Working Paper 412

# Participation of Rural Households in Farm, Non-Farm and Pluri-Activity: Evidence from India

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ISBN 978-81-7791-268-5



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# PARTICIPATION OF RURAL HOUSEHOLDS IN FARM, NON-FARM AND PLURI-ACTIVITY: EVIDENCES FROM INDIA

**S Subramanian**[1]

## Abstract

Farm households diversify their activities to supplement their income from outside the agriculture: it is an important adaptive strategy to increase family income, spread risk, stabilize salaries, reduce income inequalities to cope with the income differentials etc. This paper analyses the farm household's allocation decision by considering three possibilities, viz. working only in farm, taking up only non-farm activity and working in multi-activities (pluri-activity). The study uses India Human Development Survey data and employs generalized multinomial logit model to analyse the decision of the farm households to participate in diverse activities. The results show that old farmers with smaller land holdings, especially in SC and ST categories, are pluri-active to supplement the household income. It is interesting to find that the older age group members are more pluri-active than the youth in the household who either specialize or pursue higher education. Further, the women of the household tend to work more on farm than taking up other activities.

**JEL:** J22, J43, J61

**Keywords:** Farm, Non-farm, Pluri-activity, Time allocation

## Introduction

Of all the sectors, the rural agrarian sector is among the most resilient and adaptive to various external shocks, as it encompasses a pluralistic culture. Though its contribution to the Indian national income is shrinking over time, its capacity to employ is still the largest[1]. A majority of farmers represent either small or marginal farming communities who constitute about 85 percent[2] of the operational holdings. With the current land use policy and the current practice of inheritance and succession, India today is witnessing a continued decline in the farm sizes. Such fragmentation of land holdings has in a way reduced the profitability (Foster and Rosenzweig, 2010). Despite prospects, the sector could not fulfill the aspirations and expectations of the young generations, the effect of which are quite evident in the sudden exodus from farms[3]. These labourers move from farms towards casual/contractual jobs and self-employment in the non-farm sector, mainly within the vicinity of rural areas[4]. Such mobility within rural vicinity by the agricultural force could be due to increase in the population, lower labour absorption rate in urban area, influence of rural non-farm sector[5], weak manufacturing sector, attachment/connection to the rural environment etc. Furthermore, the increased income differentials of labour between these two segments (farm and non-farm) in turn have encouraged farmers to opt out of the farm. Some farmers to keep their roots intact continue to till along with their non-farm jobs. This phenomenon is called 'Pluri-activity'. Such strategy can be adopted by the household as a whole or the individual *per se*. Past studies have dealt with the choice between farm and nonfarm or even part-time and full-time

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This study is a part of my PhD thesis at ISEC. I thank my supervisor Dr Elumalai Kannan, Doctoral Committee Members, Panel Experts and other esteemed referees for their valuable comments and support. Based on the comments and suggestions, the paper has been revised. The usual disclaimer, however, remains.

farming. In the current study, we have come out with a possibility of working only in farm, working only in non-farm and thirdly being pluri-active. This categorization would give a new outlook and possibly see the policy implication from a different stand-point. With this background, this article explores various factors affecting the labour allocation decision for Pluri-activity in a household. The next section would elaborate about Pluri-activity and its relation to farm and nonfarm sectors in rural India.

## Conceptualizing Pluri-activity

At this juncture, understanding the concept of pluri-activity and its characteristics is of utmost importance. Pluri-activity is an age old phenomenon and the applicability of such phenomenon is in trend since the human existence. According to Fuller (1991), "*full-time farming is the aberration and in the modern farming history multiple jobs holding among farm households is the norm*". Pluri-activity entails allocation of an individual's time in multiple activities; here activities with economic benefits are preferred so as to maximize the returns. In the agrarian context, the days' time is mainly divided between a combination of *agricultural activity* (farm and off-farm) with other forms of gainful employment, i.e. *non-farm*[6] (Fuller, 1990; 1991; Loughrey *et al*, 2013) and most importantly *leisure* [a concept that was theorized by Becker in 1965]. Therefore, allocation of individuals' time between various economic activities is termed as pluri-activity or multiple job holding. But it must be noted that the concept of pluri-activity gets associated with all types and variations of agriculture, viz., whether farming in the rural-urban areas, whether grain or livestock farming, whether large or small operations, whether food or nonfarm sectors and whether economic or non-pecuniary benefits (enjoy farm work; continue family tradition; better quality diet; rear children in country side; bequeath land as inheritance) (Brooks *et al* 1986; Galdwin 1985; Rupena Osolnik 1983 as quoted in Barlett 1991) etc. Therefore, pluri-activity is not exclusively a function of agriculture, but is the product of a variety of factors wherein agriculture is an integral component. This is supported by the evidence of Bollman and Kapitany (1981) as cited in Kimhi & Bollman (1999), who concluded that part-time farmers have jobs prior to farming. Thus pluri-activity is a multifunctional phenomenon which cannot be interpreted from a single discipline but it demands an inter- and intra-disciplinary approach.

But the question remains why do people prefer to be pluri-active? Usually, a shift away from agriculture is a process adopted for sustenance and evolution of the individual and society. Huffman (1980:14) in his celebrated article mentions that people reallocate their time in response to changes in economic conditions and the value of their work. Schultz (1975: as quoted in Huffman, 1980) calls such efficient response to change as 'allocative ability'. But according to Fuller (1991), pluri-activity helps to explain the mobility process, but mobility alone does not explain pluri-activity. Early studies considered pluri-activity or nonfarm employment as temporary phenomenon; in fact, it was addressed as 'residual sector' (Vaidyanathan, 1986; Lanjouw and Lanjouw 1995, 2001). But the findings of Kimhi and Nachlieli (2001), Barrett *et al* (2010) point out that the rural nonfarm sector can serve as a bridge between agricultural-based livelihoods and industrial ones; and extensive research points out to the persistence of farm families in pluri-activity over time (Albrecht and Murdock, 1984; Saupe and Salant, 1985 as cited in Barlett, 1991). Being pluri-active helps farmers to supplement their income from outside the agriculture, an important adaptive strategy to increase family income, spread risk, stable salaries,

reduce income inequalities to cope with the income differentials and give them security of control over productive resources (Barlett, 1991; Huffman, 1991; Corsi and Salvioni, 2012; Binswanger *et al*, 2014). Literature cites examples of many countries wherein the pluri-activity has extended a positive externality to the growth of agriculture (Kimhi,1994; Benjamin and Kimhi, 2006). As a critique, Kimhi (1998) finds that in many cases even the pluri-activity can facilitate the continuation of economically non-viable farms. Studies regarding pluri-activity in India are scarce; the current study will be a contribution to the same.

Pluri-activity is indeed an efficient use of labour resources of households (Corsi and Salvioni, 2012) but such action of adopting pluri-activity necessitates the farm families to plan over and allocate the family members efficiently in order to maximize their collective utility. Such allocations are done in a very systematic way keeping in mind the various corresponding influential factors. Thus the participation decision of farmers and labour behaviour have long enthused researchers to understand how farmers divide their labour supply between farm, non-farm work or engage in pluri-activity; a phenomenon that is rarely observed in other sectors of the economy (Shishko and Rostker, 1976 as quoted in Ayal Kimhi, 2004**;** Corsi and Salvioni, 2012). Further, the issue of the pluri-activity as an entity in the rural development has not been systematically studied. This paper further discusses the various theoretical and empirical models in vogue and estimates a two-sector participation model by applying a generalized multinomial logit model using IHDS[7] data for India.

## The Genesis and Review of the Farm Household Decision Model

While the pluri-activity cannot be explained without considering the interaction between the preferences of individuals and their families with the overall economic environment. Many individuals divide their time between farming and non-farm work in varying proportions (Kimhi, 1994a). Further, one of the great problems in agriculture is the efforts to predict phenomena, as they are confounded by the complex behavioral patterns of the households, especially in rural areas. The level of complexity increases with the movement of households from subsistence to semi-commercial farms; as the decisions in subsistence households are made simultaneously within the household, while in semi-commercial farms decisions need to be in line with the market forces (Singh *et al*., 1986). Moreover, considering the various other interventions and supports from institutions like government, non-government and households; there is a whole lot of new dynamics experienced in the rural areas. Such dynamics becomes a critical factor in determining the nexus of production, consumption and labour supply (core entities of any economic environment) which are deeply interlinked and inter-depended[8]. In short, any changes in any activity would not only change the production pattern but also the saving, consumption and labour supply pattern. Hence, there has been a growing recognition that decision-making in rural areas should be set within a farm household framework (Benjamin & Kimhi, 2006). Considering all these facts, the paper tries to probe the diverse factors responsible for the rural household's labour supply decisions/individuals participation decision.

The farm household labour decision model finds its root in the seminal work of Becker (1965) who formally modeled the entity called 'household' with respect to the various activities; with a special focus on the time allocation and leisure as an economic unit. Becker's work[9] has inspired an array of

research domains viz. economic of family, human capital, children, health, value of life, consumption of leisure, but more importantly to the labour supply model. The basic precept of the Becker's approach is that the utility is maximized subject to time and budget constraint i.e. income. Thus all the interlinkages boil down to two important determining factors viz., *Income* and *Leisure*. Consequently, the farm-household model was also termed time allocation or participation model. Notably, it was Lee E Jr (1965) who first used the Income-Leisure framework in the context of allocating the resources between farm and non-farm work, mainly by using the indifference curves. Since then many studies focusing on the household allocation between farm and non-farm work have emerged. A notable and a milestone study in the household labour allocation was by Huffman (1980 and 1991) wherein he provided the basic model of non-farm labour supply and participation model for farm households. His main contribution was to model the household's utility subject to various time, inputs and budget constraints, but from a human capital perspective only[10]. Nevertheless, the contribution of Huffman has paved way to numerous research and extensions, especially on the theoretical front. The next major contributions were from Sumner (1982), Singh *et.al.*, (1986) which gave an impetus for many researchers to explore the various dimensions of farm-household decision models.

Economics as a discipline strongly encourages empirical analysis with a strong theoretical model, as it provides a simplified framework of reality. So does the farm household models, designed to capture the relationships in a theoretical fashion and then tested empirically to illuminate the consequence of policy interventions and to understand the merits of alternative policies (Singh *et.al.*, 1986). The literature is rich in applications of the agricultural household model to time allocation (Kimhi, 2004). Farmers' participation in non-farm work has been studied widely over the last two decades (for a survey, see Lass *et.al.*, 1991). But when all advancements and extensions in the literatures are seen in a holistic way, one may get an impression that each and every extension is built over the previous ones, either by adding or replacing few variables with an aim to get a unified comprehensive model. Therefore, this gives very less room either to critique or to refute especially in theoretical approach/framework.

The traditional approach has concentrated to estimate only non-farm participation equations and labour supply equations of farm operators (Bollman, 1979 as quoted in A Kimhi, 1994; Sumner, 1982; Simpson and Kapitani, 1983). This was mainly based on single equation models but as the advancements took place the researchers moved to estimate two-equation models which were more inclusive and relatively comprehensive. The two-equation models are nothing but jointly estimating the farm and off/non-farm or estimating husband and wife decisions or even combination of the two (Kimhi, 1994). The selections were based mainly on the objectives conceived by the researcher. At the outset the current paper acknowledges the contributions made by Ayal Kimhi in this area of research. The contributions of Ayal Kimhi have opened up many intricacies of modeling and application. The current study rests mainly on the contributions of Kimhi.

Some of the notable studies estimating the joint non-farm work of farm operators and spouses are Huffman and Lange (1989), Lass *et.al.* (1989), Tokle and Huffman (1991), Lass and Gempesaw (1992) or the joint farm and non-farm work of men or women [Kimhi (1991b), Buttel and Gillespie (1984), Kimhi (1994), Kimhi and Lee (1996)]. The results of these studies indicated that non-farm

labour supply of husbands and wives are positively correlated (Kimhi, 2004). As an extension to the joint estimation, Kimhi (1991b) demonstrates the importance of having direct information about farm work to the analysis of non-farm participation. Here Kimhi categories the farm work into various participation levels. As he feels farm and non-farm jointly estimated in earlier literature did not include farm labour supply information.

In another work, Kimhi (1991) extended the model based on the four choices of working, viz., only on farm, allocating the time between farm and off/non-farm (pluri-activity/part-time), working only off/non-farm and not working at all; using the indirect utility function with the farm-household framework. This is the first time that a study has incorporated the idea of pluri-activity in the models. The current study incorporates this idea for Indian scenario. But the biggest drawback of the study was that this model dealt with one person households and ignored the division of labour within the family. Therefore, this could be a grey area for future work as the extension of this model would contribute extensively to the knowledge of pluri-activity. Therefore, the current study incorporates this lacuna and tests the presence of other household members. Yet another extension was the option of working full-time non-farm is generally neglected in farmers' time allocation studies (Kimhi, 1994a) but this remains out of the ambit of the current study. Some of the other extensions wherein there have been many methodological improvements which includes the incorporation of a test for Heckman's sample selectivity bias (Sumner, 1982), estimation of an endogenous switching regression model as advocated by Madala (Kimhi, 1996b), use of the minimum distance procedure as advocated in Lee and Kimhi (1993) and also the role of farm income risk in explaining off-farm labour supply (Mishra and Goodwin, 1997).

However, all the attempts were restricted to the dynamics between the farm couple and hired labour, but all the equation changes when one includes the other members of the family. Therefore, the current study attempts to fill in some of these gaps and understand the issue from a more holistic way.

## Theoretical Model

Agricultural household model is in trend for more than three decades, it was Huffman (1991) who outlined a generic model to motivate empirical studies of farmers' time allocation. The agricultural household model is a very versatile unified model which can fit in multiple economic environments; it mainly provides insights and integrates the agricultural producers, consumers, labour supply decisions and household income in a single conceptual framework (Singh, *et.al.*, 1986; Huffman, 1991; Donnellan and Hennessy, 2012). These models, assume a unitary model of household utility maximization over consumption and leisure of all family members, subject to time and budget constraints (Benjamin and Kimhi, 2006). Though this model has undergone several changes and extensions, the basic structure of the model still remains intact. The model presented in this paper mainly encompasses the decisions of farmers to work on farm only, non-farm only and pluri-activity based on the household compositions and the participation patterns of the family members. The current attempt of theoretical modeling has been inspired and drawn from the works of different authors (Huffman, 1991; Kimhi, 1996; 2004; Kimhi, 1994b; Kimhi, 1991a; Benjamin and Kimhi, 2006; Corsi and Salvioni, 2012; Donnellan and Hennessy, 2012). As the paper is concerned only with the labour allocation decisions, the model[11] is

organized for treating the labour decisions only. Further, the model ignores many extensions and complexities, which will be included in future work.

The farm household is assumed to maximize utility over household consumption and leisure of family members, under income and time constraint. The income constraint comprises both farm income and off-farm wages. Non-negativity constraints are added to allow for non-participation in farm, non-farm and pluri-active work (Kimhi, 1994) after observing that in a multiple-person household, it is not necessarily true that all household members work on the family farm nor in off-farm but a mix of both. The model is as follows:

$$Max\ U = U(C,\ T_h(Hw,L);\ Z_u) \quad (1)$$

The farm operator maximizes his/her utility function ($U$) assumed to be the function of household consumption ($C$), the vector of household members' home time ($T_h$) and ($Z_u$) is a vector of utility shifters[12]. Home time ($T_h$) is a function of housework and Leisure ($Hw,L$). The utility is maximized subject to time and budget constraints. Each household member can use his time endowment in ($T$) for farm work ($T_f$), non-farm work ($T_m$), pluri-active ($T_p = T_f \cap T_m$) and home time ($T_h$). As the household members' times are heterogeneous, they are indexed separately (they cannot be added together in one human time constraint). Each member receives an endowment of time which the household can allocate to work in farm, non-farm, pluri-activity or home time. Home time is a residual category as it mainly includes household work and leisure. Therefore, the household members' time endowment is (in vector notation):

$$T = T_f + T_m + T_p + T_h \quad (2)$$

Non-negativity constraints are imposed on market work and farm work of each household member:

$$T_f \geq 0; T_m \geq 0; T_p \geq 0 \quad (3)$$

Consumption is constrained by the total household income. Income is composed of:

1. Farm income ($Y_f$) which is a function of each household member's farm labour supply ($T_f$)
2. Non-farm labour income, which is the sum of non-farm earnings of all household members ($Y_{mi}$) which is a function of the time allotted to off-farm work ($T_{mi}$).
3. Pluri-activity income, which is the sum of earning from both non-farm and farm of all household members ($Y_{pi}$) [this will be as per the time distributed by the individuals in each activity of farm and non-farm] which is a function of the time allotted to non-farm work ($T_{pi}$).
4. Non-labour income ($Y_o$)
5. Z represents the exogenous shifters of function $j$
6. Cost towards hired labour*[E (H)]*

$$C = Y_{f\,f}(T_f; Z_f) - E(H) + \sum_i Y_{mi}(T_{mi}; Z_{mi}) + \sum_i Y_{pi}(T_{pi}) + Y_o \quad (4)$$

The household optimization problem is to maximize $U(C,\ T_h(Hw,L);\ Z_u)$ subject to the time, budget, and non-negativity constraints. The optimal solution is characterized by the Kuhn-Tucker conditions, which are the first-order conditions for maximizing the Lagrange function:

$$U(C, T_h(Hw,L); Z_u) + \boldsymbol{\lambda}\,[Y_f{}_f(T_f;Z_f) - E(H) + \Sigma_i Y_{mi}(T_{mi};Z_{mi}) + \Sigma_i Y_{pi}(T_{pi}) + Y_o - C] + \boldsymbol{\mu_t}\,[T - T_f - T_m - T_h - T_p] + \boldsymbol{\mu_f} T_f + \boldsymbol{\mu_m} T_m + \boldsymbol{\mu_p} T_p \quad (5)$$

Over $[T_f, T_m, T_h, T_p, C]$ and minimizing it over $[\lambda\ \mu_t \mu_f\ \mu_m \mu_p]$, the Kuhn–Tucker maximization conditions yield the following on- and off-farm participation conditions:

$$\frac{\partial Y_f}{\partial L_f} \cdot \frac{\partial L_f}{\partial T_f} \leq (\partial U/\partial T_h / \partial U/\partial C) \text{ (or) } \boldsymbol{\mu_t}/\lambda \quad (6)$$

$$\frac{\partial Y_m}{\partial T_m} \leq (\partial U/\partial T_h / \partial U/\partial C) \text{ (or) } \boldsymbol{\mu_t}/\lambda \quad (7)$$

$$\frac{\partial Y_p}{\partial T_p} \leq (\partial U/\partial T_h / \partial U/\partial C) \text{ (or) } \boldsymbol{\mu_t}/\lambda \quad (8)$$

Where $\mu_t = \partial U/\partial T_h$ and $\lambda = \partial U/\partial C$; $\mu_t$ and $\lambda$ are the marginal utilities of leisure and income, respectively. Equations (6) (7) and (8) are the Marginal Rate of Substitution (MRS) between home time and other consumption of goods. Hence, participation (an internal solution) occurs when the equality is strict. If an interior solution occurs for all choices (all household members work on farm only; non-farm only and pluri-activity), the participation equations and all the constraints can be solved for endogenous variables $[T_f, T_m, T_h, T_p C \lambda\ \mu_t \mu_f \mu_m]$ as functions of all the exogenous variables $Z_u, Z_f, Z_m, Z_p, Y_0$, and $T$. This is the reduced-form solution. Using the solution in equations (6) (7) and (8), one can determine which if the labour participation condition is satisfied. If n is the number of potential workers in the household, there are 3.n participation equations, taking the forms:

$$f^j(Z_u, Z_f, Z_m, Y_0, T) \leq g^j(Z_u, Z_f, Z_m, Y_0, T),\ j = 1....n \quad (6')$$

$$h^j(Z_m^j) \leq g^j(Z_u, Z_f, Z_m, Y_0, T),\ j = 1....n \quad (7')$$

$$b^j(Z_p^j) \leq g^j(Z_u, Z_f, Z_m, Y_0, T),\ j = 1....n \quad (8')$$

The reduced form participation equations (6') (7') and (8') are obtained the following way. Note that each of the structural participation equations (6) (7) and (8) is a function of endogenous variables. The system of equations (6') (7') and (8') is obtained by replacing the $T_f$ in (6) and $T_m$ in (7) and $T_p$ in (8) by zeros; then replacing all other endogenous variables by the reduced form solution. Now from (6') (7') and (8'), farm non-participation occurs if $g^j - f^j > 0$; non-farm non-participation occurs if $gj - h^j > 0$ and pluri-activity non-participation occurs if $gj - b^j > 0$. Further, it must be noted that the model does not generate any exclusion restriction because of the shadow prices $\boldsymbol{\mu_t}/\lambda$ which are functions of all the exogenous variables. This system of equations or the reduced form can be used to outline the assumptions that underlie the empirical application, identify the relevant explanatory variables and predict signs of marginal effects.

## Empirical Model

A very pertinent task and challenge of an economist is to convert the theoretical model in to a workable empirical model. Through the empirical models, the researchers can analyze and validate the appropriateness of the conceived model of the reality. Further, various simulations and forecasting exercise can be carried out. With respect to the farm household labour time allocation and participation

model, the challenge is that the datasets dealing with the phenomena are often discrete or are measured in a discrete fashion. Two important common cases of discrete choice models are binary: Y = f (0, 1); multinomial: Y = f (0, 1, 2, ..., k). When the dependent variables take any of the mentioned forms, it is called limited dependent variable. In general cases these models are considered and modeled using non-linear probability functions (mainly to avoid the problems of Heteroscedasticity, problem of out-of-range probabilities in the linear probability model). Further, depending on the probability distributions (logistic or standard normal distribution functions), either logit or probit models can be estimated.

The theoretical model discussed in the previous section contains three important choices for the individuals to choose in a farm household. The econometrics literature focuses on modeling a single outcome from categories that are mutually exclusive, where the dependent variable outcome must be multinomial distributed (Cameron & Trivedi, 2009). Multinomial logit regression is a model that is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable (which cannot be meaningfully ordered), given a set of independent variables. The multinomial logit (MNL) model can be used when all the regressors are case-specific.

$$ME_{ijk} = \frac{\exp(xi\,\beta j)}{\sum_{1}^{m=1}\ (xi\,\beta j)} j = 1.....m$$

where $X_i$ are case-specific regressors. This model ensures that $0 < P_{ij} < 1$ and $\sum_{j}^{m} = 1\ P_j = 1$. To ensure model identification, βi is set to zero for one of the categories, and coefficients are then interpreted with respect to that category, called the base category.

The parameters of multinomial models are generally not directly interpretable. In particular, a positive coefficient need not mean that an increase in the regressor leads to an increase in the probability of an outcome being selected. Instead, we compute MEs. For individual i, the ME of a change in the kth regressor on the probability that alternative j is the outcome is

$$ME_{ijk} = \frac{\partial\ \Pr(yi=j)}{\partial\ xik} = \frac{\partial F j\ (xi,\theta)}{\partial xik}$$

The marginal effects (MEs) of interest measure the impact on the probability of observing each of several outcomes rather than the impact on a single conditional mean. The outcome, $y_i$, for individual $i$ is one of $m$ alternatives. We set $y_i = j$ if the outcome is the $j^{th}$ alternative, $j = 1, 2, \ldots, m$. The probability that the outcome for individual $i$ is alternative $j$, conditional on the regressors $X_i$, is

$$P_{ij} = Pr(y_i = j) = F_j(x_i, \theta),\ j = 1, \ldots, m,\ i = 1, \ldots, N$$

where different functional forms, $F_j(\cdot)$, correspond to different multinomial models. Only $m - 1$ of the probabilities can be freely specified because probabilities sum to one.

## Data and Estimation

The data used in the estimation of the multinomial logit model are based on the 2011-2012 second round of India Human Development Survey-II (IHDS-II) surveys. It is a nationally representative, multi-topic survey covering 42,152 households or 204,569 individuals in 1,503 villages and 971 urban neighborhoods enumerated across India. The survey covered topics concerning health, education,

employment, economic status, marriage, fertility, gender relations, social capital, village infrastructure, wage levels, and panchayat composition. The current study excluded about 33.95 per cent of the original sample in the estimation procedure because they were representation of the urban population which is out of the purview of the current study. Further, the rest of the rural data were classified in to four important groups according to their work participation status, viz., Not working, Non-farm only, Farm only, Pluri-active. The 'Not working' comprised students, dependent and retired old, home-makers etc and this group made up to approximately 51 percent of the rural samples. As the focus of the study is over the work participation decisions, the 'Not Working' group was excluded from the analysis.

**Table 1: Descriptive Statistics**

| Variable | Units | Mean | S. D. | Range | Description |
|---|---|---|---|---|---|
| **Pluri-active1** | Categories | 1.95 | 0.79 | 1-3 | 1 Non-farm only; (33.98%)<br>2 Farm only; (37.38%)<br>3 Pluri-active (28.64%) |
| **Female** | Binary | 0.40 | 0.49 | 0-1 | 1 Female; 0 Otherwise |
| **NCHILDM** | Count | 0.87 | 1.00 | 0-10 | Number of male child (0-14) |
| **NCHILDF** | Count | 0.80 | 1.05 | 0-10 | Number of female child (0-14) |
| **NTEENM** | Count | 0.37 | 0.63 | 0-5 | Number of male teens (15-20) |
| **NTEENF** | Count | 0.39 | 0.66 | 0-5 | Number of female teens (15-20) |
| **NELDERM** | Count | 0.29 | 0.47 | 0-3 | Number of male 60+ |
| **NELDERF** | Count | 0.28 | 0.46 | 0-3 | Number of female 60+ |
| **RO5** | Years | 36.97 | 15.70 | 2-99 | Age |
| **Agesq new** | Years | 1612.91 | 1285.89 | 4-9801 | Age Square |
| **Edu new** | Categories | 2.30 | 1.14 | 1-5 | Number of years completed in education<br>1: illiterate;<br>2: 1- 5 years completed (Primary);<br>3: 6-10 years completed (Secondary);<br>4: 11-14 years completed (Higher Secondary);<br>5: 15 -16 years completed (Graduate and Above) |
| **Skills new** | Binary | 0.00 | 0.07 | 0-1 | 1 Skills acquired; 0 otherwise |
| **Log non-farm wage** | Rs | 10.40 | 1.34 | 4.6-15 | Log of Non-farm wages |
| **Log farm wage** | Rs | 10.24 | 1.38 | 2.3-16.2 | Log of Farm wages |
| **Land category** | Categories | 1.10 | 1.04 | 0-4 | 0: No Land;<br>1: 0.004-2.5 acres (Marginal);<br>2: 2.5-4.9 acres (Small);<br>3: 4.950495-10 acres (Medium);<br>4: 10 and above acres (Large) |
| **Inheritance** | Categories | 1.18 | 0.52 | 1-3 | 1: Inherited/gifted land<br>2: Undivided Family Land;<br>3: Purchased/Received from Govt/Others |
| **AN1** | Binary | 0.69 | 0.46 | 0-1 | 1 Owns livestock ; 0 Otherwise |
| **Geolocation** | Categories | 2.38 | 1.18 | 1-4 | 1: North India; 2: Central India; 3: South India. |
| **Hired lab** | Binary | 0.49 | 0.50 | 0-1 | 1: Labor Hired; 0 otherwise |
| **Caste** | Categories | 2.27 | 0.96 | 1-4 | 1: General; 2: OBC; 3: SC; 4: ST |

**Source:** *Author's construction*

The other three groups, namely, 'Non-farm only' 'farm only' and 'pluri-active' (Frequency in Table 1) are considered as three cases for the analysis of the multinomial logit model. In the questionnaire, each person was asked about their participation in farm work and various non-farm work. The variables 'Non-farm' and 'farm' were extracted as they are. Further, based on the individual work participation, the non-farm (comprising of household businesses, non-farm casual labor and regular wage labour) and farm variables were categorized in to 'Non-farm only' 'Farm only' respectively and a third variable was generated as a combination of the two. Kindly note that the 'Non-farm only' and 'Farm only' are mutually exclusive. The third variable 'Pluri-active' is specially constructed to understand the participation decision of a worker when s/he participates in both farm and non-farm sectors concurrently. Working simultaneously in both sectors or being 'Pluri-active' were corroborated by matching the participation decision with that of the time allocation in a given particular day using the time use data. That is if a person allocates 4 hours of time for farm and 3 hours for non-farm, then he is pluri-active for 7 hours. Whereas for 'Non-farm only' and 'Farm only' an individual would exclusively allocate his/her time entirely for one alone. Thus the variable 'Pluri-active' is a complex combination of Farm and Non-Farm activities with varying degree of time allocation based on individuals need and preference. The data shows that about 28.64 per cent of the working population is pluri-active. This large number of being pluri-active gives a good reason to go in-depth to understand the question 'Why so many opt to be pluri-active and how the decisions are made?'

The other variables in the data set considered for the analysis are *personal information* like age, gender, years of education, number of kids, teens and old people in the household; *work information* like land holdings, livestock owned, skill sets, inheritance pattern, wages and profits, hired labour and *social information* like caste, geographical locations. These variables are opted for the analysis based on the reviews of various literatures on work participation decisions. Though there could be many more variables which determines the decisions, but due to lack of data and more importantly based on the past experience derived from the literature, these chosen variables can speak at length. The data definitions and the results of the descriptive analysis are presented in Table 1. As the analysis necessitates cleaning of the data, specific attention was given and various tools were used to set it right so that some of the minutest details are not lost.

**Table 2: Multinomial logit model**

| Variables | Coefficients | | Marginal Effects | | |
|---|---|---|---|---|---|
| | Non-Farm Only | Pluri-active | Non-Farm Only | Farm Only | Pluri-active |
| Female | -1.381*** (0.0605) | -1.650*** (0.0358) | -0.0281 | 0.3767 | -0.3487 |
| NCHILDM Number of male child (0-14) | -0.0797*** (0.0275) | -0.108*** (0.0163) | -0.0011 | 0.0252 | -0.0240 |
| NCHILDF Number of female child (0-14) | 0.0797*** (0.0245) | -0.00586 (0.0150) | 0.0052 | -0.0009 | -0.0043 |
| NTEENM Number of male teens (15-20) | -0.127*** (0.0415) | -0.168*** (0.0249) | -0.0020 | 0.0393 | -0.0373 |
| NTEENF Number of female teens (15-20) | 0.135*** (0.0369) | 0.0731*** (0.0230) | 0.0059 | -0.0192 | 0.0133 |
| NELDERM Number of male 60+ | 0.301*** (0.0563) | -0.0732** (0.0363) | 0.0217 | 0.0074 | -0.0291 |

| | | | | | |
|---|---|---|---|---|---|
| NELDERF<br>Number of female 60+ | 0.138**<br>(0.0577) | 0.103***<br>(0.0356) | 0.0050 | -0.0256 | 0.0205 |
| RO5<br>Age | 0.131***<br>(0.00881) | 0.281***<br>(0.00536) | -0.0019 | -0.0633 | 0.0651 |
| Age sq new<br>Age Squared | -0.00183***<br>(0.000112) | -0.00338***<br>(6.75e-05) | 0.0000 | 0.0008 | -0.0008 |
| Edu new<br>Primary | -0.370***<br>(0.0968) | -0.0522<br>(0.0472) | -0.0172 | 0.0188 | -0.0017 |
| Edu new<br>Secondary | 0.0830<br>(0.0783) | -0.224***<br>(0.0445) | 0.0136 | 0.0450 | -0.0586 |
| Edu new<br>Higher Secondary | 0.179*<br>(0.100) | -0.418***<br>(0.0651) | 0.0288 | 0.0821 | -0.1109 |
| Edu new<br>Graduate and above | 0.944***<br>(0.126) | -0.0241<br>(0.0984) | 0.0857 | -0.0291 | -0.0566 |
| Skills new<br>Skills | -1.162***<br>(0.350) | -1.626***<br>(0.293) | -0.0273 | 0.3613 | -0.3340 |
| Log non-farm wage<br>Non-Farm Wage | 0.295***<br>(0.0223) | -0.0850***<br>(0.0121) | 0.0217 | 0.0101 | -0.0318 |
| Log farm wage<br>Farm Wage | 0.0178<br>(0.0204) | -0.00243<br>(0.0125) | 0.0012 | 0.0000 | -0.0012 |
| Land category new<br>Marginal | 0.0412<br>(0.289) | -0.345**<br>(0.149) | 0.0152 | 0.0692 | -0.0843 |
| Land category new<br>Small | -0.204<br>(0.296) | -0.568***<br>(0.154) | 0.0078 | 0.1234 | -0.1312 |
| Land category new<br>Medium | -0.325<br>(0.300) | -0.791***<br>(0.157) | 0.0074 | 0.1759 | -0.1833 |
| Land category new<br>Large | -0.577*<br>(0.321) | -1.073***<br>(0.176) | 0.0005 | 0.2452 | -0.2457 |
| Inheritance new<br>Undivided Family Land | 0.172*<br>(0.104) | -0.102<br>(0.0651) | 0.0156 | 0.0164 | -0.0321 |
| Inheritance new<br>Purchased/Govt gifted | 0.207**<br>(0.103) | 0.0244<br>(0.0682) | 0.0130 | -0.0110 | -0.0020 |
| AN1<br>Live stocks | -0.572***<br>(0.0650) | -0.255***<br>(0.0437) | -0.0300 | 0.0690 | -0.0391 |
| Geo location new<br>Central India | 0.622***<br>(0.0659) | 0.416***<br>(0.0367) | 0.0222 | -0.1064 | 0.0843 |
| Geo location new<br>South India | 1.683***<br>(0.0807) | 0.922***<br>(0.0558) | 0.0882 | -0.2306 | 0.1424 |
| Hired lab new<br>Hired Labour | 0.241***<br>(0.0611) | -0.241***<br>(0.0358) | 0.0245 | 0.0444 | -0.0689 |
| caste<br>OBC | 0.109<br>(0.0683) | 0.401***<br>(0.0420) | -0.0065 | -0.0897 | 0.0962 |
| caste<br>SC | 0.200**<br>(0.0849) | 0.605***<br>(0.0495) | -0.0083 | -0.1348 | 0.1432 |
| Caste<br>ST | 0.331***<br>(0.0936) | 0.719***<br>(0.0550) | -0.0047 | -0.1609 | 0.1656 |
| Constant | -6.610***<br>(0.445) | -2.622***<br>(0.247) | | | |

**Source:** *Author's Construction*

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Number of obs = 24843

LR chi2 (58) = 8746.71

Prob> chi2 = 0.0000

Log likelihood = -18254.933

Pseudo R2 = 0.1933

Out of the three possible outcomes, we have set 'farm only' as base category. Therefore, the coefficient interpretations of non-farm and pluri-activity will be in comparison with the base category.

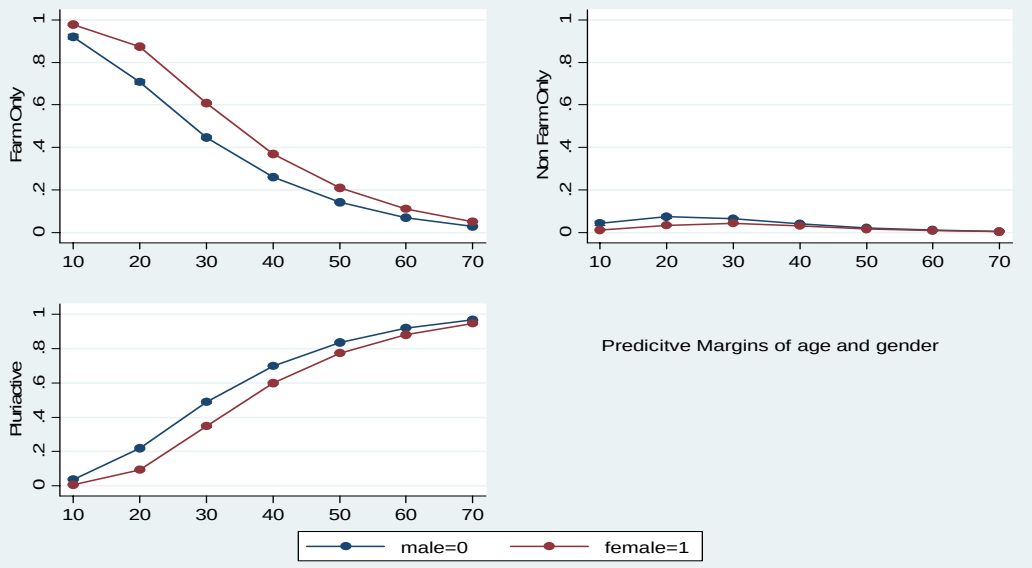
The estimation results of the multinomial logit model is presented in Table 2. It contains coefficients and their corresponding marginal effects. With this it is possible to draw conclusions about the magnitude and directions of each variable on the probability of working non-farm only, farm only and being pluri-active. The model is stable with a log likelihood ratio of -18254.933 and significant with 1% level of significance. Likelihood Ratio (LR) Chi-Square test that (non-farm only relative to farm-only and pluri-active relative to farm-only) at least one of the predictors' regression coefficient is not equal to zero. This result tends to confirm that independent variables taken together influence participation decisions. The pseudo $R^2$ is an indication of the goodness of the model and a measure of the predictive strength of a model.

The estimated coefficients are sometimes hard to interpret as they actually are the difference between parameters of two equations. Therefore, Table 2 has two components to it, one is the model coefficients with their significance and t values, which gives the direction and signs of the effect of independent variables on to dependent variable. The marginal effects provide the magnitude of the effects of the explanatory variables that can be examined by calculating the probabilities of different combinations of farm only, non-farm only and pluri-active status.

## Individual Characteristics

The variables typically included in the model are the individual's age, gender, education, and skill sets. An age squared variable has been included to capture the life cycle effect. Age and age square are continuous variable representing the general experience that increase the marginal value of time in each activity and other forces (Beyene, 2008). In the current model, the age and the age square variables have the expected signs, i.e., age has a nonlinear effect on all the three work activities, and it is positive at the younger age and becomes negative at older ages. The older group depicts an increasing trend at a decreasing rate, implying that the probability of *old age farmers* as pluri-active is higher. This particular result goes in contradiction to the results of Kimhi (1994b); Sharma & Bhaduri (2009): they concluded that 'cumulative inertia' or attachment to surroundings, jobs, friends etc could possibly reduce the movement of older farmers. But for the non-farm only and farm-only scenarios, the youth have a greater probability and this corroborates the findings of most of the literature, including Lass *et al* (1991); Beyene (2008); Sharma & Bhaduri (2009) and Kimhi (1994b). This can be attributed to the reasons like the youth are more open to opportunities, risk lovers and more importantly like to remain focused. A gender-based effect of age profile shows an interesting result that the probability participation of women in farm only is higher than male counterparts; whereas the male outdo in the other two (see fig 1). The probability of women in pluri-activity is higher than that of non-farm only case. In a way this result validates the work of Subramanian (2015), which concludes the rising feminization of agriculture. With tightening labour market, high labour scarcity has emerged at different scales with increased wages especially for men labour. As a consequence, the male labour have been drifting away from agriculture to non-agriculture and the women are struggling in agriculture; hence, tending towards feminization of agriculture.

**Figure 1: Predictive Means of Age and Gender**




**Source:** *Author's Construction*

Development of *human capital* has a great impact on labour movement to non-farm sector in the long run. Investment in education and agricultural extension services increases farmers' non-farm labour supply by increasing their reallocative ability (Huffman 1977 and 1980 as cited in Loughrey *et al* 2013). All the educational variables are not statistically significant. In comparison to farm-only decision the likelihood of primary education is negative and significant in non-farm-only cases but for pluri-active work the results are insignificant. That is, as the level of education goes up, i.e. in the higher secondary and graduate levels, the non-farm only and pluri-activity becomes positive and significant. This indicates that years of education increases the labour supply in non-farm and pluri-active work as is usually found in rural areas especially with agriculture. This result is in line with Sharma & Bhaduri (2009), Lim-Applegate, Rodriguez, & Olfert (2002) who conclude that the education has a positive effect on the farmer's propensity to shift out of agriculture. Interestingly, graduate-level education has no significant effect on the decision to participate in pluri-activity. The probable cause may be the nature of the non-farm activities available in that particular region for pluri-activity, i.e., government-related schemes, or traditional non-farm work. Many a time higher education in countryside doesn't translate immediately into employment (Ghosh *et al* 2006 as in Sharma & Bhaduri, 2009). The education variable increases the productivity and the non-farm only sector and in turn raises the non-farm wages by more than its corresponding rise in their reservation wage (Lim-Applegate *et al.*, 2002; Lass *et al.,* 1991). Surprisingly, skills seem to have a negative impact on non-farm only and pluri-activity categories in relation to the farm-only scenario.

## Family Characteristics

Family affects the participation decisions by individuals. Family characteristics variables included to capture effects of the number of children in two age groups: 0-14 years old, 15-21 years old and 60+ members. The number of family members working in any of the groups serve as a proxies for farm labour demand (Kimhi, 2000). Family members of various age groups affect time allocation between farm-only and non-farm only and pluri-active work differently. Small children and old people, which can be classified as dependents, generally impose a cost on the household, not only in terms of consumption goods but also in terms of time spent in house work (Kimhi, 1996a). As expected in comparison to farm- only decision the likelihood of male child participating in both non-farm only and pluri-active work is negative and significant i.e. male children are generally encouraged to be in farm than otherwise. Whereas, the female children generally get off to various non-farm works mainly attached to household or business, and the pluri-active coefficient is insignificant. The possible reason could be that the household's aspiration to pass on the legacy of farming to the male child is higher. The similar trend continues for both the gender groups of teen category, while here there is a significant and positive coefficient for women in pluri-activity and non-farm only as against farm-only scenario. According to Kimhi (1996a), if farm work is a better complement to house work than is non-farm work, it is expected that prime-age household members will work more on the farm and less on non-farm activities. But recent literature has found an interesting phenomenon, not surprising though, that youths are drifting away from agriculture and this has not been tested here in the present model.

## Farm Production and Financial Characteristics

Land is one of the most important factors that facilitates/impedes a farmer of his cultivating activity in agriculture. As expected land coefficients are negative and insignificant in the case of non-farm relative to farm only scenario but interestingly though the coefficients are negative for pluri-active work, but is significant at 1 % level. This shows the connection of land in the pluri-activity status. The larger land tends to have a significant negative impact on non-farm. The results of the model support the established literature that states that there exist correlations between shrinking land holdings and the non-farm employment/ pluri-activity (Haggblade and Hazell, 1989; Chikwama 2004; Reardon 1998; Lanjouw and Lanjouw 2001). But it is also true that as the division of the land undergoes, the farmer's interest to till would gradually decline; but right now the model cannot provide evidence to prove the same. According to Sharma and Bhaduri (2009), a farmer may quit out of desperation to fight the odds of farming due the various bottlenecks within the system.

Land not only provides an economic status but also political, sociological and psychological support to the tillers. Backed by various cultural and traditional practices, the ownership of the land is passed on as succession and is acquired by inheritance. The results show a significant and positive result for non-farm only relative to farm-only scenario. This result indicates the tendency of non-farm only workers to hold on the land for future investment. This corroborates the findings of Vijay (2012), who calls such phenomenon '*the rise of new landlords*'. Moreover, in rural areas it is the land that acts as a primary source of collateral for loans and a key indirect financial supporter for maintenance of both farm and non-farm activities (Nickerson *et al*, 2012; Briggeman *et al,* 2009). Surprisingly, land

inheritance variable gives an insignificant result for pluri-activity reason for which cannot be determined at this stage.

Unpredictably, the coefficients of farm wage are all insignificant. Whereas non-farm wages increase the non-farm earnings and hence affects non-farm labour supply positively and farm labour negatively Kimhi, (1998). Female labour participation is less in general because of their comparative advantage in housework. Unlike the regular salaried employment, agricultural employment does not guarantee an expected flow of stipulated wage. The remuneration in agriculture is totally dependent on many exogenous variables which are untimely, uncertain, and fluctuating. Due to such unexpected variations in returns in farm activities, tillers take up pluri-activity (Dethier and Effenberger, 2011). This is well supported with the negative but significant sign of pluri-activity relative to farm-only scenario. This indicates that farmers involved in pluri-activity tend to depend more on non-farm income than the farm income.

Barlett (1991), Mishra and Goodwin (1997) tried to look into the role of risk-taking behaviour wherein they found that off-farm employment makes farmers more risk averse as it provides a more stable income than farm. Therefore, the tendency among farmers is to take up non-farm activity as a part-time activity so that their risk is diversified. Evidence has been found in Ethiopia and Burkina Faso, that the non-farm provides safety nets to face weather uncertainty (Webb and Reardon, 1992; Bezabih *et al,* 2010). Such hedge against risk may enable farmers to increase the adoption of more risky high-return crops (Lanjouw and Lanjouw, 1995; 2001; as quoted in Dethier and Effenberger, 2011).

## Social Characteristics

Social divisions in India's countryside are a well-established fact. These divisions arise due to the dominance factor which wields the greatest economic and political power (Srinivas 1987) and this power flows exclusively from control of land (Dumont 1970 as cited in Anderson 2012). Given the dominance of upper castes in the farm economy with relatively large land ownership (Kishore 2015)**,** they have the highest share of earnings from cultivation and non-farm incomes among all social groups. SCs and STs have the highest share of income from agricultural wage employment and low share in non-farm sector, which makes them more vulnerable (Lanjouw & Shariff, 2004). The model in the paper gives a contrasting evidence of a positive and significant participation of SCs and STs in non-farm only and pluri-activity relative to farm-only scenario. Table 3 gives the predicted probabilities of caste-wise participation in the three categories of farm-only, non-farm only and pluri-activity. The predicted probabilities give heavy weight behind pluri-activity in which STs seem to have a larger share and the forward categories the least share. This case is reversed in the case of farm-only scenario wherein the STs have the least share. The numbers for non-farm only show a very low despite significant results. A detailed categorization of caste with land levels for each scenario is provided in the appendix Fig 1 to 3.

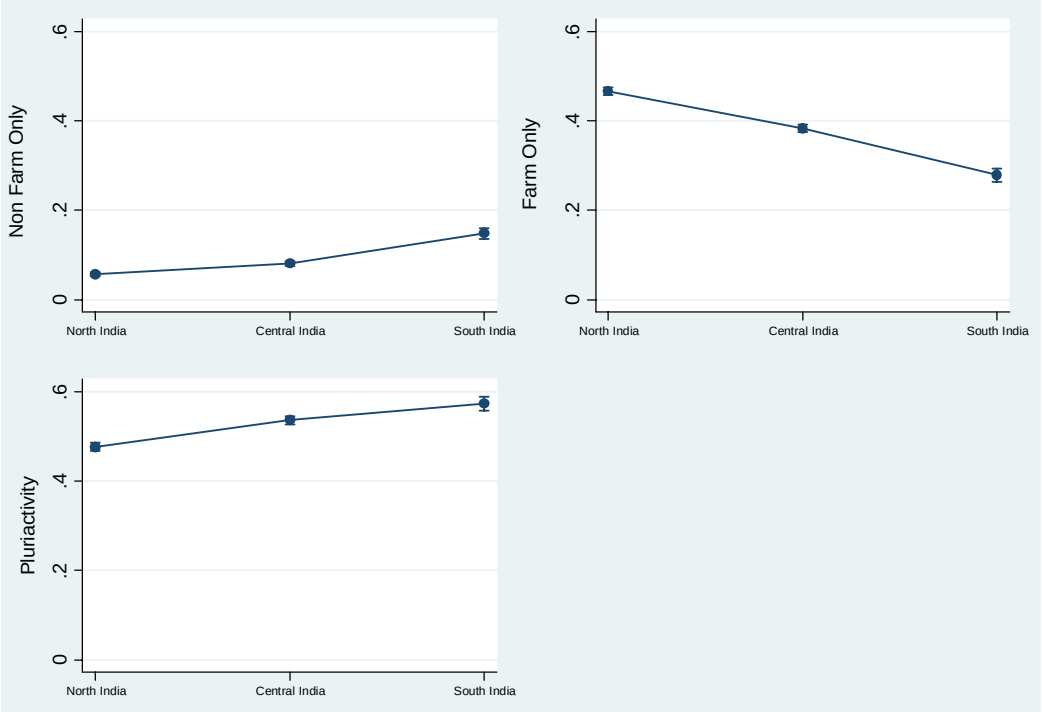
**Table 3: Caste and employment decision predicated probabilities**

| | Non-Farm Only | Farm Only | Pluriactivity |
|---|---|---|---|
| **General** | 8.7 | 47.2 | 44.1 |
| **OBC** | 8.0 | 40.7 | 51.2 |
| **SC** | 7.9 | 37.5 | 54.7 |
| **ST** | 7.2 | 34.7 | 58.1 |

**Source:** *Author's Construction*

The coefficients of the geographical location are positive and significant for non-farm only and pluri-activity relative to farm. Fig 2 gives the predicted probabilities of the locations which give a clear picture of the South India has the dominance in non-farm and pluri-activity status whereas the north India goes just opposite with the probability of farm-only being the highest. Lanjouw & Shariff (2004) studied the geographical effects on non-farm sector with great details and found similar trends; they concluded that education was one of the prime factor for such stark difference between geographical boundaries.

**Figure 2: Predicted Probabilities of Geographic Locations across Work Participation decisions**




**Source:** *Author's Construction*

## Conclusion

This paper uses a novel method of categorizing the rural work related activities in three possibilities using the time-use survey, i.e. working only in farm, working only in non-farm, and thirdly being pluri-active in the Indian context. The aim is to understand the underlying factor that determines a family to allocate a member of the household in various activities. As the data suggests that maximum members in rural areas prefer being in non-farm, interestingly about 28 percent adopt multiple activities or otherwise called pluri-active. Being pluri-active helps a farmer to supplement their income from outside the agriculture, it is an important adaptive strategy to increase family income, spread risk, stable salaries, reduce income inequalities to cope up to the income differentials and give them security of control over productive resources. Pluri-activity is indeed an efficient use of labour resources of households (Corsi and Salvioni, 2012) but such actions of adopting pluri-activity necessitates the farm families to plan over and allocate the family members efficiently in order to maximize their collective utility. Such allocations are done in a very systematic way keeping in mind the various corresponding influential factors. Thus the participation decision of farmers and labour behavior has long attracted researchers to understand how farmers divide their labour supply between farm, non-farm work or engage in pluri-activity.

The factors responsible for the rural household labour allocation decision is studied in detail using generalized multinomial logit model, the decision of participation between the three choices were established using the Indian IHDS data. The result shows that the explanatory variables have significantly different effects. There seem to be a wider interest to opt for pluri-activity to balance the income of the rural households. Of late, the rural labour market dynamics has altered due to diversified opportunities for employment with increased economic growth, introduction of employment guarantee scheme, demographic change along with expansion of universal education for all girls and boys, increased connectivity and mobility from rural to urban areas, changes in trade policies, attitude towards participation of women in economic activities outside their home. All these factors have led to more people opting for pluri-activity. ICRISAT village-level studies indicated that in the semi-arid regions of India, the agricultural income out of the total income has been falling drastically. Currently, farmers are deriving more income from non-farm activities than farm activities due to expanding opportunities in service sector. The results also state that male old farmers with smaller land-holdings, especially in SC and ST categories, are pluri-active; whereas, women are moving towards agriculture. Such evidences drawn from the analysis suggest the extent of structural transformation taking place in the economy largely owing to the changing structure of agriculture and economic factors.

## Notes

[1] About 48.9 percent of labour force is employed in agriculture contributing to just 13.9 percent of GDP, Government of India (2014)

[2] Agricultural census published by Government of India provides a detailed break-up to land-holding categorization by farmers.

[3] According to Census 2011, India has 127.6 million main cultivators and nearly 15 million main cultivators are fewer today than they were in 1991, and over 7.7 million fewer since 2001, according to the latest Census data. On average, that's about 2,035 farmers losing 'main cultivator' status every single day for the last 20 years.

[4] The rural-to-urban migration is exceptionally low with migration rates hovering between 4.5 and 7 percent.

[5] The rural non-farm sector (RNFS) encompasses all non-agricultural activities: mining and quarrying, household and non-household manufacturing, processing, repair, construction, trade and commerce, transport and other services in villages and rural towns undertaken by enterprises varying in size from household own-account enterprises to factories in rural areas (Jha, Brajesh, 2006).

[6] The degree of connection to the land in the economic process entails the difference between farm, off-farm and non-farm. The current paper considers farm (process of raising crops from the land) off-farm (all the activities in and around farming including livestock with minimal connection to the agricultural land), non-farm (no relation to the agricultural land for economic process). Western literature uses off-farm and non-farm interchangeably. For sake of simplicity, the paper considers 'Farm' as Farm and off-farm together.

[7] Desai, Sonalde, Reeve Vanneman and National Council of Applied Economic Research, New Delhi. India Human Development Survey-II (IHDS-II), 2011-12. ICPSR36151-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2015-07-31. http://doi.org/10.3886/ICPSR36151.v2

[8] According to Singh *et.al.*,(1986) production decision can be independent to the consumption and labour decisions but consumption and labour supply decision are not independent of production decision as the production decisions determine farm profits which in turn are the income for household this influence the consumption and labour supply decisions; authors refer this phenomenon as profit effect.

[9] Please see the discussion paper by (Heckman, 2014) for a complete overview of the development and extensions of Gary Becker's work on time.

[10] Joint allocation or participation between farm and off-farm was not explicitly brought in; and for empirical analysis the author used two dependent variables namely 1) the proportion of farm operators reporting any off-farm work 2) the average number of off-farm workdays for measuring the intensity of off-farm labourers.

[11] The paper adopts the unitary model as against the bargaining approach, in which each household member acts individually. A unitary model deals with one-person household and ignores division of labour within the family and it also abstracts from compensating differentials between occupations (A Kimhi, 1991a).

[12] Utility shifters are mainly to capture the various parameters like human capital, efficiency of household production etc which enable the utility to shift.

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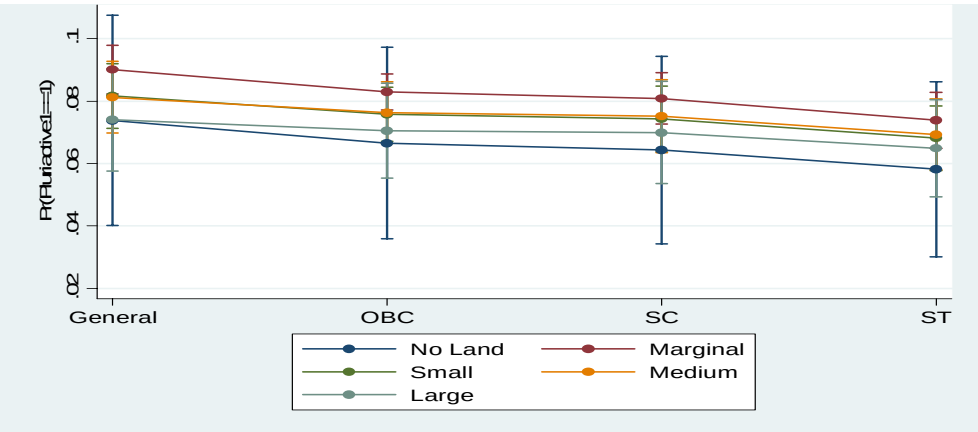
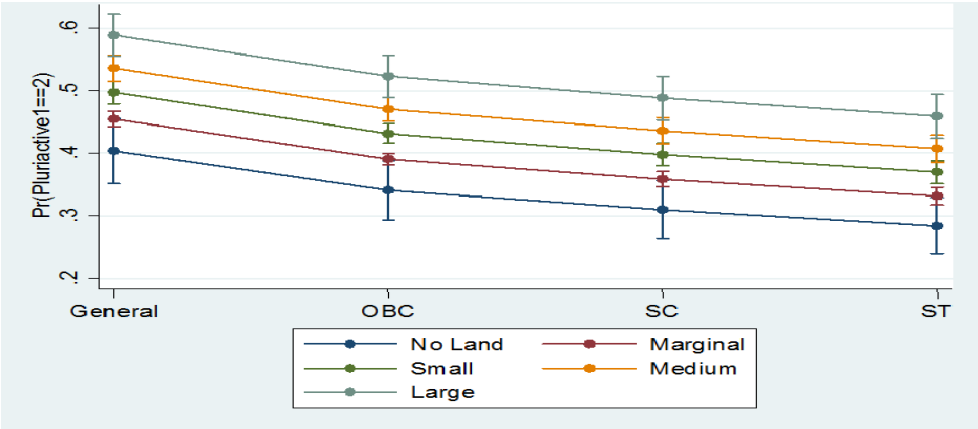
**Annex Figure 1: Predictive Margin of Caste and Land Category for Non-farm Only**



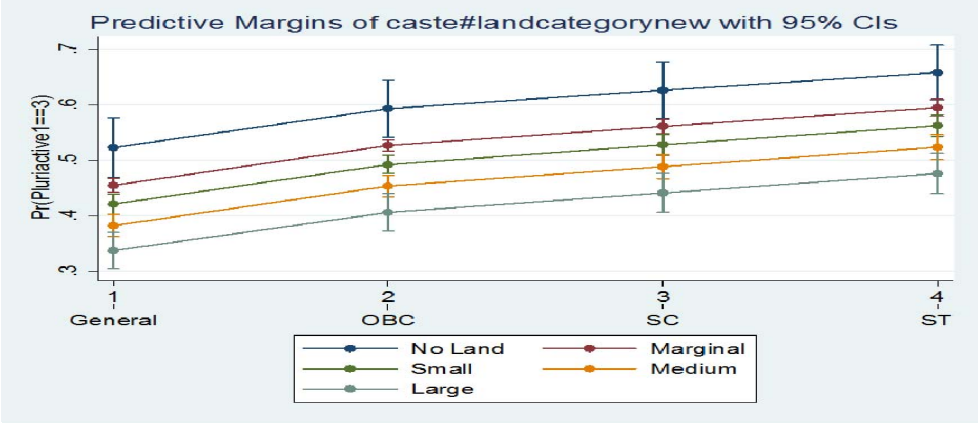

**Source:** *Author's Construction*

**Annex Figure 2: Predictive Margin of Caste and Land Category for Farm Only**




**Source:** *Author's Construction*

**Annex Figure 3: Predictive Margin of Caste and Land Category for Pluri-activity**

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