for 46 per cent of the farm households.

There is a considerable disparity in the contribution to income by different sources across income quintiles. Agriculture is the dominant source of income for the bottom 20 per cent households, accounting for nearly half of their total income. Wages and salaries (28.4%) and livestock (18.7%) are other major income sources for these households. The non-farm business activities,

Table 1. Income sources of farm households by income quintile

Income quintile	Per capita income (₹/annum)	Income sources							
		Agriculture		Livestock		Wages and salaries		Non-farm business	
		Partici-pation rate (%)	Share in income (%)	Partici-pation rate (%)	Share in income (%)	Partici-pation rate (%)	Share in income (%)	Partici-pation rate (%)	Share in income (%)
Lowest	2503	89.8	49.2	54.6	18.7	42.2	28.4	6.6	3.7
Second	4079	90.2	45.2	61.1	19.2	50.4	31.2	8.0	4.4
Third	6162	90.1	43.8	66.2	19.6	51.0	30.1	10.0	6.4
Fourth	9834	90.8	45.3	70.4	19.2	48.0	25.2	16.1	10.3
Highest	32324	93.5	38.4	72.3	10.7	36.8	13.5	30.4	37.4
All	10411	90.9	41.4	64.9	14.4	45.7	19.8	14.2	24.4

Table 2. Income sources of farm households by landholding size

Land-holding size	Percentage of total households	Income sources							
		Agriculture		Livestock		Wages and salaries		Non-farm business	
		Partici-pation rate (%)	Share in income (%)	Partici-pation rate (%)	Share in income (%)	Partici-pation rate (%)	Share in income (%)	Partici-pation rate (%)	Share in income (%)
Sub-marginal (0.002-0.5 ha)	40.0	83.1	16.2	61.6	14.8	63.9	36.1	19.5	32.9
Marginal (0.5-1.0 ha)	23.3	96.7	36.3	63.8	15.0	40.1	21.4	12.5	27.4
Small (1.0-2.0 ha)	19.0	97.2	49.6	65.8	15.7	34.3	15.4	10.4	19.3
Medium (2.0-4.0 ha)	11.5	95.8	56.6	70.3	13.8	27.0	9.7	7.8	19.9
Large (>4.0 ha)	6.3	91.6	67.0	78.1	12.2	18.8	4.4	9.8	16.4
All	100.0	90.9	41.4	64.9	14.4	45.7	19.8	14.2	24.4

however, are not that important as only 6.7 per cent of them have access to such activities. In contrast, the non-farm business activities and agriculture are the major income sources for the top 20 per cent households. Together, these sources comprise three-fourths of their total income and have almost equal share. Nevertheless, only 30 per cent of the households in this income quintile have access to non-farm business activities. Wages and salaries, and livestock contribute 13.5 per cent and 10.7 per cent, respectively to their total income. For the three middle-income quintiles, agriculture contributes around 45 per cent to their household income and is followed by wages and salaries (25-30%) and livestock (19%). Though farm households' participation in non-farm business activities improves with income level, their contribution to the total income does not exceed 11 per cent.

This pattern of income distribution shows that the poor households depend mainly on the agriculture and wage labour, while the rich diversify towards non-farm business activities. In the case of non-farm business, the ratio of participation rate to income share increases with income level, and this provides us an important inference that 'the poor diversify more towards low-paid, low-return non-farm activities, while the rich tend to be engaged more in high remunerative activities'.

Another way of looking at the relative importance of an income source is through landholding size. Across different farm categories, participation rate in agriculture is almost similar (Table 2). The ownership of livestock increases with 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 has a negative association with the landholding-size. Also, the households at the lower end of land distribution are more engaged in non-farm business activities.

The share of non-farm income sources, viz. wages (including salaries) and non-farm business declines steeply with the increase in landholding-size. The non-farm income comprises as high as 69 per cent of the total household income at the lowest end of land distribution (sub-marginal). For the marginal farm households, the non-farm sources make up 48 per cent of their total income — non-farm business 27 per cent and wages and salaries 21 per cent. As landholding-size increases, the income share of agriculture increases, and other income sources become less important. There is a sharp decline in the share of wages and salaries, from 36 per cent at the lowest to 4 per cent at the highest end of land distribution. The income from agriculture and livestock contributes 80 per cent to the total household income of the large farmers (> 4.0 ha). 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

Table 3. Correlation coefficients of income share (%) with per capita land and per capita income

Income source	Per capita land (ha)	Per-capita income (₹)
Agriculture	0.072	-0.047
Livestock	-0.002	-0.038
Wages and salaries	-0.058	-0.061
Non-farm business	-0.019	0.191

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.

The patterns of distribution of income sources by farm size and income level are in stark contrast. For example, the income share of non-farm business activities improves with upgoing income quintiles, but declines with increasing landholding-size. To probe this relationship further, we estimated the correlation of income sources with the per-capita landholding size and per-capita income (Table 3). 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 landholding size, and negative with income level. This contrast in income sources between income quintile and farm size offers another important inference that 'the non-farm sector and labour market can serve as the potential entry points

for land-constrained farm households to enhance their income level'. 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.

Contribution of Income Sources to Inequality of Income

Table 4 presents the inequality in distribution of income sources and their contribution to the overall inequality in income. The Gini coefficient of the total household income has been found to be estimated to be 0.584. The non-farm business income is the most unequally distributed ($G_k = 0.958$), and is the second largest source of inequality in income (37%). It is due to its concentration across a small number of households, and high correlation with total income ($R_k = 0.917$). The inequality is also very high in the distribution of wages and salaries ($G_k = 0.834$), but because of larger participation of the poor in labour market, their contribution to inequality is amongst the lowest (13%). Agriculture is the most equally distributed income source ($G_k = 0.684$), and being the largest income source, it also contributes highest to the inequality (39%). The livestock is the second most equally distributed income source ($G_k = 0.745$), and contributes least to the overall inequality in total income (11%).

Table 4 also presents the Gini income elasticity ($R_k G_k/G$) which distinguishes between inequality-increasing and inequality-decreasing income sources.

Table 4. Contribution of different income sources to inequality in total income

Income source	Share in total income (S_k)	Gini coefficient for source income (G_k)	Gini correlation with rank of total income (R_k)	Contri-bution of income source to total inequality ($R_k G_k S_k$)	Proportion contri-bution of source income to total inequality ($R_k G_k S_k/G_k$)	Gini income elasticity ($R_k G_k/G$)	Absolute change in overall Gini coefficient	Per cent change in overall Gini coefficient
Agriculture	0.414	0.684	0.813	0.230	0.394	0.952	-0.012	-0.020
Livestock	0.144	0.745	0.577	0.062	0.106	0.737	-0.022	-0.038
Wages and salaries	0.198	0.834	0.467	0.077	0.132	0.668	-0.038	-0.066
Non-farm business	0.244	0.958	0.917	0.214	0.367	1.505	0.072	0.123
Total	1.000	0.584	1.000	0.584	1.000			

If the value of Gini income elasticity is unity, it indicates neutrality of the income source to inequality, but if its value is greater (less) than unity, then the source is inequality-increasing (decreasing). The non-farm business income has Gini income elasticity of more than unity, suggesting that non-farm business income would have an un-equalizing effect on income distribution. On the other hand, wages and salaries and livestock would have an equalizing effect on income inequality. Further, we also looked into the marginal effect of a change in income source on inequality. A 1-per cent increase in non-farm business income c*eteris paribus* raises Gini coefficient of the total income by 0.072, which is equivalent to 0.123 per cent increase in inequality at the margin (Table 4). The marginal effect of other income sources is negative, implying that these sources would contribute towards improving income distribution. Across income sources, wages and salaries have a larger equalizing effect.

A comparison of participation rates, income shares and marginal effects of income sources led us to conclude that despite their small income effects, the wages and salaries, livestock and agriculture have an equalizing effect on income distribution, while the non-farm business has an opposite effect. Nevertheless, the non-farm sector has a strong income effect and its potential in enhancing rural economic growth cannot be undermined. The sector is heterogeneous, and the effects of different non-farm income-generating activities on inequality would vary depending on whether a source is accessible to the poor or to the rich (Birthal and Singh, 1995; Adams and He, 1995).

Determinants of Farm Households' Access to Income Sources

Literature has identified a number of push and pull factors that motivate rural households to diversify their income, activity and asset portfolios (Barrett *et al*., 2001). The push factors include higher risk, diminishing returns to input-use, excess supply of labour in relation to land, and imperfections in land, labour and credit markets. To ascertain the relative importance of some of these factors in farm households' access to different income sources, we estimated the truncated regressions. The dependent variable was 'share of a source in total income', and the explanatory variables included landholding size, tenurial status, land productivity, labour availability, access to farm and

non-farm credit, and age, sex, caste and education of the household-head. The regression equations were estimated including state fixed effects so as to control the location-specific factors influencing income sources.

Table 5 presents the descriptive statistics of the explanatory variables. Land has emerged as an important factor in farmers' decision to diversify their activity or income portfolio. The average size of landholding of the sample households is 1.25 ha, and 63 per cent of the households have landholdings of less than 1.0 ha. If land-lease market is flexible, farmers may adjust their resources by leasing-in or leasing-out land. On average, the leased-in land comprises 9 per cent of the operated land. The low productivity of land may push farm households towards non-farm activities. The average gross revenue from crop production has been estimated to be ₹ 27916/ha, but with a very large dispersion.

The probability of participation in non-farm activities is expected to be higher for the households having smaller landholdings, larger families and/or more number of workers. The average family-size of the sample households has been estimated to be 5.5, and two-thirds of the family members are in the age group of 15-59 years. Gender composition of the workers is an important factor in the choice of an activity. Many factors such the trade-off between household chores and income opportunity, distance to an income-generating activity, nature of activity and skills influence a woman's participation in non-farm activities. It is anticipated that the households having a higher proportion of female workers also have a higher probability of being engaged in the traditional income-generating activities such as crop production and animal husbandry. Close to half of the workers (15-59 years) in our sample were women.

'Age' can be considered a proxy for the working capacity of a person. Generally, younger persons are more capable to take up strenuous works, such as wage labour, and hence are expected to participate more in activities that demand physical strength, while the elder members are more likely to pursue the traditional family occupations that are not strenuous. The mean age of the household-heads was 46.8 years. Further, the low-skilled and less-educated workers are expected to be more engaged in the traditional low-paid

Table 5. Descriptive statistics of the variables used in regression

Variables	Mean	Standard deviation
Land possessed (ha/household)	1.25	8.76
Land holding size (ha/person)	0.27	0.83
Leased-in land (Proportion in land possessed)	0.09	3.82
Land productivity (gross income) (₹/ha)	27916	148432
Household size (No.)	5.53	2.81
Workers (age 15-59) (No.)	3.15	1.66
Female workers (Proportion in total workers)	0.50	0.19
Age of the head of the household (Years)	46.79	13.3
Sex of the head of the household (Male=1, otherwise=0)	0.93	0.25
Literacy status of household-head		
Illiterates (Proportion in total)	0.44	0.50
Primary (Proportion in total)	0.27	0.44
Middle (Proportion in total)	0.14	0.35
Secondary & higher secondary school (Proportion in total)	0.12	0.32
Graduation and above (Proportion in total)	0.03	0.17
Access to credit		
Farm credit (Yes=1, otherwise=0)	0.29	0.46
Non-farm credit (Yes=1, otherwise=0)	0.03	0.16
Social Groups		
Scheduled castes (SC) (Proportion in total)	0.17	0.38
Scheduled tribes (ST) (Proportion in total)	0.15	0.36
Other backward castes (OBC) (Proportion in total)	0.39	0.49
Other castes (Proportion in total)	0.29	0.45

activities, and skilled and educated ones in more remunerative non-farm activities.

India's social system is quite heterogeneous and is stratified based on caste. The scheduled caste and scheduled tribe households are considered to be less-endowed with land and other resources. Such households comprised close to one-third of the total farm households in the sample, and are expected to be engaged more in low-paid wages and less-remunerative non-farm activities.

The lack of access to external finances can impede investment in farm as well as non-farm activities that require high start-up capital or even operational expenses (Barrett, *et al.*, 2001). For instance, diversification within agriculture towards fruit plantations requires more initial capital to establish an orchard. Likewise, starting a new non-farm business also requires high start-up capital. The access to external finance eases the liquidity constraint, and we have included dummy variables for farm households'

access to farm and non-farm credits. Close to 30 per cent farm households in the sample had accessed credit for agricultural purposes, and 3 per cent for non-farm business activities.

The regression estimates for farm households' access to different income sources are presented in Table 6. As expected, the income share of agriculture is positively and significantly associated with landholding size, while other income sources become less important with increase in landholding size. The effect of agricultural productivity is also as per expectations; higher profits in agriculture keep the farmers in agriculture. These results suggest that small landholdings and low agricultural productivity are the important push factors motivating farm households to diversify away from agriculture towards non-farm income-generating activities.

The excessive employment pressure on agriculture is an important trigger for non-farm diversification. The regression coefficient for labour endowment

Table 6. The regression estimates for determinants of income share

Explanatory variables	Agriculture			Livestock			Wages and salaries			Non-farm business		
	Coefficient	z-statistic	P>|z|	Coefficient	z-statistic	P>|z|	Coefficient	z-statistic	P>|z|	Coefficient	z-statistic	P>|z|
Proportion of leased-in land	0.0007	0.74	0.461	-0.0016	-2.83	0.005	0.0012	1.34	0.182	-0.0004	-2.32	0.020
Land productivity	1.0289	94.60	0.000	-0.2894	-14.40	0.000	-1.1532	-18.56	0.000	-0.0622	-12.80	0.000
Landholding size	0.8751	44.59	0.000	-0.0845	-3.53	0.000	-0.9702	-14.17	0.000	-0.0383	-5.75	0.000
Ln Number of workers	-1.1006	-9.94	0.000	-0.5764	-4.00	0.000	0.5192	1.99	0.046	0.0172	0.46	0.643
Number of workers × landholding size	0.1663	10.53	0.000	0.0227	1.24	0.215	-0.1575	-4.75	0.000	-0.0101	-1.95	0.051
Age of household-head	-0.0025	-3.65	0.000	0.0019	1.75	0.081	-0.1584	-1.39	0.164	-0.0003	-0.99	0.321
Proportion of female workers	0.5310	11.66	0.000	0.3560	4.56	0.000	-0.4840	-3.22	0.001	-0.0131	-0.53	0.595
Availability of credit												
Access to farm credit	0.2769	12.14	0.000	0.1768	5.42	0.000	-0.4236	-7.25	0.000	-0.0402	-3.77	0.000
Access to non-farm credit	-0.8365	-17.24	0.000	-1.0753	-13.44	0.000	-2.0297	-12.53	0.000	0.1232	11.74	0.000
Educational level												
Primary	-0.0871	-4.26	0.000	-0.0434	-1.23	0.219	-0.2221	-3.59	0.000	0.0841	8.06	0.000
Middle	-0.2585	-9.65	0.000	0.0509	1.17	0.241	-0.0270	-0.35	0.727	0.0873	7.24	0.000
Secondary	-0.6321	-21.45	0.000	-0.2067	-4.66	0.000	0.6885	7.57	0.000	0.1000	7.86	0.000
Graduation and above	-1.1209	-22.81	0.000	-0.5933	-7.73	0.000	2.0044	10.49	0.000	0.1036	4.89	0.000
Social group												
Scheduled tribe	0.1032	3.61	0.000	-0.2490	-4.79	0.000	0.3534	3.71	0.000	-0.0771	-4.20	0.000
Scheduled caste	0.0510	1.97	0.049	-0.3388	-7.64	0.000	0.2466	3.07	0.002	-0.0648	-5.06	0.000
Other backward castes	-0.0398	-1.79	0.074	0.0258	0.72	0.473	-0.0909	-1.43	0.152	-0.0206	-2.07	0.038
Number of observation	33220			23050			17545			6090		
log-likelihood	-30578			-35028			-8723			-385		
Wald chi²	20280			3525			1122			1203		

(workers) has been found negative and significant in the case of agriculture and livestock and positive and significant in the case of wages and salaries. It also carries a positive sign for non-farm business income, but is insignificant. This implies that households with larger labour resource look for income opportunities in the labour market and non-farm activities. Nonetheless, the households having larger endowment of both land and labour prefer agriculture over low-paid non-farm activities. Our results also suggest that households with more women in workforce tend to remain engaged in agriculture and animal husbandry.

It is not surprising to see that education has a strong effect on income diversification. The income from non-farm business is related positively and significantly 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 being 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 regression coefficients for credit suggest that those having access to farm credit (for crop as well as livestock production) are less likely to diversify towards non-farm activities, and those who have access to non-farm credit are less likely to diversify away from non-farm activities.

Finally, we examined the relationship between social identity and income sources. The results suggest that scheduled caste and scheduled tribe households have less access to non-farm business activities, probably because of their limited skills and barriers they face in accessing finances for starting non-farm business. The results have shown that these households are more involved in wage employment and agriculture. These findings are similar to those reported by Lanjouw and Murgai (2008). Earlier, Lanjuow and Shariff (2002) had reported that scheduled caste and tribal households

were less involved in agriculture because of their limited access to land. We probed it further and found that scheduled caste and scheduled tribe households are not as deprived in land distribution as is often perceived. Together, these households control about one-fourth of the total arable land, almost equal to their share in total population of the country.

Conclusions and Policy Implicatons

Although agriculture is the dominant source of income for farm households in India, the non-farm sources contribute 44 per cent to their household income. The share of non-farm income declines with landholding size, but has a positive relationship with total income. This suggests that the non-farm sector and labour market can serve as the potential entry points for small landholders to enhance their income levels. A number of push and pull factors determine the extent of diversification towards non-farm sector. The small size of landholdings, lower farm profits and surplus labour tend to push farm households out of agriculture, while educational level and access to credit facilitate their transition towards non-farm sector.

Agriculture being the largest income source, contributes highest to the income inequality. But because of its wider spread, any change in agricultural income is unlikely to have a significant effect on income distribution. The distribution of wages and salaries, and livestock is skewed towards the poor, and an increase in income from these sources has an equalizing effect on income distribution. On the other hand, the distribution of non-farm business income is highly unequal and any increase in it would lead to deterioration in income distribution.

The findings in the study have some important policy implications. First, as inequality is neutral to changes in agricultural income, the development policies should emphasize on intensification as well as diversification of small farms, which dominate the Indian agriculture, and make immense contributions to national food-security. Simultaneously, there is a need to develop markets, infrastructure and institutions that may enable agriculture to tread on a sustainable growth path.

Second, animal husbandry is widely practised in India by the small landholders. Livestock generate a regular stream of outputs, help in consumption

smoothening during the periods of crop failures, and assume the functions of banking and insurance. Moreover, being concentrated among smallholders, the livestock reduce income inequality. Efforts and investment should therefore be targeted towards development of animal husbandry.

Third, the poor households depend more on wages for their livelihood. This calls for creating sustainable employment opportunities in the rural non-farm sector.

Fourth, the non-farm sector has considerable potential to enhance income of the poor if they are facilitated to overcome some of the financial and market barriers they face in their entry into the non-farm sector.

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