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Augmenting Small Farmers' Income through Rural Nonfarm Sector: Role of Information and Credit Institutions

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Abstract

Low level of income of farmers is a critical concern in India in the backdrop of which the current union Government emphasized to double farmers' income by 2022. As the land size of the small and marginal farmers who constitute 80 percent of farmer population in India is limited, reducing farmers' distress and doubling of farmers' income through farm sector alone is almost impossible. In this regard, nonfarm sector can not only absorb the excess labour from agriculture but also generate additional income for the farm households. Further the sector can help in mitigating risks for the farmers and check migration to urban areas. The nonfarm sector however, has not received its due importance in the country and in this backdrop, the current paper discusses the nature and extent of nonfarm activities in India using India Human Development Survey unit record data. An exercise carried out to understand the determinants of income from nonfarm activities using Tobit regression shows that the households who could avail larger size loans (for any purpose including agriculture) or insurance from financial institutions and have access to information and networks are the ones who could get higher nonfarm income. As the credit for nonfarm activities per say is rather limited, it can be inferred that higher level of credit for even farm activities can help nonfarm sector as well possibly through production linkages.

Introduction

As observed in case of many progressing countries, the Indian economy too experienced a decline in the share of agricultural output in gross domestic product with the growth of the economy, where the share of agriculture and allied activities in the gross domestic product reduced from 58 percent in 1950-51 to around 18 percent in 2014-15. However, the decline in the share of the farm sector output in GDP has not kept parity with the share of the sector in total employment, implying that a large percentage of farmer households (around 50 percent) remain dependent on a small part of income. In addition to low income, the agricultural sector is faced with frequent supply side shocks causing fluctuations in its growth rates with instances of even negative growth. For example, the growth rate of agricultural sector was 1.5 per cent in 2012-13, 4.2 per cent in 2013-14, and (-) 0.2 per cent in 2014. Such trends create enormous uncertainty in the minds of the farmers, 80 percent of whom operate in marginal and small landholdings and have meager savings. In this backdrop, the rural nonfarm sector has the potential to alleviate the agrarian distress of the farmers by providing avenues for generating additional income as well as acting as a risk mitigating device.

While the farm sector includes activities like crop production, animal husbandry, plantation and forestry, the non-farm sector includes all other economic activities

including small food/ agro processing units, retailing, wholesaling, storage related activities, house-based cottage industries (bamboo or say cane based), weaving and so on. As a result, the products of agriculture and allied activities often enter as an input for the nonfarm sector and help generating additional income and employment. In other words, the complementary relationship that often exists between the farm and non-farm sectors is important and it allows for diversification within the farms.

Potential positive impacts of developing nonfarm sector are not only confined to the small and marginal farmers. It can be especially useful to the landless tenant farmers, who cannot otherwise sustain a livelihood through agriculture (cultivation). Further, an expansion of the non-farm sector can lessen unemployment through an increase in labor demand and thereby help raising wages in the rural labor markets. This contributes to a more equitable income distribution and a stable demand for agrarian goods through consumption linkage (Lanjouw et.al, 2001). Given such beneficial impacts of nonfarm activities for ensuring sustainability for the small and marginal farmers it is necessary to examine the factors that determine the development of the sector. It is indeed important to concentrate on the small and marginal farmers' category for whom these additional income generating activities are essential for escaping poverty and can act as risk mitigating devices. In case of less developed economies many a times we notice that lack of information regarding possible activities and funding acts as major impediments (see Rajeev et al, 2015) and hence we consider it necessary to examine the role of these factors on the development of the nonfarm sector. On the other hand, large farmers usually get fully involved in agriculture activities and if they wish to get engaged in nonfarm activities both information and funds do not become constraining factors.

A large number of studies that focus on nonfarm sector have looked into the *linkages* between farm and nonfarm activities and informal business in rural areas and an exhaustive review of literature is beyond the scope of this paper. A few scholars (see von Braun and Pandya-Lorch, 1991) have argued that the relation between farm and nonfarm employment is inverse in the sense that underdeveloped agriculture leads to the development of nonfarm sector in a region-- implying that the rural nonfarm activities arise mainly because of certain push factors. In other words, the general conclusion of these papers is that if agriculture is incapable of generating enough employment, it leads to the growth of RNFS (see Bhaumik, 2002). There are also studies which claim that growth of farm and nonfarm sectors is complementary in nature. Mellor and Lele (1973) for instance argued that the growth in agriculture increases income of the farmer households and this in turn raises demand for rural nonfarm goods and services, thereby develops the nonfarm sector through consumption linkages. Recent studies, however have accepted coexistence of both; for example, (see Haggblade et.al, 2007) maintain that nature of agricultural development in a state largely determines the nature of non-agricultural sector. Several authors across the globe also focus on the trait that a household takes up multiple income generating activities, which is termed as pluri-activity, to enhance their economic condition. Reardon et al (2007) provide a summary of certain studies (such as Barrett, et. al, 2001; 2005), which show that Chinese households and households and communities in Kenya, Ivory Coast and Rawanda follow development paths that comprise adoption of alternative income generating activities in the farm and

nonfarm sectors. On the other hand, more Latin American households specialize in one activity (see Reardon et al., 2007).

While the rural nonfarm sector is developing in India over the years, extent of pluri-activity and the factors that persuade a small farmer to take up these activities is not addressed adequately, and this research attempts to fill this gap by focusing, among other factors, on the role of information and networking and financial institutions. Our initial analysis of data reveals that most of the nonfarm enterprises are own account enterprises meaning that they have no hired labour. They are also seen to have low levels of gross value added. One of the reasons for not being able to go beyond such subsistence enterprises is, as mentioned above, due to lack of knowledge about profitable production possibilities and marketing opportunities (See Rajeev et al, 2015). Networking and education may help to overcome such shortcomings. In addition, institutional factors such as lack of access to credit or risk mitigating instruments like insurance through financial institutions may also impact development of the nonfarm sector. However, role of these factors have not been rigorously tested in the existing literature.

In this background, the current paper unfolds in 4 sections. The next section describes the data source and examines the nature and extent of nonfarm business among small and marginal farmers. Section 3 then examines using a Tobit regression model the role of information and funding opportunities in the development of the rural nonfarm sector especially for the small and marginal farmers. A concluding section is presented at the end.

Data Sources and Certain Basic Indicators

The paper is based on data collected through India Human Development Survey (IHDS), carried out in 2011-12 through a joint research endeavour of the University of Maryland, USA and the National Council of Applied Economic Research, India. The survey was conducted in two rounds known as IHDS – I (2004-05) and IHDS – II(2011-12) and in this study we use the more recent data base (2011-12). It is a multi-topic survey of 42,152 households includes 1,503 villages and 971 urban neighborhoods across India. Data are collected under two categories. The first of which is related to the households under which enquiry has been made about household income, expenditure, remittances etc. The second category considers institutional aspects which cover information about village level infrastructure such as health, education and so on.

From IHDS-II survey we have isolated data for small and marginal farmers and an analysis have been carried out using the unit record household level data. A marginal farmer is defined as a farmer cultivating land below 1 hectare while the small farmers are the ones who cultivate between 1 to 2 hectares of land.

A land size wise analysis of farmer households in rural areas shows that 75.1 percent of farmers in major states are small while the marginal farmers comprise about 15.1 percent totaling to about 90 percent of farmers in small and marginal category. These numbers are however not free from regional disparities. For example, in terms of share of small and marginal farmers, West Bengal (91.7%) ranks the highest followed by Bihar (86.9%) and Uttar Pradesh (86.5%) while Maharashtra (52%) ranks the lowest.

Analysing major occupational activities of small and marginal farmer households (see table A.1 in the Appendix) it is observed that cultivation continues to be a main activity for majority, across India. An interesting observation, however, is the relatively low share of cultivation (less than half) in states like West Bengal, UP and Tamil Nadu which have very high percentage of small farmer households. These are also the states with the highest percentage of households engaged as wage labours (agricultural and non-agricultural). Apart from cultivation, wage labour (both agriculture and non-agriculture) is found to be the second major occupation with an exception of Punjab, Haryana and Assam. Salaried occupation forms a significant head in states like Assam and Haryana where wage labour engagement is low. Apart from this, farmers are engaged as artisans, petty shopkeepers but the fraction of households having them as the main occupation is pretty low (see Table A.1 in the Appendix).

If we consider main occupation of the sample households, only 8 percent of small and marginal farmers are involved in nonfarm business activity as a principal activity. However, if we look at nonfarm business both as a principal activity as well as a subsidiary occupation, then this percentage naturally increases (to around 14 percent) but not to a substantial level (table A.2 in the Appendix). As far as return from nonfarm activities are concerned for the small and marginal farmers, our analysis based on IHDS data shows (table A.3 in the Appendix) an average earnings of more than Rs 60000 per annum, which is a non-trivial amount in the light of what they earn from farm sector¹. However, in the absolute sense this is not a substantial amount and table A.3 also reveals that only a small percentage of farmers are engaged in nonfarm activities. Thus, it is important to see what factors act as a deterrent to take up or enhancing nonfarm activities.

This led us to concentrate on a possible major constraint viz., access to funds for investment in nonfarm business. Examining accessibility to credit from the unit record data we observe that at an aggregate level, the share of households that have received loans from all sources in the last five years is around 65 percent. A state-wise analysis displays more or less similar figures with the acute exceptions of Assam (18.9%) and Gujarat (31%) and Haryana (43%). This is a matter of serious concern as these are also the states which have highest fraction of marginal farmer households (see Table A.4 in the Appendix).

As far as access to loans from formal institutors are concerned, it is observed that at the national level only 27.7 percentage of households have received credit. It is also observed that around 3 percentage of small and marginal farmers who applied were rejected by a formal institution and 69.3 percentage of households did not apply for a loan (Table A.5). The households that did not apply for a loan can be risk rationed as well in the sense that the fear of not being able to repay led them to avoid taking a loan. This is where lack of information and financial illiteracy can play a role. In the next section, we discuss some of these possible factors that may have impacted the development of rural nonfarm sector amongst the small and marginal farmers who are in need of additional income for their sustenance.

¹ Rajeev and Vani (2011.) shows that about 70 percent of the marginal farmers net profit from farm sector is close to zero.

Understanding the Determinants of Nonfarm Income

3.1 Variables for the Analysis: Dependent Variable

The dependent variable is non-farm business income of the household. It is important to note that around 85 percent of small and marginal farmer households in the sample were not having any non-farm business. For these households non-farm business income was assigned as zero. 1706 households in the sample had positive business income and nine households had negative business income. For the regression analysis we have considered these 9 households to earn zero income (to avoid the problem of outliers).

3.2 Explanatory Variables

The explanatory variables included in our analysis comprise a set of variables that pushes a small or marginal farmer household to adopt non-farm business and also the variables that may create conducive atmosphere to take up nonfarm activities (pull factors). Both these factors can be idiosyncratic in nature or can be common regional specific factors.

3.2.1. Push Factors

The farm households are 'pushed' into non-farm activities primarily because of uncertainty in farm income or due to poor economic status, which may result either because of possessing smaller sized land holdings or lower agricultural yield rate in a region. Non-farm business in these situations generally acts like an insurance.

Thus, the economic condition of a household is an important push factor which can be indirectly captured through land holdings. In order to identify the effect of land holdings on non-farm business income, we have included size of cultivated land as an explanatory variable. However, sometimes farm households have other sources of income, such as regular salary or wage income. In these cases, push effect may not occur even though agricultural income may be low. The effect of alternative sources of income too is captured in our model by considering two variables, namely, salary and wage incomes of the households. These two factors are not combined to form a single variable because of their distinguishing characteristics such as larger and regular in nature of salaries compared to that of wage earnings.

Since agricultural sector is characterized by presence of uncertain shocks, farmer households need to insure themselves against risks and nonfarm activities can act as a risk mitigating device. There are generally three kinds of risk that farmers face, namely production risk, price risk and input risks (see Rajeev et. al 2015). To protect against these risks a farmer household may attempt to save more as saving can act as a risk mitigating device. Sometimes insurance can be indigenous and informal in nature, such as in the form of sharecropping, where the farm household is a tenant who gets assurance of help from the landlord (see Braido, 2003) in case of a distress situation. Access to credit can also be considered as an instrument which helps to shield against adversities. In addition, there are formal insurance schemes pertaining to life, crop or health. Presence of any of these risk-mitigating devices may deter a household from taking up additional income generating activities in the form of non-farm activities to shield against possible risks. One may also argue on the contrary that the households having insurance may make higher investment in non-farm sector since they need to maintain lower precautionary savings.

Insurance may also provide a cushion and induce a household to take additional risk in some cases. Thus, the role of insurance in case of enhancing nonfarm activities needs to be empirically tested. We have considered dummy variables for sharecroppers, for households that have availed formal insurance schemes such as life insurance, health insurance or crop insurance and households which have access to credit. A discussion on access to credit is provided in the next section.

3.2.2 Pull Factors

Non-farm activities are not always distress driven. As already mentioned, non-farm jobs may arise with a rise in agricultural surplus and resulting income earning investment opportunities in the nonfarm sector. The economic status of households captured by land size, salary or wage earnings thus can also act as pull factor as a household with higher income have resources for investment in nonfarm activities.

In addition, if a region (here district) is economically advanced (captured through median value of monthly per capita consumption expenditure of the respondents, MPCE) it can generate better demand for nonfarm products. Some of these demands may be for consumption purposes while the other may be for intermediary goods for productions in the manufacturing or services sector. Since there are many districts in which the total number of households surveyed was less than 20, taking the median value has helped us in removing the effect of outliers. Agriculture yield could have been another variable to capture economic status of a region or a household. We have used median MPCE instead of agricultural yield because yield may vary from one year to another based on agricultural shocks that a region faces. India is geographically vast and different regions face different climatic conditions at any given point of time. It is possible for a developed agricultural region to face a relatively low yield, while a less developed region may not have an agricultural crisis in the year of survey. Temporary shocks have less impact on MPCE due to presence of consumption ratchet effect. The state specific dummy variables will capture other regional factors.

Access to credit, which can sometime provide the necessary capital to invest in rural non-farm sector, can be an important pull factor. Access to credit can also boost agricultural productivity and surplus (see Awotide et al, 2015) and therefore can increase nonfarm income generation. On the basis of given data, we observe that accessibility to finances can be captured in two ways, namely, in terms of incidence of availing loans (number of loans within a specific time period) and extent or size of the loan. In the regression analysis incidence of availing loan is captured by including number of times a household has availed loans in last 5 years. Incidence can positively impact the dependent variable only if the incidence does not imply perpetual indebtedness resulting from income below subsistence level. Extent of accessibility is captured by the largest size loan the household has availed in last 5 years.

Aside from the above-mentioned factors, access to information relevant for taking up profitable nonfarm activities may have a positive impact on actual starting of a non-farm business, and to capture this effect we have included two dummy variables one relating to educational achievements and the other relating to access to media. Thus, the first dummy variable was formed by assigning households having members with secondary education the value 1 and rest as zero. Another

dummy variable was formed where households who have regular access to radio, TV and newspaper were assigned the value 1, other households were assigned the value zero.

Social networking may impact non-farm business in a number of ways as it can provide necessary contacts for starting a business. Social contacts and networking can also aid access to low cost inputs, market information etc. Households having more members are expected to have better social networking, as are households having members belonging organizations such as mahila mandal, SHGs, religious bodies, unions, caste associations panchayat etc. Caste affiliations of households may affect social networking wherein generally higher caste households in India are expected to have such benefits. Each one of these factors is included in the regression analysis.

In addition to that of social networking, households having more members may have an additional advantage in the labour market. These households can perform nonfarm activity with family labour. Utilising family labour reduces problems of moral hazard. In the regression analysis carried out, we have considered two variables to capture the number of household members. First, we have included teenagers and adult members (age between 14-60 years) and secondly, we have considered old aged family members and child. This has been done because teenagers and adult members are expected to be more productive than children and older members.

State specific dummy variables included in the analysis are expected to capture several regional fixed effects. The table1 provides explanations for the variables used in the analysis, and subsequently table 2 presents the related descriptive statistics.

Table 1: Notations and Explanations of the Variables used in the Analysis

Cultivated Land	Size of the cultivable land held by the farmer household
Wage Earnings	Wage Income of the Household
Salary Earnings	Salary Income of the Household
Forward Caste	Forward Caste = 1, others =0
Adult and Teenage Mmembers	Number of adult and Teenage members of the household (age between 14-60 years)
Child and Old Members	Number of children (below 14 years) and old household members (above 60 years)
Secondary Education	Households with members having secondary education =1,others =0
TV/radio/Newspaper	If anyone is a regular user of TV, Newspaper or radio a value 1 is assigned, zero value is assigned otherwise
Social Connections	Households having membership in Mahila Mandal, SHGs, chit fund schemes, political party, religious groups, cooperatives clubs etc were assigned the value 1, rest = 0
Sharecropping	Sharecropper =1, rest = 0

Insurance	If the household has availed life, health or crop insurance =1, others = 0
Number of Loans	Total number of loans availed in last 5 years
Largest Loan Size	Largest size loan in last 5 year
District Median MPCE of farmers	Median monthly per capita consumption expenditure of small and marginal farmer households in a district
State Specific Dummy Variables	Represented by the respective names

Table 2 Mean and standard deviations of the variables used in regression

Variable	Obs	Mean	Std. Dev.	Min	Max
Nonfarm Business Income	12181	8972.049	58134.48	0	2457000
Cultivated Land	12181	1.273837	1.346881	0	50
Wage Earnings	12181	18398.42	28555.1	0	308500
Salary Earnings	12181	13825.64	54201.47	0	1080000
Forward Caste	12181	0.24177	0.428173	0	1
Adult and Teenage Mmembers	12181	3.5823	1.627976	0	16
Child and Old Members	12181	2.107134	1.684304	0	19
Average Age of Head	12181	47.79017	11.89173	17.5	89
Secondary Education	12181	0.358099	0.479461	0	1
TV/radio/Newspaper	12181	0.432723	0.495474	0	1
Social Connections	12181	0.623594	0.484504	0	1
Sharecropping	12181	0.154092	0.361052	0	1
Number of Loans	12165	2.069955	3.059471	0	60
Largest Loan Size	12164	43153.06	143058.8	0	7500000
Insurance	12099	0.31358	0.463967	0	1
District Median MPCE of farmers	12181	17435.89	5965.188	6401.33	48373.34
Tamil Nadu	12181	0.021098	0.143718	0	1
Andhra Pradesh	12181	0.055578	0.229115	0	1
Karnataka	12181	0.127822	0.333905	0	1
Maharashtra	12181	0.094574	0.292637	0	1
Gujarat	12181	0.03998	0.195921	0	1
MP	12181	0.121172	0.326341	0	1
Orissa	12181	0.079714	0.270862	0	1
West Bengal	12181	0.048518	0.214867	0	1
Assam	12181	0.023972	0.152967	0	1
Bihar	12181	0.048929	0.215728	0	1
Uttar Pradesh	12181	0.154667	0.361602	0	1
Rajasthan	12181	0.105492	0.307199	0	1
Haryana	12181	0.046794	0.211206	0	1

Note: average salary income is less than average wage income because there are more number of wage earners in the sample than salary earners.

3.3 Econometric Model

The dependent variable used here is per capita non-farm business income of small and marginal farmer households, excluding wage income. It is important to note that the dependent variable assumes the value zero for large number of observations because non-farm businesses are not carried out by all households. Under this circumstance, one may think of a Probit model, which is generally used when a distribution is censored either from below or from above. In other words, the model is used when the actual dependent variable is not observed below or above a particular value. However, under circumstances in which the optimal choice for some individuals is itself a corner solution i.e. $y = 0$, literature suggests the use of a Tobit model (see Wooldridge 2002).

The structural equation in the Tobit model is:

$$y_i^* = X_i \beta + \varepsilon_i \dots (1)$$

$\varepsilon_i \sim N(0, \sigma^2)$ and y_i^* is a latent variable that is continuous for values greater than 0.

The observed y is defined by the following measurement equation

$$y_i = \begin{cases} y_i^*, & \text{if } y_i^* > 0 \\ 0, & \text{if } y_i^* \leq 0 \end{cases}$$

The Tobit model is estimated using the maximum likelihood procedure and the likelihood function takes the following form

$$L = \prod_i^N \left[\frac{1}{\sigma} \phi \left(\frac{y_i - X_i \beta}{\sigma} \right) \right]^{d_i} \left[1 - \Phi \left(\frac{X_i \beta}{\sigma} \right) \right]^{1-d_i}$$

The parameters in this model i.e. β s and σ are estimated from the log likelihood function.

Endogeneity and other concerns

There is possibility of an endogeneity between non-farm business income and size of the loan in our analysis. A Durbin-Wu-Hausman test was carried out in order to inspect this. The test procedure is carried out in two steps: First, loan size was regressed on all exogenous variables and the estimated value of residual was obtained. In the second step the residual term was included in the regression analysis. However, the test did not support presence of endogeneity as the coefficient of the residual term was insignificant.

Another problem faced in cross sectional analysis is presence of heteroscedasticity. Robust Standard Error option was used to deal with this. We have also used four regressions to show robustness of the model. Most of the coefficients did not change sign and significance with a change in model specification.

3.4 Results

Four regressions carried out to understand the impacts of different agriculture and other related (push and pull) factors on nonfarm income are presented in Table 3. The first regression included a set of idiosyncratic socio economic variables, the second regression included variables which capture household's access to credit and insurance as well as information and social networking related variables. The third model considers the impacts of region specific variables on the dependent variable. The last model is an incorporation of all the variables. We have considered those variables as significant which are significant in all the regressions².

Sign of the regression coefficients of the major variables can be summarized as follows. Size of the cultivable land, wage earnings and salary earnings show negative relation with the dependent variable in all the regressions. Variables capturing access to credit and information possess a positive relation with non-farm business income. As far as insurance is concerned, formal insurance has a positive impact on non-farm business income while insurance or security which may be provided through sharecropping has no significant impact on the dependent variable. The coefficient of the caste variable is also not statistically significant. Number of adult and teenage members of the household has a positive impact on nonfarm income. Total number of old aged and children members is not statistically significant in the first regression. District Median MPCE bears a positive statistically significant sign related to the dependent variable (table 3).

Table 3: Regression Results with nonfarm business income of the household as dependent variable (TOBIT MODEL)

Explanatory Variables	Coefficient	Coefficient	Coefficient	Coefficient
Cultivated Land	-11037.5** (4844.1)			-14387.2*** (5697.2)
Wage Earnings	-2.3*** (0.3)			-2.13 *** (0.28)
Salary Earnings	-0.4*** (0.1)			-0.53*** (0.11)
Forward Caste	1352.2 (6539.2)			-7551.6 (6903.97)
Adult and Teenage Mmembers	34126.8*** (3921.1)			27438.45*** (3478.47)
Child and Old Members	874.7 (1862.8)			3796.251** (1934.70)
Average Age of Head	-1442.5*** (279.2)			-1384.55*** (277.3)
Secondary Education		54650.9*** (8156.6)		32790.59*** (6745.3)
TV/radio/Newspaper		30228.7*** (6005.7)		32207.89*** (6675.07)
Social Connections		3556.5 (5852.4)		10793.67* (6197.4)

² We have also run a regression with per capital nonfarm income as dependent variable and arrive at qualitatively similar results.

Sharecropping		-5319.4 (7640.6)		-11967.6 (8742)
Number of Loans		2615.9*** (721.8)		1827.699** (752.09)
Largest Loan Size		0.1*** (0.034)		0.1028*** (0.03)
Insurance		45222.2*** (7697.6)		39640.1*** (7232.04)
District Median MPCE of farmers			5.07*** (0.909)	3.855*** (0.87)
Tamil Nadu			-171254 (28353.74)	-19093.2 (26218.28)
Andhra Pradesh			-87576.3*** (22322.09)	-64963.8*** (20900.03)
Karnataka			56846.62*** (19881.33)	72952.11*** (20215.33)
Maharashtra			-5070.48 (20684.2)	-902.446 (19220.1)
Gujarat			-38381.87 (26166.28)	-28496 (25225.92)
MP			34362.9* (21320.6)	51951.59*** (20759.03)
Orissa			56204.59** (24721.6)	47738.42** (23581.11)
West Bengal			67630.58*** (24298.66)	71108.17*** (23303.47)
Assam			17075.56 (26074.82)	17928.67 (25481.32)
Bihar			60866.41** (26257.42)	58259.37** (25616.65)
Uttar Pradesh			66708.42*** (22519.93)	59754.26*** (21000.91)
Rajasthan			26042.34 (20696.31)	34923.31* (19565.17)
Haryana			2742.75 (21337.86)	-2431.87 (20151.75)
Constant	- 226065.5*** (26736.09)	- 283952.7*** (29568.64)	- 347416.3*** (46609.73)	- -357816*** (49931.9)
Number of observations	12181	12079	12181.0	12079
Uncensored observations	1688	1667	1688.0	1667
F	11.79	13.16	4.88	3.97
Log pseudo likelihood	-25518.229	-25316	-25742.6	-24982
sigma	189400.9**	190389.9**	197157.8**	181125.7**

Note: *** denotes significance at 1 percent, ** denotes significance at 5 percent and * represents significance at 10 percent level. Figures in the parentheses are standard errors of the coefficients

Presence of a positive relation between median MPCE of farm households in a district and non-farm business income shows that non-farm business are adopted more often and generate higher income in agriculturally developed regions. This can perhaps happen either because of consumption linkage where farm surplus generates demand for non-farm goods and thereby augmenting non-farm income. Secondly, it may also happen because of agricultural surplus being invested in non-farm sector.

Institutional factors such as access to credit and insurance can also have positive impact on the nonfarm income. A farm household usually avail credit for farm activities as supply of such credits are more due priority sector lending norms. Credit for nonfarm activities is comparatively less prevalent. But as mentioned above (Rajeev and Vani, 2011) credit to agriculture can enhance productivity and thereby create surplus for nonfarm. Similarly access to insurance from formal institutions help farm households to reduce their precautionary savings and invest the surplus in nonfarm activities.

One expects relatively large farmers (amongst the small and marginal farmers) and households having additional wage and salary income to generate higher agricultural surplus compared to the other category. However, when we look at the relation that non-farm business income has with the size of cultivated land and wage and salary earnings, the regression reveals a negative relation, implying that farm households with relatively lower farm surplus are earning more from non-farm business. One possibility as mentioned already in the previous section could be specialization by relatively larger farmers on farm business because of cultivating (comparatively) larger sized land by family members thereby facing shortage of family labour for non-farm activities. Hiring labour can be considered as a possibility but presence of higher supervision and labour cost may reduce returns from investments. In this context, a positive sign of the coefficient of the variable 'adult and teenage members' provides further support to this line of argument. The regression result shows that households having more adult and teenage members earn higher from nonfarm activities, which to some extent proves the role played by family labour in generating nonfarm income. The argument of labour shortage for non-farm activities can also be considered for households having regular salaried and wage earning members. There could be other reasons as well. For instance, higher earnings in farm sector or additional wage and salary earnings may lead to a backward bending labour supply curve for non-farm sector since households with higher income may prefer leisure to work effort.

If the hypothesis of family labour shortage is accepted then it implies that non-farm activities by farmer households are mainly explained by the existence of surplus labour in the family. From the data, it is observed that only 2.6 percent of the small and marginal farmer households involved in non-farm business incur expenditure on hiring labour for non-farm business. Thus, non-farm activity is mainly carried out using family labour. However, this does not negate the argument of leisure labour tradeoff, particularly for regular salaried individuals who earn more than wage earners.

The other important variables that positively influence non-farm business incomes are access to education, regular access to newspaper, radio or television. These factors create 'pull' effects into the non-farm sector as noted above, driving investments to the sector so as to diversify income sources and safeguard against

agricultural risks such as crop failure. Thus, our econometric exercise appears to reveal that there are significant pull factors that are promoting expansion in the non-farm sector, which further supports the hypothesis that RNF activity is driven by excess labor supply in households, who might seek to utilize this labor to diversify incomes owing to income generating opportunities in the RNFS. The regression results also show the positive impact of insurance on non-farm business income, the channels of impact of which are explained in earlier.

Conclusions

The objective of this paper is to identify the factors that induce a small or marginal farmer household to carry out non-farm business.

Our econometric exercise reveals that the factors that may deter a household to take up non-farm business is the absence of family labour— as hired labour can be relatively expensive and may in turn make the business non-profitable. Thus, it was observed that non-farm business is carried out mainly with the help of family labour and lack of excess labour in the family tend to discourage a household to invest in any nonfarm business. This happens also due to the fact that nonfarm activities are primarily petty businesses and earn low return³.

It is observed that non-farm business is largely associated with development of a region. Relatively developed region generates higher non-farm business income to farmers may be through both consumption as well as production linkages. We also observed that access to credit, insurance, education and media has a positive role in non-farm business. Access to credit may even be for farm sector as due to the priority sector lending norms loans for agriculture is easier to access in India; but that can create higher productivity and production linkage. Presence of insurance of any kind provides a shield against possible risks and hence funds can be utilized for nonfarm investment rather than used as savings. Thus, both funding opportunities and availability of cost effective risk mitigation instruments can help households to take up nonfarm activities.

However, we observe that only a small percentage of households are getting engaged in the nonfarm activities. Lack of financial assistance for nonfarm activities and better knowledge about possible profitable businesses opportunities definitely act as deterrents. Absence of knowledge about marketing is another major factor. To enhance adoption and income of the small and marginal farmers through nonfarm activities these lacunas need to be addressed adequately.

³ This has been observed during our survey in various parts of the country. See Rajeev and Bhattacharjee (2017).

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APPENDIX

TABLE A.1 DISTRIBUTION OF FARMER HOUSEHOLDS (SMALL AND MARGINAL) ON THE BASIS OF MAIN OCCUPATION (Rows add up to 100)

States	Cultivation	Agricultural Allied Activities	Agricultural wage labour	Non agricultural wage labour	Artisans	Petty shop	Organized Business	Salaries	Profession	Pension/Ret etc.	Others
Punjab	48.0 %	.6%	2.1%	13.1 %	.3%	5.7 %	.2%	14.7%	.2%	6.3%	8.8 %
Haryana	57.5 %	1.4%	1.7%	8.3%	.2%	4.9 %	1.0 %	16.7%	.5%	5.5%	2.3 %
Rajasthan	52.5 %	.6%	1.6%	25.0 %	.5%	5.2 %	.2%	9.0 %	.5%	3.0%	2.0 %
Uttar Pradesh	46.8 %	.7%	7.7%	24.9 %	.5%	5.8 %	.2%	7.0 %	.4%	2.4%	3.5 %
Bihar	51.8 %	3.7%	10.7 %	13.3 %	.4%	5.2 %	.8%	6.6 %	.3%	3.0%	4.0 %

Assam	68.6%	.1%	.4%	7.7%	1.8%	5.4%	.1%	12.2%	0	3.2%	.5%
West Bengal	43.0%	.5%	20.5%	13.5%	.2%	6.8%	.2%	8.0%	.6%	3.8%	2.9%
Orissa	51.4%	.1%	6.7%	22.8%	1.5%	4.0%	1.1%	6.5%	.6%	3.9%	1.3%
Madhya Pradesh	59.4%	1.2%	6.5%	19.0%	.1%	5.5%	.1%	4.3%	.2%	2.2%	1.7%
Gujarat	65.2%	4.7%	14.0%	6.9%	.8%	1.8%	.2%	5.0%	0	1.2%	.1%
Maharashtra	71.3%	1.2%	12.9%	3.3%	.6%	1.5%	.2%	3.4%	.1%	4.0%	1.6%
Andhra Pradesh	49.2%	.7%	31.6%	7.0%	1.5%	2.3%	.3%	6.1%	0	.6%	.7%
Karnataka	58.0%	.7%	22.9%	5.1%	1.1%	4.1%	.4%	5.1%	.1%	2.0%	.5%
Tamil Nadu	41.1%	9.5%	17.1%	15.4%	0	4.6%	.6%	5.5%	0	1.6%	4.5%
All Major States	53.0%	1.5%	11.9%	15.8%	.7%	4.7%	.4%	6.8%	.3%	2.7%	2.4%

Source: computed using IHDS II (2011-12)

Table A.2 Percentage of small and marginal farmer households having first business, second business and third business

States	First Business	Second Business	Third Business
Punjab	18.0%	2.0%	.2%
Haryana	13.9%	2.4%	.5%
Rajasthan	13.0%	1.4%	.0%
Uttar Pradesh	15.5%	1.0%	.0%
Bihar	12.9%	.5%	.3%
Assam	11.5%	1.2%	0
West Bengal	16.5%	1.3%	.2%
Orissa	11.8%	.7%	.1%

Madhya Pradesh	13.5%	.9%	.1%
Gujarat	7.1%	0	0
Maharashtra	9.3%	.8%	.2%
Andhra Pradesh	6.9%	.2%	0
Karnataka	17.6%	1.9%	.4%
Tamil Nadu	11.2%	.4%	0
All Major States	13.0%	.9%	.1%

Source: computed using IHDS II (2011-12)

Table A.3 Distribution of small and marginal farmers in terms of their nature of return from nonfarm business activities (rows add up to 100)

States	Positive	Zero	No	Average
Punjab	18.0%	0.0%	82.0%	120654.8
Haryana	13.5%	0.1%	86.3%	127730.5
Rajasthan	13.0%	0.0%	87.0%	78727.23
Uttar Pradesh	15.2%	0.2%	84.6%	49194.47
Bihar	12.6%	0.0%	87.4%	109965.8
Assam	11.9%	0.0%	88.1%	40962.44
West Bengal	15.5%	0.2%	84.2%	45780.59
Orissa	11.8%	0.0%	88.2%	53142.1
Madhya Pradesh	13.4%	0.0%	86.6%	31200.31
Gujarat	7.1%	0.0%	92.9%	63942.65
Maharashtra	9.3%	0.0%	90.7%	54386.71
Andhra Pradesh	6.7%	0.0%	93.3%	29808.27
Karnataka	17.3%	0.2%	82.6%	46400.13
Tamil Nadu	11.0%	0.2%	88.8%	98441.22
All Major States	12.8%	0.1%	87.1%	59842.76

Source: computed using IHDS II (2011-12)

Table A.4 Percentage of small and marginal farmer Households having debt in last 5 years

Punjab	54.6%
Haryana	43.0%
Rajasthan	66.5%
Uttar Pradesh	71.8%
Bihar	66.4%
Assam	18.9%
West Bengal	56.1%
Orissa	53.7%
Madhya Pradesh	75.9%
Gujarat	31.9%
Maharashtra	52.0%
Andhra Pradesh	88.7%
Karnataka	83.3%
Tamil Nadu	70.7%
All Major States	65.2%

Source: computed using IHDS II (2011-12)

Table A.5 Percentage of small and marginal farmer Households having debt from Formal institutions in last 5 years

STATE	RECEIVED BANK LOAN	APPLIED BUT DID NOT RECEIVE	DID NOT APPLY
Punjab	30.6%	0.8	68.6
Haryana	25.1%	3.4	71.5
Rajasthan	29.7%	1.2	69.1
Uttar Pradesh	25.3%	1.7	73
Bihar	11.0%	3.9	85.1
Assam	9.9%	5.6	84.5
West Bengal	15.0%	2.4	82.6
Orissa	25.4%	9.3	65.3
Madhya Pradesh	28.7%	1.3	70
Gujarat	12.9%	2.8	84.3
Maharashtra	33.6%	3.2	63.2
Andhra Pradesh	60.9%	4.1	35
Karnataka	43.1%	2.7	54.1
Tamil Nadu	32.5%	2.4	65.1
All Major States	27.7%	2.9	69.3

Source: computed using IHDS II (2011-12)

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