

Impact of Rural Outmigration on Agricultural Production of Rural Farm Households: The Case of Kutaber Woreda, Ethiopia

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Abstract: Over the past several years, rural areas in transition countries including Ethiopia have experienced a structural transformation in their agricultural sectors combined with profound demographic changes, primarily due to massive out migration of the rural active and educated labor forces toward urban areas and abroad. Despite the potential relevance of migration and resulting remittances in fostering or hindering of transformation in agriculture, in Ethiopia little is understood about the linkage between these activities. This study aimed to analyze the impact of rural out migration on agricultural production by using a cross-sectional data obtained from randomly chosen 270 rural farm households during 2016/17 production season. A two stage Cobb-Douglas production function was used. The estimated results of the first stage showed that out-migration of labor from rural areas had insignificant effect on the labor hours allocated for agricultural activities of both temporary and permanent migrant sending households. On the other hand, the remittance income from migrant had significant and increasing effect on farm capital stock of permanent migrant sending households. Yet, it had positive but insignificant effect on farm capital stock of temporary migrant sending households. The second stage analysis revealed that migrant sending households obtain higher income than non-migrant sending households especially the permanent one. This indicated that rural out migration had a positive impact on agricultural production of study area on the rural households. The study recommends that Ethiopian government should give emphasis to the potential contributions of outmigration in supporting or generating employment opportunities.

Keywords: Temporary Migrant, Permanent Migrant, Labor, Capital, Remittance, Income

1. Introduction

Agriculture is a proven path to prosperity. No region of the world has developed a diverse modern economy without first establishing a successful foundation in agriculture [2]. The notion is quite important for Africa where, close to 70% - 80% of the population is involved in agriculture as smallholder farmers working on parcels of land, on average, less than 2 hectares. As such, agriculture remains Africa's surest bet for developing inclusive economies and creating decent jobs mainly for the youth [2, 17, 12, 15]. Africa wide, farms smaller than 2 ha produce about 30% of total agricultural output, while

4–20 ha produce another 50% [14].

Though subsistent and often affected by climate including climate variability, Ethiopia's agriculture continues an important source of livelihood and primary occupation for majority of smallholder rural youths (63%) and the overall population [19]. Since 2010, agriculture stands the second most dominant sector next to service sector of the country's economy. It provides employment for 80% of the total labor force and contributes 42.7% to GDP and 70 percent to foreign exchange earnings [18, 7].

In Ethiopia, twelve million smallholder households account for approximately 95% of agricultural GDP and 85%

of employment [20]. The smallholders cultivate 20% of the total 51.3 million hectares of arable land suitable for agriculture [5]. However, an increase of smallholder agriculture means further increase in land fragmentation. The disproportionate younger population makes imperative to create more jobs especially through de accumulation of rural assets such as land [21]. In effect, the emerging landlessness and eroding of land as a safety net among the youth enforces them to stay out from their parents' land to seek out off-farm labor opportunities [14, 18].

Evidences are mounting that smallholder agriculturalists are reliant on the timing and quantity of rainfall [11, 19]. When households rely heavily on rain fed agriculture, the induced production shock is often transformed into an income shock and, in turn, into a negative consumption shock [9]. To averse the risk associated in agricultural sector the rural households are seek alternative income source to meet family need [7]. Households reinvest their resource to increase income flows from non-agricultural activities and transfers by engaging in off-farm activities or non-agricultural small businesses, participating in formal and informal social safety networks to receive various transfers as needed, or sending household members to urban areas to receive remittances from them [9].

In Ethiopia, rural out migration is best understood as one of the strategies adopted by individuals, households or communities to enhance and diversify their livelihoods [10, 3]. People migrate from rural to internal and international destinations primarily for better living conditions like better wage and better economic opportunities [22]. So, to increase our awareness about the effect of this flow, the present study examine the impact of rural out migration on agricultural

production of migrant sending rural families in Ethiopia. The analysis focused on the effect of rural - out migration on labor availability, the effect of remittance on farm capital stock availability, and finally the impact of rural-out migration on farm income of the study area.

2. Methodology

2.1. Description of Study Area

Study was conducted in South Wollo Zone of Amhara regional state in Ethiopia. It is one of the ten Zones and found 11°8' N 39°38' E. It is bordered on the south by North Shewa and the Oromia zone, on the west by West Gojjam, on the northwest by South Gondar, on the north by North Wello and on the east by the Afar Region. Kutaber is one of the woreda in this zone.

According to Kutaber Woreda Agriculture and Rural Development Office (KWARDO), the Woreda span a total area of 70071 Km² with different agro climatic zone varying from Kolla, Woina Dega and Dega. The average annual rainfall of the woreda is 1110.57 mm per year. It receives high rainfall during Kiremt season that starts in June and ends in September and short rainy season is in Belg in January and ends in February. The mean minimum temperature for the woreda ranges from 6.56°C during October and November to 23.13°C during May. The main economic base of the community in kutaber is agriculture. A dominantly sedentary mixed farming system, both crop and livestock productions are the main livelihood activity. The major cultivated crops include Teff, Barley, Wheat, Bean, Field peas, Maize, Chickpeas, and sorghum.

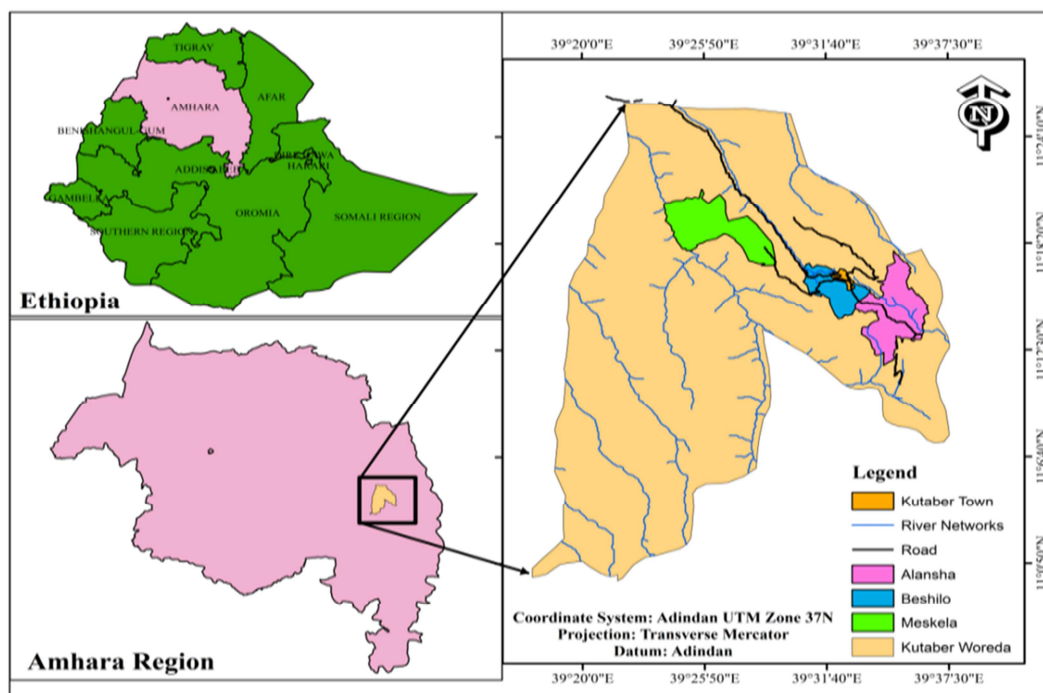


Figure 1. Map of Kutaber woreda that show the study area.

2.2. Sampling Techniques and Sample Size

Out of 22 rural kebeles (smallest administrative unit), from study woreda, three of them were selected after discussion with the officials of woreda social affairs and agriculture bureau. The selected kebeles are: Alansha (03), Beshilo (06) and meskela (011) with total of 350, 443 and 803 number of households respectively.

For selected kebeles, preliminary survey was under taken to identify migrant sending households either, in temporary or in permanent patterns, and non-migrant sending households. The identification of temporary and permanent migrant sending households was done based on Goldstein and Goldstein (1991) time of residence criterion. The authors classify migrants, no matter whether official or unofficial, as

‘permanent’ if they have stayed at the destination place for a year or more, and as ‘temporary’ for those arriving within a year.

A rural household is classified as temporary migrant sending household if at least one of its family members migrated in 2016/17 and earlier to destination location to earn wage income and return home within a year from departure time to provide labor support for agricultural activities of 2016/17. A rural household is called permanent migrant sending household if at least one of its family member migrated before 2016/17 to destination location to earn wage income but not arrive in 2016/17 to provide labor support for agricultural activities of the household.

Table 1. Number of migrants from each kebele

| Types of households | Number of households by kebele | | |
|-------------------------------|--------------------------------|--------------|---------------|
| | Alansha (03) | Beshelo (06) | Meskela (011) |
| No. non-migrant sending | 188 | 219 | 334 |
| No. temporary migrant sending | 75 | 150 | 126 |
| No. permanent migrant sending | 72 | 64 | 333 |
| Both temporary and permanent | 15 | 10 | 10 |
| Total | 350 | 443 | 803 |

Source: Preliminary field survey (2018)

Taking to consideration of the above categories (strata) in the table above, final selection of households was undertaken randomly. The total sample size was determined following Cochran's formula:

$$n0 = \frac{z^2 pq}{d^2} \rightarrow n = \frac{n0}{1 + \frac{n0-1}{N}}$$

Where; n^0 is the desired sample size when the population is greater than 10,000, n is number of sample size when population is less than 10,000, z is 95% confidence limit i.e. 1.96, p is 0.5 (proportion of the population to be included in

the sample i.e. 50%), q is 1-0.5 i.e. (0.5), d is margin of error or degree of accuracy desired (0.05), and N is total number of population

Accordingly, 308 households were selected out of 1561 households by excluding 35 households those sent both temporary and permanent migrants simultaneously. The total 308 sample households were distributed to both migrant sending (permanent and temporary) and non - migrant sending households based on theirs share from total 1561 households of sampled kebeles (table 2).

Table 2. Sampled households from each kebele.

| Types of households | Alansha | Beshelo | Meskela | Total |
|---------------------------|---------|---------|---------|-------|
| Non migrant sending | 37 | 43 | 66 | 146 |
| Temporary migrant sending | 15 | 29 | 25 | 69 |
| Permanent migrant sending | 14 | 14 | 65 | 93 |
| Total | 66 | 86 | 156 | 308 |

Source: field survey (2018)

2.3. Model Specification and Analysis

The neoclassical Cobb-Douglas type production function is used to analyze the effect of migration on farm output/income or agriculture (i.e. through the effects on production factors). The effects of rural-out migration are estimated in two stages. In the first stage the effects of migration on production factors (labor and capital) are analyzed; and in the second stage, the effects on farm income are estimated based on the results of the first stage.

Migration involves the removal of labor in one hand, and the flow of remittances on the other that alters the available

labor and capital input and thereby affecting farm income. In order to capture the differences within different migration patterns, the analysis is done for both temporary and permanent patterns of migration.

Determinants of available labor for migrant sending household are given by

$$L_{(T)} = \alpha_0 + \alpha_1 N_M + \alpha_2 HH_S + \alpha_3 N_D + \varepsilon_{L(T)} \quad (1)$$

and

$$L_{(P)} = \beta_0 + \beta_1 N_M + \beta_2 HH_S + \beta_3 N_D + \varepsilon_{L(P)} \quad (2)$$

Where N_M , HH_S , N_D refer to number of migrants in a household, size of a household and number of dependents in a household, respectively. The dependent variable is farm labor available in a household at given time of farming measured in labor-hours (L). Labor - hours is the product of the number of individuals working on the farm and the average working hours spent per day calculated for a given cropping season. In study are the average cropping season where farmers intensively in farm activity is six months. $L_{(T)}$ and $L_{(P)}$ are labor variables for comparison with respect to temporary and permanent patterns of migration, respectively.

Similarly, the determinants of capital stock for migrant sending households are given by:

$$K_{(T)} = \gamma_0 + \gamma_1 R_Y + \gamma_2 F_Y + \gamma_3 M_C + \varepsilon_{K(T)} \quad (3)$$

and

$$K_{(P)} = \delta_0 + \delta_1 R_Y + \delta_2 F_Y + \delta_3 M_C + \varepsilon_{K(P)} \quad (4)$$

Where, the independent variables R_Y , F_Y and M_C refer to remittance income measured in ETB, farm income measured in ETB and migration cost measured in ETB, respectively. The dependent variable is the farm capital stock of households allocated for agricultural production (including physical capital such as farm implements and hoes, draft animals; and working capital such as chemical fertilizers, seeds and pesticides valued in monetary terms). $K_{(T)}$ and $K_{(P)}$ are capital stock variables for comparison with respect to temporary and permanent patterns of migration, respectively.

The predicted values from the OLS regression results of the above equations are then inserted in the outcome model in of the second stage. In the second stage, the predicted values of labor and capital inputs (from first stage estimation) for both temporary and permanent patterns of migration are used as independent variables in the second stage. In this stage, the predicted values of labor and capital variables including the exogenous variable land (L_d) are taken as explanatory variables for farm income. For the purpose, the Cobb-Douglass type production function is adopted in the second stage.

$$F_Y = AL^\alpha K^\beta L_d^\gamma \quad (5)$$

The linear econometric model in the second stage embeds the predicted values of the first stage estimation, plus land as exogenous variable as indicated in equations below. Comparison is made between non-migrant sending and temporary migrant sending households as well as between non-migrant sending and permanent migrant sending households. The non-migrant sending households are taken as control groups.

Comparison 1: non-migrant sending versus temporary migrant sending households

$$\ln F_{Y(T)} = \eta_1 + \alpha_1 \ln \hat{L}_{(T)} + \beta_1 \ln \hat{K}_{(T)} + \gamma_1 \ln L_d(T) + \varepsilon_{FY(T)} \quad (6)$$

Comparison 2: non-migrant sending versus permanent migrant sending households

$$\ln F_{Y(P)} = \eta_2 + \alpha_2 \ln \hat{L}_{(P)} + \beta_2 \ln \hat{K}_{(P)} + \gamma_2 \ln L_d(P) + \varepsilon_{FY(P)} \quad (7)$$

Where $\hat{L}_{(T)}$ and $\hat{L}_{(P)}$ are the predicted estimations of labor from equation 3.1 and 3.2, respectively $\hat{K}_{(T)}$ and $\hat{K}_{(P)}$ are the predicted estimations of capital 3.3 and 3.4, respectively. η_1 and η_2 are constants in the respective model.

Based on the predicted estimations of the above equations (3.6 and 3.7), the differences in farm income between migrant sending and non-migrant sending households are calculated as follows.

Farm income percentage difference of temporary migrant sending households against non-migrant sending households is given by:

$$(T) = \frac{\ln \hat{F}_{Y(nm)} - \ln \hat{F}_{Y(T)}}{\ln \hat{F}_{Y(nm)}} \times 100 \quad (8)$$

And, Farm income percentage difference of permanent migrant sending households against non-migrant sending households is given by:

$$(P) = \frac{\ln \hat{F}_{Y(nm)} - \ln \hat{F}_{Y(P)}}{\ln \hat{F}_{Y(nm)}} \times 100 \quad (9)$$

Where $\ln F_{Y(T)}$, $\ln F_{Y(P)}$ and $\ln F_{Y(nm)}$ are the predicted values of farm income for temporary, permanent and non-migrant sending households, respectively.

3. Result and Discussion

In this study from the total of 308 samples only 270 interview schedule/questionnaires are adequately filled and correctly replied by respondents (60 temporary, 82 permanent and 128 non- migrant sending households). Thus, data from 270 (87.6% response rate) of sampled households considered in the analysis and results generated as follow.

3.1. Socio – Demographic Characteristics of the Migrant

The rate of migration is found significantly higher for the people who belonged to the age group of 19 and above in both temporary and permanent patterns of migration this indicates young adults, among others, are more migratory and the rate was about 17.59% and 26.1% for youths (10-18 years) in temporary and permanent migrants, respectively. This is in agreement with a study conducted by [1] that shows in Africa most migrants both within and across national borders are young adults aged 15-39. Migration is not only age selective phenomena, but it is also sex selective phenomena [18]. In terms of sex, this study found that more than half of temporary migrants were males whereas in case of permanent migrants both sexes have equal representation (50% each).

Marital status is another important characteristic influencing the propensity to migrate and the amount of remittance to be sent back to home. According to [4], the matter of being married, unmarried (single), divorced and widowed has an effect on the decision to migrate. Single persons have less responsibility than married ones. As such, the propensity to

migrate is highest among the single than married ones. With regard to marital status of migrant more than half (60.41%) of permanent migrants are single, 34.35% are married and 5.2% are divorced at the time of migration.

Most studies of rural-out migration found that, relatively better educated shows the highest propensity to migrate [8, 19]. But the findings of CSA [6], in Ethiopia showed that 70% of

internal migrants were illiterate. This study found the high portion of migrants are those attained secondary education (54.5%) and college and above (35.2%) in permanent and temporary patterns, respectively. In contrast with some previous researches results and reports, this study found that illiterates are less involved in both permanent (0.7%) and temporary (5.6%) types of migration.

Table 3. Socio-demographic characteristics of migrants.

| Migrant characters | Temporary migrant | | Permanent migrants | |
|---------------------------|-------------------|------------|--------------------|------------|
| | Frequency | percentage | Frequency | percentage |
| Age (years) | | | | |
| Below 10 | 2 | 1.85 | 2 | 1.50 |
| 10-18 | 19 | 17.60 | 34 | 25.37 |
| Above 18 | 87 | 80.55 | 98 | 73.13 |
| Sex | | | | |
| Male | 61 | 56.48 | 67 | 50 |
| Female | 47 | 43.52 | 67 | 50 |
| Marital status | | | | |
| Single | 31 | 28.70 | 81 | 60.45 |
| Married | 74 | 68.52 | 46 | 34.33 |
| Divorced | 3 | 2.78 | 7 | 5.22 |
| Widowed | 0 | 0 | 0 | 0 |
| Educational status | | | | |
| No formal education | 6 | 5.55 | 1 | 0.75 |
| Primary education | 29 | 26.85 | 43 | 32.09 |
| Secondary and preparatory | 35 | 32.40 | 73 | 54.48 |
| College and above | 38 | 35.19 | 17 | 12.69 |

Own computational result, 2018

3.2. Descriptive Statistics on the Effect of Rural out Migration on Labor Availability

The survey result indicates that on average non-migrant sending households have more active labor force (3.34 persons) working in the farm than both temporary and permanent migrant sending households. This indicates that out migration of labor reduce the number of active labor

forces working in the farm since above 90% of migrants are under the age bracket of 15-44 years. However, the average hours spent per day per person for agricultural activities by migrant sending households is higher than non-migrant sending households. Permanent migrant households allocate more hours (8.06 hours) than temporary migrant sending households (6.91 hours) and non-migrant sending households (6.68 hours) for agricultural activities per day per person.

Table 4. Descriptive statics of active labor force and working hours.

| | Non-migrant sending Households | | Temporary migrant sending Households | | Permanent migrant sending households | |
|---|--------------------------------|----------|--------------------------------------|----------|--------------------------------------|----------|
| | Mean | Std. Dev | Mean | Std. Dev | Mean | Std. Dev |
| Total active labor (person) | 3.34 | 1.47 | 2.93 | 1.93 | 3.23 | 1.60 |
| Average working hours /per day/per person | 6.68 | 3.71 | 6.91 | 3.92 | 8.06 | 3.41 |

Own computational result, 2018

Unpaired sample t-test is used to test the statistical significance of the difference in the average labor hours spent per day per person for agriculture purpose between temporary migrant sending and non-migrant sending households, and permanent migrant sending and non-migrant sending households. There is a statistically insignificant difference in the average hours spent for agricultural activity per day per person between temporary migrant sending and non-migrant sending households ($t=0.385$, $df=109.84$). However, the average labor hour spent per day per person for agricultural activities of permanent migrant sending households is significantly higher than non-migrant sending households ($t=2.76$, $df=183.17$).

In addition, the survey result also shows that family labors, hired labors and both family and hired labors are the possible sources of agricultural labors for both migrant sending and non-migrant sending households. The result reveal that 85.94% of non-migrant sending households, 66.67% of temporary migrant sending households and 81.71% of permanent migrant sending households use only family labors. Only 4% of permanent migrant sending households use hired labor only however 10% temporary migrant sending households and 7.81% non-migrant sending households are use hired labor only primarily for crop production activities.

3.3. Descriptive Statistics on Remittance

The survey result of this study indicates that 55% of temporary migrant sending households and 48.7% of permanent migrant sending households received money remittance in 2016/17. From those households received money remittance, 18.18% and 35% of temporary and permanent migrant sending households, respectively received

remittance only one time during 2016/17. However, from the total money remittance received households during 2016/17, 51.52% and 27.5% of temporary and permanent migrant sending households respectively received money remittance for four and above times. Unlike permanent migrant sending households' majority (60%) of temporary migrant sending households received good remittance like coffee, sugar, cloths and footwear instead of cash remittance.

Table 5. Summary statics of remittance by migration patterns during 2016/17 G.C.

| | | Temporary migrant sending households | | Permanent migrant sending households | |
|---|------------------------|--------------------------------------|-------|--------------------------------------|-------|
| | | Frequency | % | Frequency | % |
| Money remittance | HHs with remittance | 33 | 55 | 40 | 48.78 |
| | HHs without remittance | 27 | 45 | 42 | 51.22 |
| | One time | 6 | 18.18 | 14 | 35 |
| Frequency of receiving money during | Two times | 10 | 30.30 | 7 | 17.5 |
| | Three times | 0 | 0 | 8 | 20 |
| | Four and above | 17 | 51.52 | 11 | 27.5 |
| In-kind remittance | HHs with remittance | 36 | 60 | 26 | 31.71 |
| | HHs without remittance | 24 | 40 | 56 | 68.29 |
| | One time | 20 | 55.56 | 22 | 84.62 |
| Frequency of receiving In-kind remittance | Two times | 4 | 11.11 | 2 | 7.69 |
| | Three times | 4 | 11.11 | 1 | 3.85 |
| | Four and above | 8 | 22.22 | 1 | 3.85 |

Own computational result, 2018

The survey result of this study also show that the average remittance received per household was 4669.70 ETB with standard deviation of 3585.4 for temporary migrant sending households and 22770 ETB with standard deviation of 24014 for permanent migrant sending households, respectively. The minimum money remittance received was 500 ETB and the maximum was 14000 ETB for temporary migrant sending households. Permanent migrant sending households was received a minimum remittance of 300 ETB and a maximum of 80000 ETB.

3.4. Estimated Results of Farm Income

3.4.1. Estimated Result for the Determinants of Labor Inputs (Stage 1 Estimation)

The OLS output in table 6 shows us the determinants of labor inputs in both temporary and permanent patterns of migration. The OLS coefficient of determination shows that about 42.5% labor hour available for agricultural activities among temporary and 55.6% among permanent migrant sending households is explained by the change in household size, number of dependents in the family and number of migrants. Size of household affect farm labor hour positively

and significantly in both temporary and permanent patterns. The increment of household size by one individual in the active age group leads to 1247.1 and 1558.5 increases in labor hours of temporary and permanent migrant sending households, respectively.

On the other hand, the relationship between number of dependents in the household and farm labor hours is negative and significant. Increases in the number of dependent family member by one reduce labor hours available for agricultural activities by 1071.5 and 898.2 among temporary and permanent migrant sending households, respectively. Households with more number of dependents (young children and elderly) are supposed to take care of the dependents left in the house and as result hampers the time to be allocated for farm activities. In terms of number of migrant household members, the result shows insignificant effect on farm labor availability. This may be due to the increasingly declining of farm land size per household obscure the need for labor to work on farm particularly for the temporary pattern where the relationship is negative.

Table 6. OLS result for determinants of labor inputs (dependent variables: $L_{(T)}$ and $L_{(P)}$).

| L | Adj. R ² | F-stat | Const. | | Numbers of Migrant (N _M) | | Household size (HHs) | | Numbers of Dependent (N _D) | |
|-----------|---------------------|-------------------|----------------|--------|--------------------------------------|--------|----------------------|--------|--|--------|
| | | | Coeff. | t-test | Coeff. | t-test | Coeff. | t-test | Coeff. | t-test |
| $L_{(T)}$ | 0.425 | F (3 56) 12.42*** | 613.2 (1391) | 0.44 | -80.19 (340.7) | -0.24 | 1274.1*** (333.2) | 3.82 | -1071*** (314.2) | -3.41 |
| $L_{(P)}$ | 0.556 | F (3 78) 29.73*** | -811.4 (714.3) | -1.14 | 180.5 (226.1) | 0.80 | 1558.5*** (184.3) | 8.46 | -898.2*** (273) | -3.29 |

Note: *** indicates to the variable is statistically significant at 1% level of significance. Robust standard errors are given in parenthesis. The number of observation is 60 in temporary migrant and 82 in permanent migrant models. Source: analysis result (2018).

In general the estimation result and the test statistics confirm the hypothesis that household size affect farm labor

hour positively and number of dependents in the household affect farm labor hour negatively whereas the effect of number of migrant on farm labor is insignificant.

3.4.2. Estimated Results for Determinants of Farm Capital Input (Stage 1 Estimation)

OLS also fitted to assess determinants of farm capital inputs. About 26% and 57% of change in farm capital stock explained by variables included in the case of temporary and permanent migrant sending households respectively. Farm income has a positive and significant effect on farm capital stock investment in both temporary and permanent migrant sending households. The finding affirms increment in the amount of farm income predicted for increased investment on farm capital stock. For instance a 10% increase in farm income would lead to increase in farm capital stock by 4.4% for temporary and 6.5% for permanent migrant sending

households.

Unlike temporary migrant sending households, remittance income from permanent migrants has shown a significant impact on the investment of farm capital stock. This is in connection with destination of migrant. Since majority of permanent migrants were international migrants the amount of money they sent back is significant in changing farm capital stock. Increment of remittance income for instance by 10% leads to a 2.58% increase in the amount of farm capital stock of permanent migrant sending households. The effect of migration cost on farm capital stocks for both temporary and permanent migrant sending households is found to be insignificant. It is an indication that farm capital stock of migrant sending households is not depleted as a result of sending migrants.

Table 7. Estimated result for determinants of farm capital stock (dependent variables: $K_{(T)}$ and $K_{(P)}$).

| K | Adj. R ² | F-stat | Constant | | Remittance Income (R _Y) | | Farm Income (F _Y) | | Cost of Migration (M _C) | |
|-----------|---------------------|------------------|-----------------|--------|-------------------------------------|--------|-------------------------------|--------|-------------------------------------|--------|
| | | | Coeff. | t-test | Coeff. | t-test | Coeff. | t-test | Coeff. | t-test |
| $K_{(T)}$ | 0.26 | F (3 56) 7.9** | 9517.3 (3562.9) | 2.61 | 0.89 (0.50) | 1.77 | 0.44*** (0.09) | 4.46 | 2.01 (1.83) | 1.10 |
| $K_{(P)}$ | 0.57 | F (3 78) 34.9*** | 8053.6 (2414.7) | 3.34 | 0.258*** (0.08) | 3.21 | 0.65*** (0.12) | 5.34 | -0.0005 (0.05) | -0.01 |

Note: ** and*** indicate significance at 5% and 1% level of significance, respectively. Robust standard errors are in parenthesis. The number of observation is 60 in temporary migrant and 82 in permanent migrant models. Source: analysis result (2018).

Overall model results and test statistics confirm the hypothesis that remittances and farm income positively affect the farm capital stock whereas the effect of cost of migration on farm capital stock of migrant sending households is negligible.

3.4.3. Effect of Rural out Migration on Farm Income (Stage 2 Estimation)

Agricultural activities are subsistence and practiced on fragmented and degraded land in the country. The income farm households receive from their farm is not sufficient for investment activities beyond consumption. In consequence, according to FGD participants, the situation leads to the notion that migration of labor will not impair agricultural activity owing to labor shortage. Second stage estimation

designed to discern how migration affects production and income generation ability of households.

The second stage of estimation results where the predicted values of labor and capital in the first stage estimation are regressed on farm income. The effects of labor migration and remittances are already embedded on labor and capital variables in the first stage estimation. The variable land is also included as an exogenous variable in the second stage model to capture effect on farm income of rural households. Comparison is done between for both migrant patterns against non-migrant sending farm households. Farm income of non-migrant sending ($\ln F_{Y(N)}$) compared with temporary migrant sending households ($\ln F_{Y(T)}$) as well as permanent migrant sending ones ($\ln F_{Y(P)}$).

Table 8. Cobb – Douglas Estimation result for determinants of farm income (dependent variables: $\ln F_{Y(T)}$ and $\ln F_{Y(P)}$).

| LnF _Y | Adj. R ² | F-stat | Constant | | Predicted Labor $\ln \hat{L}$ | | Predicted Capital $\ln \hat{K}$ | | Land $\ln \hat{Ld}$ | |
|------------------|---------------------|-------------------|---------------|--------|-------------------------------|--------|---------------------------------|--------|---------------------|--------|
| | | | Coeff. | t-test | Coeff. | t-test | Coeff. | t-test | Coeff. | t-test |
| $\ln F_{Y(T)}$ | 0.78 | F (3 55) 69.59*** | -10.25 (1.86) | -5.51 | 0.356*** (0.105) | 3.40 | 1.68*** (0.165) | 10.2 | 0.392*** (0.127) | 3.09 |
| $\ln F_{Y(P)}$ | 0.8 | F (3 71) 105.3*** | -6.34 (2.28) | -2.78 | 0.132 (0.103) | 1.27 | 1.48*** (0.177) | 8.38 | 0.248 (0.166) | 1.50 |

Note: *** refers to the variable is statistically significant at 1% level of significance. In this regression robust standard errors are in parenthesis. The number of observation is 59 in temporary migrant and 75 in permanent migrant models. Source: analysis result, (2018).

Included explanatory variables explained 78% and 80% of the variation in farm income for temporary and permanent migrant sending households, respectively. Labor has a significant positive effect on farm income of temporary migrant sending households. A one % increase in labor hour, result in a 0.35% increment in farm income of temporary migrant sending household. The effect of labor on farm

income of permanent migrant sending households is insignificant result. This means the marginal product of each additional labor used is insignificant.

Farm capital stock has shown a significant and positive effect on farm income than labor and land inputs and takes largest share in determining production in both temporary and permanent migrant sending households. A one %

increase in farm capital stock, results in 1.68% and 1.48% increment in farm income of temporary and permanent migrant sending households respectively. In this regard, remittance plays an important role for investment on farm capital stock in terms of farm capital holding between migrant sending and non - migrant sending households. It is also shown that a 1% increase in land size would result a 0.392% in farm income of temporary migrant sending households.

The sum of the coefficients of the production factors exceeds one, which is not in line with the assumption of the

Cobb-Douglass production function. The production function assumes that the sum of the coefficients of the production factors is summed up to one and applied for macro level analysis. The analysis has been done at micro (household) level and could not hold the homogenous assumption of the production function.

Based on the second stage estimation results, table 9 presents income difference calculations to determine whether gains are possible for temporary and permanent migrant sending households when compared with that of non-migrant sending households.

Table 9. Farm income comparisons.

| | Non-migrant sending HHs | Temporary- migrant sending HHs | Difference | % difference |
|----------------------------|-------------------------|--------------------------------|-----------------|----------------|
| $\ln F_Y$ | 9.359 | 9.419 | -0.06 (gain) | -0.641% (gain) |
| | Non-migrant sending HHS | Permanent-migrant sending HHS | Difference | % difference |
| $\ln F_Y$ | 9.359 | 9.577 | -0.218 (gain) | -2.32% (gain) |
| Actual average farm income | | | | |
| | Non-migrant sending HHs | Temporary migrant sending HHs | Difference | |
| F_Y | 19296.53 | 21308 | -2011.47 (gain) | |
| | Non-migrant sending HHs | Permanent migrant sending HHs | Difference | |
| F_Y | 19296.53 | 26744.45 | -7447.92 (gain) | |

Source; Analysis result (2018)

The result shows, farm income of temporary migrant sending households is higher by 0.641% (2011.47) compared to that of the non - migrant sending households. This can be attributed to a positive commutative effect of labor out migration and remittance on labor and capital inputs of temporary migrant sending households. Similarly, farm income of permanent migrant sending households exceeds non – migrant sending households' by 2.32% (7447.92). Labor is found to be insignificant in contributing to farm income of permanent migrant sending households. Therefore, the change observed in farm income of permanent migrant sending households is mainly as a result of a change in capital stock, which in turn influenced by farm income and remittance. Generally, out migration have a positive impact on agricultural production of migrant sending households.

Farm income gain of permanent migrant sending

households as a result of permanent migration is higher than for temporary migrant sending. This indicates that permanent migrant sending households have received high remittance than temporary migrant sending households that enhance investment on capital stock.

Moreover, unpaired sample t-test (Table 10, below) conducted to test the statistical significance of the differences in the actual average farm income between temporary migrant sending and non-migrant sending households, and between permanent migrant sending and non-migrant sending households. Average income differences test shows a statistically insignificant difference in the actual average farm income between temporary migrant sending and non - migrant sending households. However, the actual average farm income of permanent migrant sending households was significantly higher than non-migrant sending households.

Table 10. Statistical test results of farm income differences.

| Migration Patterns | F_Y | | Migration patterns | F_Y | |
|--|----------------|-----------|--|----------------|----------|
| | Mean | Sta. err. | | Mean | Sta.err. |
| Permanent migrant sending HHs | 26744.45 | 2762.90 | Non-migrant sending HHs | 21308 | 2735.2 |
| Non - migrant sending HHs | 19296.53 | 2099.84 | Temporary migrant sending HHs | 19296.53 | 2099.48 |
| Difference | 7447.92 (gain) | 3470.3 | Difference | 2011.53 (gain) | 3448.28 |
| Diff=mean (F_{Yp}) – mean (F_{Yn}) | | | Diff=mean(F_{Yt})-mean(F_{Yn}) | | |
| t=2.1462 | | | t=0.5833 | | |
| Ho: diff=0 | | | Ho: diff=0 | | |
| df=166.227 | | | df=128.332 | | |

F_{Yp} , F_{Yt} , and F_{Yn} represent average farm income for permanent, temporary and non-migrant sending households, respectively. Source: analysis result (2018).

4. Conclusion and Recommendation

Farm household survey was conducted in 2016/17 production season by interviewing 60 temporary migrant

sending, 82 permanent migrant sending and 128 non-migrant sending households through structured questionnaire. Stratified random sampling technique was employed to select sample respondents. A two stage Cobb-Douglas production function fitted to analyze the effect of rural out migration on

production factors and its effect on farm income. In the first stage, the determinants of labor and capital inputs together with outmigration and remittance were estimated. The effect of outmigration on the labor hours and remittance on farm capital stock allocated for agricultural production were found insignificant for temporary migrant sending households. For permanent migrant sending households the result is mixed. While outmigration tends to increase farm capital stock allocated for agricultural production significantly, its effect on farm labor hours was insignificant.

Effect of migration patterns on farm income was assessed in the second stage estimation using Cobb–Douglas function. The result indicated rural out migration increases total farm income of migrant sending households. Permanent migrant sending households obtained higher farm income than both temporary migrant sending and non-migrant sending households. It also found that both labor and land size had insignificant effect in determining farm income of permanent migrant sending households. Increment in farm income by the model associates a high investment on farm capital stock, which is in turn as a result from saving from remittance and farm income. Interestingly, all production factors including land significantly affected farm income in the case of temporary migrant sending households. This indicates sustained link between agricultural practices and temporary migrants and their remittances.

Therefore, rural-out migration makes the remaining rural labor force productive (depending on the size of working family members in a household and the size of land owned) and boosts the capital stock of households that in turn enhances farm income. In recommendation, due emphasis should be given to the potential contributions of migration through remittances in supporting or generating employment opportunities for other family members in the places of origin and create ample environment favoring agricultural sector as this may attract more remittances to be channeled to this sector.

Conflict of Interests

The authors declare that they have no competing interests.

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