Importance of Non-farm Income to Community Forest User Households in Rural Nepal

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Abstract: The paper empirically examines the household-level importance of various income sources and the factors associated with the non-farm work participation of community forest user households in rural Nepal. Data for the study was collected using structured survey of 275 randomly selected households. The income data are presented in absolute and relative terms by different household categories. Determinants of non-farm work participation is tested using probit regression model. Results show that non-farm income constitute an average of 55.5% of the total household income. Non-farm income such as remittances (migration from work abroad) and pensions constitute the most important source of income for all categories of household. Larger sized non-dalits households, which hold relatively larger value of implements and smaller land area show significant association with non-farm work participation. The varying share of the non-farm income to the total household income resulting by the combination of household’s individual and socio-economic characteristics are discussed. The study suggests that typical policies such as improvement in human capital, e.g. improved literacy and skills, and rural infrastructures will remain important for promoting and making the poor benefit from the income opportunities through various non-farm sectors.

Keywords: community forest, income, participation, remittance, poor, Nepal

1. Introduction

Non-farm work participation reflects a complex decision-making structure of the farm households. There has been a key concern of policy makers and development economists about the growth of rural non-farm activities in recent years (Haggblade et al., 2006). There are several important reasons behind participation of a farm household in non-farm work, and this can be seen from two perspectives. First, from peculiar households’ livelihood perspective, the farm households rely on non-farm work to meet family needs as an additional source of income. The facts confirmed that non-farm income is an important factor in household economies and also food security (FAO, 2004). When on-farm opportunities for livelihood have failed or failed to meet survival requirements, farm households will turn to alternative income sources. Second, from the broader perspective, it is now recognized that non-farm employment could contribute in absorbing a growing rural labor force, a more spatially balanced population distribution, and poverty reduction. Given the limitations to arable land, the growth in rural employment has mostly not productively been absorbed in the farm sector. Either migration to urban areas or the development of non-farm employment in rural areas must take up the slack (Lanjouw and Lanjouw, 2001).

Non-farm work is defined as the participation of individuals in remunerative work away from the agricultural farm activities and has been seen to perform an increasingly important role in sustainable development and poverty reduction, especially in rural area (FAO, 1998). The economy of non-farm activities has become the interest of governments, non-governmental organizations-NGOs, international agencies and development practitioners because of its growing “commonness” in many developing countries. It has been considered as an alternative income source and as an essential way to increase overall rural economic activities and employment in many developing countries.

Lots of evidence point to the fact that rural household income share from non-farm activities has been growing substantially (Chhetri et al., 2015). Previous studies found that on average, non-farm incomes in rural area account for 40% of the total income in Latin America countries (Reardon et al., 2002). Reardon et al.’s (2002) study from Sub-Saharan Africa also reported the contribution of non-farm as 30% to 42% of total household income. In this connection, Asian countries have lower shares but still significantly account for around 29% to 32% of total household income (Davis, 2004). These considerable shares of non-farm income are mainly influenced by the expansion of off-farm activities in rural areas. Many studies found that the majority of farm households are engaged in
off-farm employment. Also, there are those who still have primary job in on-farm and having second job in off-farm activities.

The decisions for the farm households to participate into non-farm work activities are driven to maximize income as well as to minimize risks (Massey, 1990; Massey et al., 1993). The risks might be related to crop insurance, unemployment, market opportunities, capital markets, and so on. Stark (1991) argues that households send their members away from home for work not only for income but also to raise their socioeconomic status relative to other households in the society. In views of Corral and Reardon (2001) and Deichmann et al. (2001), geographical and institutional conditions are important factors that determine the decision of a household to participate in non-farm work activities. However, the extent and the nature of this decision process are yet too little to be recognized.

In Nepal, Community Forest arguably represents the most advance and progressive model worldwide for participatory management of the local forest resources. Though community forest user households generate sustainable income from community forests for their subsistence (Chhetri et al., 2016; Adhikari, 2005), non-farm income can have different effects at various levels as more than 85% of the population of the country live in rural areas and heavily depend on forest-livestock based agriculture for their livelihoods. Per capita GDP is estimated to be 1,200 (PPP US$); 46% are unemployed and 25% live below the poverty line (CIA, 2010). A decade long civil war between the government and Maoist insurgents severely limited the development efforts and contributed to a rise in unemployment, poverty, and rural-urban inequality (World Bank, 2006; Sharma, 2006). At households’ level, it helps to increase income and consumption smoothing (Kannan and Hari, 2002); increase saving and asset accumulation and improve access to health services, to better nutrition and education (Hadi, 1999). Likewise, at village/community level, non-farm income can help generate local commodity markets and local employment opportunities.

Though the importance of non-farm work is highlighted, micro level quantitative analysis of the factors influencing non-farm work is rare in Nepal. In fact, there are no empirical models of non-farm work participation rates of Nepalese farmers. Therefore, there is a need to begin filling the gaps in the knowledge on employment behavior, particularly of non-farm work participation decision of Nepalese farm-households. This paper tries to fill a part of this knowledge gap by estimating the household level incomes and thereby analyzing the factors associated with the incidences of non-farm income activities. Understanding the way in which households generate income from different non-farm sources and examining its potentials to improve the rural well-beings are expected to help in formulating policies to reduce poverty.

2. Methodology

2.1. Study area

Two community forest user groups (here after referred to as CFUGs), Tibrikot CFUG in Kaski and Kankali CFUG in Chitwan District were purposively selected for the study (Fig. 1). Both of these CFUGs contain large variation in the types of livelihood activities and agricultural potential.
2.1.1 Tibrikot community forest

Tibrikot CF lies in Hemja VDC, a place located approximately 10 km North-West of Pokhara valley. Hemja VDC constitutes a semi-urban community in Kaski district. There are 222 user households in Tibrikot community forest of which majority are Chhetri’s and only a few are the Brahmins. The community forest comprises of 1,963 Ropani (nearly 100 hectares) of land and is dominated by *Shima wallichii* (Chilaune) and *Castanopsis indica* (Katus), with minor occurrence of other species like *Asparagus Racemosus* (Kurilo), *Mallotus philippensis* (Kumkum), *Bambusa vulgaris* (Bamboo), *Phyllanthus emblica* (Amala), etc. In the past, much of the forest was very thin due to extreme pressure and daily demand for fuelwood, fodder and other forest products. These days, Tibrikot CFUG restrict households from using substantial quantities of forest products, apart from the collection of smaller value products like forest litter and twigs which is unrestricted.

2.1.2 Kankali community forest

The Kankali Community Forest is located in the foothills of the Mahabharata Range in Chainpur Village Development Committee (VDC) situated at the northern side from Sauraha. It is about 15 kilometers from Sauraha and takes around half an hour drive to reach to this community forest. Presently, the total user members of the community forest are 1,830 households, which cover all the (1-9) wards of Chainpur VDC. The Kankali forest covers more than 760.75 hectares of Sal (*Shorea robusta*) forest land and consisting of three types; planted, regenerated and natural. Beside this rich biodiversity and ecotourism promotional activities enhance the name and fame of this CFUG. The major attraction of the tourist in this CFUG was landscape and biodiversity. The Kankali Community Forest is not only meant for the forest-related activities but also concerned to the socio-economic aspects of the people of Nepal. It aims to fulfill the forest product demand of the community people, conserve biodiversity, eco-tourism promotion for per capita income generation through the active participation of the community people in all these activities.

2.2. The data

The data for the study was collected using household surveys; data collection took place from March to December 2009 and involved randomly selected households in each of the two sites. A total of 106 households in Tibrikot and a total of 169 in Kankali were interviewed comprising of a total of 275 households. Separate randomization was carried out in the selected CFUGs. Addition context specific background information about the villages and the CFUGs activities for the study was collected using village surveys and the discussion with the communities of the selected sites.

2.2.1. Decomposition of the household income

Households used a large number of products, for both commercial and subsistence purposes, harvested across land use types in both the sites. The majority of products was valued using farm-gate or barter prices or through valuation of a close substitute with a local market price (e.g. Cavendish, 2002). The valuation was based on own reported prices for several products recorded across the year. The value of products generally not traded, such as leaf litter, fodder, and ground grasses, were obtained using willingness-to-pay methods (Boxall and Beckley, 2002).

Household total annual income is defined as the sum of all gross incomes minus the costs of intermediate inputs and capital costs, i.e. value added net income (Sjaastad et al., 2005) – this does not subtract the value of households’ own labour input. Results are reported as total household income per adult equivalent unit (aeu). Total household income is distinguished between three income categories:

1. Environmental income, generated from forests and non-forest environmental sources. This includes values resulting from extraction of raw materials, processing environmental products, and wages for environmental related activities such as community forestry services. This income category is subdivided in forest and non-forest environmental income. The latter is net income from non-cultivated wild products collected outside forests.

2. Farm income, generated from crop, livestock and farm wage. Crop income includes the net income from the total agricultural crop production, both annual and perennial crops, including
agro-forestry and horticulture, and income from crop by-products. Livestock income is the net income generated from the imputed value of livestock products and services as well as home-consumed livestock and the net return from all traded livestock. Incremental stock value changes are excluded.

3. Non-farm income, generated from other sources than the above two including income from own business activities, national and international remittances, government and private sector employment and pensions, gifts and rents.

2.3. Data analysis

The total income of the household come from different sources and the share of non-farm income to the total household income for the different categories of households were first computed. Then, a detailed analysis of the characteristics of household participating in non-farm work and the hypothesized relationship to factors coming from individual characteristics (age, sex and education level); household characteristics (household size, caste, number of children, household exposed to shocks and poor household), farm characteristics (crop land, other types of land, land rented in, land rented out and location) and other income asset characteristics (implement value, debt, bank saving, value of livestock holdings and value of utensils) was carried out. Econometric approach is used in analyzing the data (Greene, 2000). A bi-variate probit regression model [1] was used for identifying the determinants of non-farm work participation of the rural household.

\[ P(N_i = 1 | x_i) = P(\beta_0 + \sum_j \beta_j I_{ji} + \sum_l \beta_l H_{li} + \sum_k \beta_k F_{ki} + \sum_m \beta_m A_{mi}) \]

The dependent binary variable \( N_i \) indicates whether household \( i \) participate in non-farm income generating activities. Factors associated with the non-farm work activities comes from the four different categories as previously explained. In, model [1], \( i \) denotes the factors coming from individual characteristics; \( H \) the household characteristics; \( F \) farm characteristics and \( A \) other income/asset characteristics. The details of each of the variables used in [1], their descriptive statistics and the respective expected signs are presented in Table 1.

2.4. Limitation

The paper could not address the important issue of the changing role of non-farm income to community forest user households as the income estimation and analysis is based on cross-sectional data, while dynamic relationships between changes in income across time are not covered. Despite every effort made in data collection, our income data might have been underreported, as households always tended to hesitate disclosing their incomes from various sources.

3. Results and Discussion

First, average absolute and relative household income per adult equivalent unit is presented across income groups (poor, middle, and rich) by source. Second, total household income is further decomposed by income source and house types (receiving and not receiving remittances) for all types of absolute and relative incomes as well as cash and subsistence incomes. Last, the probit regression results that explain the factors associated with the participation of non-farm income activities is presented.

3.1. Total household income by source and income group

For the purpose of generating an idea on the importance of different income sources to different categories of households, the source-wise average annual absolute and relative incomes of the households by three income groups, poor, middle and rich is presented in Table 2. The average annual income per aeu was Nepalese rupees (Nrs) 64,113 (USD 916) and ranged from Nrs 38,491 (USD 550) to 103,202 (USD 1,474) from the lowest to the highest income groups. Non-farm income \( \Box \) which included remittances, service income, pensions, business, gifts and rent - was the largest
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Table 1. Descriptive statistics for the model variables and their expected signs (n=275).

| Independent variables                      | Mean  | Std. Dev. | Min  | Max  | Expected signs |
|--------------------------------------------|-------|-----------|------|------|----------------|
| **Individual characteristics**             | **Mean** | **Std. Dev.** | **Min** | **Max** | **Expected signs** |
| Age of the household head (year)           | 52.49 | 14.31     | 22   | 95   | -/+            |
| Sex of the household head (1=female)       | 0.17  | 0.38      | 0    | 1    | -              |
| Education of the household head (year)     | 4.58  | 4.90      | 0    | 17   | -/+            |
| **Household characteristics**              |       |           |      |      |                |
| Caste (1=Dalit)                            | 0.08  | 0.28      | 0    | 1    | -              |
| Household size                             | 5.28  | 2.25      | 1    | 16   | +              |
| Number of children (<12 year of age)       | 1.38  | 1.30      | 0    | 7    | -              |
| Exposed to shocks in the last 5 year (1=yes)| 0.32  | 0.47      | 0    | 1    | -              |
| Poor (lowest income teicle)(1=yes)         | 0.33  | 0.47      | 0    | 1    | +              |
| **Farm characteristics and location**      |       |           |      |      |                |
| Log of crop land (ha)                      | 0.03  | 0.05      | 0    | 0.34 | -              |
| Log of other land (ha)                     | 0.05  | 0.12      | 0    | 1.68 | -              |
| Land rented out (1= yes)                   | 0.19  | 0.39      | 0    | 1    | +              |
| Land rented in (1=yes)                     | 0.23  | 0.42      | 0    | 1    | -              |
| Location (1=Chitwan)                       | 0.61  | 0.49      | 0    | 1    | -/+            |
| **Other income/asset characteristics**     |       |           |      |      |                |
| Log of implement value (Nrs.)              | 8.74  | 2.28      | 0    | 12.61| -              |
| Log of bank saving (Nrs.)                  | 4.80  | 4.56      | 0    | 13.18| -              |
| Log of debt (Nrs.)                         | 6.82  | 4.66      | 0    | 12.87+|                |
| Log of livestock value (Nrs.)              | 8.37  | 3.47      | 0    | 15.05| -              |
| Log of utensil value (Nrs.)                | 8.79  | 2.49      | 0    | 13.32| -              |

Source of income, contributing an average of 55.5% of the total household income and was the major determinant of the household’s income status. Yet, forest-livestock based agriculture was still the dominant mode of livelihoods of households living in the area. Unlike non-farm income, the relative importance of both farm and environmental incomes increased with increasing income (Table 3). On average, forest and environmental income contributed 11.0% to total household income. A similar trend was seen with crop income, which aggregated contributed 11.5% to the total household income. The average share of environmental income in the sample mean total household income is 11.0% ranging from 7.3% to 13.7%. Almost similar pattern of higher environmental income dependency among more well-off households has also been reported (Jodha, 1986; Adhikari, 2005; McElwee, 2008). Studies are, however, not directly comparable due to differences in methods and definitions. For instance, the Nepal study by Adhikari (2005) excludes non-forest environmental income, only includes income from community forests in forest income, and deducts labour costs when calculating net income; results are therefore not directly comparable between the two studies. Two comparable studies from the Nepalese middle hills report slightly lower environmental income ranges of 5.5-25.6% (Chhetri, 2016) and 6-22% (Aryal and Angelsen, 2007). These differences appear to be due to differences in geographic and recall periods (their use of one year recall period would expect to lead to lower recording of forest income than when using quarterly recall periods, Lund et al., 2008).

3.2. Total household income by source and household receiving and not receiving remittances

Household not receiving remittances generate larger share of income from forest and non-forest environmental resources which makes up 16.1% and 4.5% of total annual mean household income respectively. Forest and non-forest environmental income groups show that these are similar trends across the two income sources (Table 3).

Patterns of reliance on farm income also vary across household types; notably the share of crop, livestock and farm wage decreases for the household receiving remittances compared to the household not receiving remittances. Household receiving remittances are able to generate significant share (52.4%) of their total household income from it. Pensions (28.5%) and business (14.5%) sources are particularly important to the households having no income from remittances. A seasonal break down
of the data reveals that income is largely generated from forests in January to March, when green firewood is collected and stored and animal fodder outside forests is scarce. Household respondents generally claimed that access to forest products, mainly through community forestry, was equal to all households.

Table 2. Household mean annual absolute and relative incomes (Nrs)$^1$ per aeu (adult equivalent unit) by income source and income groups (n=275).

| Data          | Poor     | Middle   | Rich      | Sample mean of all households |
|---------------|----------|----------|-----------|------------------------------|
|               | Environmental |         |           |                              |
| Forest        | 1,324 (3.4) | 1,427 (2.8) | 1,479 (1.4) | 1,410 (2.2) |
| Non-forest    | 1,479 (3.8) | 2,685 (5.3) | 12,675 (12.3) | 5,628 (8.8) |
| Sub total     | 2,803 (7.3) | 4,112 (8.2) | 14,154 (13.7) | 7,038 (11.0) |
|               | Farm      |          |           |                              |
| Crop          | 2,909 (7.6) | 6,750 (13.4) | 12,331 (11.9) | 7,346 (11.5) |
| Livestock     | 3,953 (10.3) | 10,682 (21.2) | 21,628 (21.0) | 12,117 (18.9) |
| Wage          | 2,859 (7.4) | 2,125 (4.2) | 1,123 (1.1) | 2,032 (3.2) |
| Sub total     | 9,721 (25.3) | 19,556 (38.8) | 35,082 (34.0) | 21,496 (33.5) |
|               | Non-farm  |          |           |                              |
| Remittances   | 13,503 (35.1) | 12,698 (25.2) | 18,185 (17.6) | 14,800 (23.1) |
| Service       | 432 (1.1) | 1,196 (2.4) | 333 (0.3) | 654 (1.0) |
| Pension       | 10,531 (27.4) | 9,435 (18.7) | 14,522 (14.1) | 11,499 (17.9) |
| Business      | 846 (2.2) | 2,405 (4.8) | 20,093 (19.5) | 7,807 (12.2) |
| Gifts/rent/other | 655 (1.7) | 965 (1.9) | 833 (0.8) | 818 (1.3) |
| Sub total     | 25,966 (67.5) | 26,698 (53.0) | 53,966 (52.3) | 35,578 (55.5) |
| Total         | 38,491 (100) | 50,366 (100) | 103,202 (100) | 64,113 (100) |

Remittances are important or dominant income sources for the household receiving remittances, which make up an average of 52.4% of the total household income. Remittances are mainly transferred by internationally migrating male household members while pensions are typically generated from former service in the national or foreign armies. There may be significant barriers to entry that hinder poorer households from pursuing these livelihood options, including costs (transport, visa, rent seeking), lack of human capital (languages, illiteracy, skills), and negative modification of access due to social relations (difficulties navigating official procedures, low caste). In such a scenario, as also suggested by Rigg (2006), increasing human capital may constitute the most promising way to increase access of poorer households to higher return activities. The result also reveals that the share of total non-farm income to the total cash income for the household receiving remittances is much higher (83.3%) compared to the households not receiving remittances (86.2%).

The above findings on the income sources for different categories of households indicate that this income source is important in accurately understanding total household accounts and thus, ultimately, livelihood choices and activities. If all sorts of income sources are not considered the resultant partial understanding may provide an inadequate basis for designing interventions. Existing studies on income and livelihoods in the region that have ignored environmental income should in consequence be read with caution.

### 3.3. Factors associated with participation of non-farm work activities

The result of the probit model investigating the factors with the participation of the household in income generation from remittances is summarized in Table 4. The regression output showed that age of the household head and number of children are significant but has negative effect with remittance income. It suggests that the households with “old age” people having larger number of

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$^1$One USD = approximately 70 Nepalese Rupees in the study period
Table 3. Total annual mean household (n=275) absolute (Nr) and relative income per aeu by income source and household receiving remittances and not receiving remittances.

| Income source | Without remittance | With remittance | Sample mean of all households |
|---------------|--------------------|-----------------|------------------------------|
| Environmental |                   |                 |                              |
| Forest        | 1,383 (2.5)        | 1,460 (1.89)    | 1,410 (2.2)                  |
| Non-forest    | 7,522 (13.6)       | 2,153 (2.7)     | 5,628 (8.8)                  |
| Sub total     | 8,905 (16.1)       | 3,613 (4.5)     | 7,038 (11.0)                 |
| Farm          |                   |                 |                              |
| Crop          | 8,247 (14.9)       | 5,692 (7.1)     | 7,346 (11.5)                 |
| Livestock     | 10,894 (19.7)      | 14,362 (17.9)   | 12,117 (18.9)                |
| Wage          | 1,806 (3.3)        | 2,448 (3.1)     | 2,032 (3.2)                  |
| Sub total     | 20,948 (37.8)      | 22,502 (28.1)   | 21,496 (33.5)                |
| Non-farm      |                   |                 |                              |
| Remittances   | 0 (0.0)            | 41,959 (52.4)   | 14,800 (23.1)                |
| Service       | 870 (1.6)          | 259 (0.3)       | 654 (1.0)                    |
| Pension       | 15,771 (28.5)      | 3,660 (4.6)     | 11,499 (17.9)                |
| Business      | 8,046 (14.5)       | 7,368 (9.2)     | 7,807 (12.2)                 |
| Gifts/rent/other | 860 (1.6)    | 741 (0.9)       | 818 (1.3)                    |
| Sub total     | 25,547 (46.1)      | 53,986 (67.7)   | 35,578 (55.5)                |
| Total         | 55,399 (100)       | 80,102 (100)    | 64,113 (100)                 |

children are less likely to work, or travel outside the country as they are physically weak and also have to invest longer time to take care of their children. On the other hand the likelihood of the participation of the households in generating income from outside the country is more and significant for the households with larger number of family members and with more debt (Table 4). This may be a strong indication that there is a division of labor inside the household, as also suggested by Corsi and Findeis (2000) and Schultz (2001). Similarly, the result also confirmed that the likelihood of less educated people from the poorer households is significant in participating income generation activities from remittances as the signs of the co-efficient of these variables are negative and positive respectively and the p-value is less than 0.05.

The probit model result for investigating the factors associated with the participation in generating total non-farm income (within and outside Nepal) is presented in Table 5. The result did not show any significant relationships between land holding and participation in non-farm work activities. It suggests that, in general, land holding is not the major determinant factor to take decision in participating non-farm work in Nepalese farm households. Household size and log of implement values showed significant and positive association with non-farm work participation indicating that availability of family labor and some asset holding are also essential for the household members to get involved in the work other than in farm. The significant negative association between education of the head and Dalit caste indicates the likelihoods of low degree of participation of the Dalits and also of the member from the household with less educated head in non-farm work activities. Also in general the result confirmed that in overall non-farm work activities household, member from Chitwan participate less compared to the households in Hemja.

4. Conclusions

Findings showed that all households, regardless of income levels, rely on diverse income, farm, non-farm and environmental income sources. Non-farm income remains the dominant (55.5\%) source of income, though its importance decreases with rising income. The study also shows the decreasing trend of the relative incomes from remittances & pensions with rising total household income. Remittances and pensions constitute the most important source of non-farm income. The mean share of environmental income is 11.0\%, ranging from 7.3\% in the lowest income tercile to 13.7\% in the highest. Farm income constitutes an average of 33.5\% of total household income, that
Table 4. Probit model results on factors associated with the participation in generating total non-farm income from remittances.

| Independent variables                          | Coef  | Std. Err. | z     | P>|z|  |
|-----------------------------------------------|-------|-----------|-------|------|
| **Individual characteristics**               |       |           |       |      |
| Age of the household head (year)              | -0.01*| 0.01      | -1.91 | 0.06 |
| Sex of the household head (1=female)          | -0.14 | 0.22      | -0.65 | 0.52 |
| Education of the household head (year)        | -0.05**| 0.02      | -2.35 | 0.02 |
| **Household characteristics**                 |       |           |       |      |
| Caste (1=Dalit)                               | -0.41 | 0.33      | -1.24 | 0.22 |
| Household size                                | 0.09* | 0.05      | 1.72  | 0.09 |
| Number of children (<12 year of age)          | -0.14 | 0.09      | -1.66 | 0.10 |
| Exposed to shocks in the last 5 year (1=yes)  | 0.07  | 0.18      | 0.41  | 0.69 |
| Poor (lowest income tecile)(1=yes)            | 0.35**| 0.17      | 2.01  | 0.04 |
| **Farm characteristics and location**         |       |           |       |      |
| Log of crop land (ha)                         | 2.66  | 2.37      | 1.12  | 0.26 |
| Log of other land (ha)                        | -1.02 | 0.91      | -1.13 | 0.26 |
| Land rented out (1= yes)                      | 0.17  | 0.22      | 0.79  | 0.43 |
| Land rented in (1=yes)                        | 0.07  | 0.21      | 0.31  | 0.75 |
| Location (1=Chitwan)                          | 0.25  | 0.20      | 1.27  | 0.21 |
| **Other income/asset characteristics**        |       |           |       |      |
| Log of implement value (Nrs.)                 | 0.03  | 0.05      | 0.55  | 0.58 |
| Log of bank saving (Nrs.)                     | 0.00  | 0.02      | -0.08 | 0.94 |
| Log of debt (Nrs.)                            | 0.04**| 0.02      | 2.38  | 0.02 |
| Log of livestock value (Nrs.)                 | 0.01  | 0.03      | 0.44  | 0.66 |
| Log of utensil value (Nrs.)                   | 0.02  | 0.04      | 0.50  | 0.62 |
| **Constant**                                  | -0.84 | 0.65      | -1.29 | 0.20 |

Log pseudo likelihood = -164.14  Wald chi²(18) = 29.64  Pseudo R² = 0.08

*p<0.1, **p<0.05

is: livestock (18.9); crop (11.5%); and farm wage (3.2%). Middle level households generate the largest share from the farm in relative terms, compared to the poorer and richer households. Share of the non-farm income to total household income is much lower for the household not receiving remittances. On the other hand; the average share of non-farm income to the total cash income of the household is very high (75.5%), indicating high importance of non-farm source in fulfilling the cash needs of the households irrespective of their income status. The results show that household socio-economic characteristics are the dominant factors affecting the decision in participating or not participating in non-farm work activities. In general, non-farm job participation is more likely to be chosen by younger individuals, by those with higher human capital, and by non-dalits household’s having larger family members and holding more implement values. It suggests that the typical policies such as improvement in human capital and rural infrastructures will remain important for promoting and making the poor benefit from the income opportunities from various non-farm sectors.

Finally, the study deals with the aggregation of income and wage data. The analysis could be improved with more detailed information on non-farm versus on-farm income, including information on non-farm activities by sector and status.
Table 5. Probit model results on factors associated with the participation in generating total non-farm income.

| Independent variables                                      | Coef | Std. Err. | z    | P>|z| |
|------------------------------------------------------------|------|-----------|------|-----|
| Individual characteristics                                 |      |           |      |     |
| Age of the household head (year)                           | -0.01| 0.01      | -0.75| 0.46|
| Sex of the household head (1=female)                       | 0.19 | 0.28      | 0.66 | 0.51|
| Education of the household head (year)                     | -0.08**| 0.03      | -2.51| 0.01|
| Household characteristics                                  |      |           |      |     |
| Caste (1=Dalit)                                            | -0.58| 0.35      | -1.65| 0.10|
| Household size                                             | 0.12*| 0.06      | 1.93 | 0.05|
| Number of children (<12 year of age)                       | -0.09| 0.11      | -0.84| 0.40|
| Exposed to shocks in the last 5 year (1=yes)               | 0.29 | 0.27      | 1.06 | 0.29|
| Poor (lowest income teicle)(1=yes)                         | 0.09 | 0.24      | 0.36 | 0.72|
| Farm characteristics and location                          |      |           |      |     |
| Log of crop land (ha)                                      | -10.64| 7.40      | -1.44| 0.15|
| Log of other land (ha)                                     | 8.63 | 5.52      | 1.56 | 0.12|
| Land rented out (1=yes)                                    | 0.04 | 0.28      | 0.16 | 0.87|
| Land rented in (1=yes)                                     | -0.01| 0.29      | -0.02| 0.98|
| Location (1=Chitwan)                                       | -0.64**| 0.31      | -2.05| 0.04|
| Other income/asset characteristics                         |      |           |      |     |
| Log of implement value (Nrs.)                              | 0.09*| 0.05      | 1.74 | 0.08|
| Log of bank saving (Nrs.)                                 | 0.04 | 0.03      | 1.53 | 0.13|
| Log of debt (Nrs.)                                         | 0.00 | 0.03      | 0.08 | 0.93|
| Log of livestock value (Nrs.)                              | -0.04| 0.04      | -1.11| 0.27|
| Log of utensil value (Nrs.)                                | -0.02| 0.05      | -0.31| 0.75|
| Constant                                                   | 1.35 | 1.01      | 1.35 | 0.18|

Log pseudo likelihood = -73.78
Wald chi²(18) = 35.30  Pseudo R² = 0.16

* p<0.1, ** p<0.05

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