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The Effect of Rural Out-Migration on Farm Income of Migrant Sending Rural Households: The Case of Alaje *Woreda*, Tigray Regional State, Ethiopia.

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ABSTRACT

Research on the relationship between rural-out migration and agricultural production is highly hampered by empirical evidence fromthe perspective of migrant-sending rural households. This paper assesses the effect of rural-out migration on farm income of migrant- sending rural households with evidence from Alaje woreda, Southern Tigray, Ethiopia. This paper utilized both desk and field research that depends on both secondary and primary data. A mixed research approach was applied. Using a simple random sampling technique 145 sample households were used for the household survey. The quantitative data were analyzed by descriptive and inferential statistics. Cobb-Douglas production function approach and ordinary least squares regression model was used to estimate the impact of rural-out migration on farm income. The findings showed that rural out-migration has significantly reduced the available labor in migrant-sending households and remittances play a positive and significant role in boosting investment in capital stock. Migrant sending households have obtained higher income from the farm as a result of positive marginal productivity of labor and remittance incomereceived.

Keywords: Farm Income; Migrant sending households, Cobb- Douglas production function, rural out-migration

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1. INTRODUCTION

The patterns of migration in Africa are complex and its causes or drivers vary widely. In general, people may be induced or compelled to move as a result of cultural, demographic, socio-economic, environmental, and/or political factors (Zoomers, 2010).

Rural-urban migration has historically been played a significant role in the urbanization process and economic growth of several countries andcontinues to be significant in scale. Rural-urban migration accounted for urban population growth and urban growth in Africa in the past three decades. Also, Migration has been an important livelihood and survival strategy for many poor groups across the developing world, particularly in Africa (Greenwood & Hunt, 2003; Lall *et al*., 2006).

By taking into account the case of European cities in the 19th and early 20th century, empirical evidence in development economics suggest that rural-out migration results in industrialization and economic growth. However, concerning developing countries particularly Africa,some key questions have not found clear answers and did not get empirical explanations (Lall *et al*., 2006). Rural households also use rural-out migration as an alternative strategy to diversify their sourceof income and livelihood. Empirical evidence regarding the effect of rural-out migration on farm income is a highly debated and mixed issue. On one hand, it implies a loss of labor force from the rural sectorand on the other hand, the inflow of remittance from migrants promotes agricultural investment (De Brauw, 2014).

Empirical studies show how remittances increase the total income of households directly or indirectly through stimulating investment in production and how it could compensate for the lost labor. Nevertheless, it has been argued that the micro impacts of migration and remittances on agriculture production and productivity arecomplex, little explored and the topic has been a growing area of research on agricultural and development economics (Taylor and Martin, 2001).

In Africa, research has been carried out on the effects of rural-out migration on the livelihoods of households left behind. Some of these studies include those of (Ajaero and Onokala, 2013; Yamarak, 2013), and others. However, these studies have been done at the macro level and on the effect of formal international remittance flows on national economies. Other studies on internal rural-out migration have alsofocused on the livelihood of the migrants themselves based on urban centers. Therefore, this research analyzes the effect of rural out- migration from the perspective of migrant-sending rural households.

Ethiopia is experiencing a high level of population pressure, populationredistribution, and rural-out migration (Mberu, 2006). Although rural- out migration has a long history in Ethiopia; empirical evidence on the relationship between rural-out migration and socio-economic development is little explored from the context of migrant-sendingrural households. As a result migration and population policies are poorly designed (Beneberu, 2012). To the knowledge of the researcher,most of the rural-out migration studies done in Ethiopia excluded the effects of rural-out migrations on the

rural migrant-sending householdsand mainly focus on the livelihoods of migrants. Some of these studies include Belay, (2013); Birhan, (2013), Gebru and Beyene, (2014), and others.

Despite the limited number of empirical researches in the country that investigates the effect of rural-out migration from the perspective of migrant-sending rural households, there exist no previous studies that investigated the impact of rural-out migration on farm income of migrant-sending rural households in the study area. In light of the fore mentioned gaps, this paper is designed in filling the gap to the existing limited empirical research on internal migration particularly rural- urban migration by taking Alaje as the study site. Therefore, the focus of this paper was to assess the effect of rural out-migration and remittance flows on farm income of migrant-sending rural households by taking Alaje as the study site.

2. MATERIALS AND METHODS

2.1 Research Design

To understand properly the existing effect of out-migration on farm income of migrant-sending rural households a cross-sectional survey design was employed. A mixed research approach was used as they do support each other at a different level.

2.2 Sample design

This study was conducted in Alaje *Woreda*, Tigray region. The *woreda* for this particular study was purposefully selected because the migration of labor is prevalent in this particular woreda and known for sending-out labor migrants to destination locations such as to Mekelle and Humera areas.

The study area comprises 21 rural *kebeles* in total. Three sample *kebeles* were selected purposively by taking into account the magnitude of migrants. A total of two thousand and one hundred nine (2109) migrant-sending households were found. Using Yamanes' (1967) formula 145 sample households were selected using a simple lottery random sampling procedure. To have a proportional number of sample households from the study *kebeles* proportional sampling was used.

2.3 Data sources and data types

Primary data sources for this research were household heads or senior household members. The instruments of data collection from these data sources were questionnaires and focus group discussion with migrant- sending households of the study area and government officials, and local administrators. The type of data generated from household's survey is demographic characteristics, Agricultural production, use of Agricultural inputs, farming activities, expenditure pattern, landholding size, migration, and remittance received. Secondary data sources also used such as**;** books, journals, magazines, and reports from migration bureaus, agriculture

bureaus, publications ofgovernmental and non-governmental organizations, statistical and census reports, and the internet.

2.4 Methods of data collection

The structured questionnaire was designed to collect data from migrant-sending household heads. The household survey questionnaire was consists of different sections pertains to collecting the amount of necessary information on household demography, agricultural production, migration and remittance, socio-economic conditions of migrant-sending households. Focus group discussion was also conducted with selected community members for each sample village to collect complementary information for certain questions in the research topic.

2.5 Method of data analysis

The data were analyzed by descriptive and inferential statistics. The descriptive analysis includes percentages, averages, tables, and graphs, whereas the inferential statistics include regressions analysis. OLS regression model was also used to estimate the impacts of rural out- migration on farm income of migrant-sending households.

2.6 Specification of Econometric model for the effect of out-migrationon farm income

Out-migration affects the total labor force available in the household. Similarly, change in the available capital stock is expected as a result of remittances obtained from migrants.

To analyze the effect of rural-migration on-farm income via its effect on production factors, the log-linear Cobb-Douglas production function is used which is the commonest in literature. First, the effectof out-migration on production factors (labor input and capital inputs) were analyzed, including the characteristics of migration variables as determinant factors. Based on the predicted result on production factors, the effect on farm income is estimated using Ordinary Least Squares (OLS).

Migration involves the removal of labor on one hand, and the flow of remittances on the other that changes the available labor and capital input and thereby affecting farm income. Therefore, the followingregression model is specified for the determinants of available labor and capital stock for migrant-sending households.

$$\text{Labor} = \alpha_0 + \alpha_1 NM + \alpha_2 SOH + \alpha_3 NOD + \varepsilon_L \quad (1)$$

$$\text{Capital} = \beta_0 + \beta_1 RI + \beta_2 FI + \beta_3 MC + \varepsilon_K \quad (2)$$

2.7 Dependent variables

Labor: Is farm labor available in a household at a given time offarming measured in Labor-hours. Labor-hours is the product of the number of individuals in a household working on the farm and the average working hours spent per day and calculated for a given cropping season. In the research area, the average on-farm cropping season where farmers intensively engage in farm activities is six months.

Capital: Is farm capital stock allocated for agricultural productionincluding physical

capital and working capital valued in monetaryterms.

2.8 Explanatory variables for labor input

Number of migrants in a household (NM): it is expected that households who send migrants to destination region are expected to allocate less labor on-farm activities (negative relationship).

Size of a household (SOH): it is expected that households with larger family size, in general, are expected to allocate a greater number of labor on-farm activities (positive relationship).

Several dependents in a household (NOD): it is expected that households with more dependents are expected to allocate fewer labor-hours on-farm activities as working members are also responsible to provide care for the dependents in the house and to other non-farm activities (negative relationship).

2.9 Explanatory variables for capital input

Remittance income (RI): higher remittances are expected to enhance the investment in the capital stock of migrant-sending households (positive relationship).
Farm income (FI): Higher-income from the farm is expected to predict higher investment on capital stock (positive relationship).
Migration Cost (MC): Migrant sending households incur the cost of migration as part of initial investment while sending migrants.
To estimate the impact of out-migration and remittance on-farm income the predicted values of labor and capital variables from OLS regression results of Equations 1 and 2 including the variable land size (LS) are taken as explanatory variables. For estimation, the log-linear form of the Cobb-Douglass type production function is used as indicated in equation 3 below.

$$\ln FI = \eta_1 + \alpha_1 \ln PL + \beta_1 \ln PC + \gamma_1 \ln LS + \varepsilon_{YF} \quad (3)$$

Where,
lnFI is a log of the annual farm income of households (in ETB for2020).
lnPL and lnPC are a log of the predicted values of labor and capitalfrom Equations 1 and 2, respectively.
lnLS is a log of farmland size of the households measured in hectaresη_1 is constant.

3. RESULTS AND DISCUSSION

3.1 Econometric Results of the effect of rural out-migration onproduction factors

Table 1 and 2 below presents the econometric analysis or the linear regression model result, for the determinants of labor input and farm capital stock of migrant-sending rural households respectively.
Before running the regression model, the problem of multicollinearity among the explanatory variables was checked by using collinearity diagnostics or Variance

Inflation Factor (VIF). The value of VIF for each variable proved that the assumption of multicollinearity was not violated or there was no serious problem among the variables, as VIF values for each variable are less than 10. Similarly, using the Durbin-Waston authocollinearity checked and found that there was no authocollinearity problem.

TABLE 1: determinants of labor input of migrant-sending ruralhouseholds

Dependent variable labor input				
Explanatory variables	Coefficients	Std.Error	t-value	P>|t|
NM	-1480.43	149.34	-9.91	0.000***
SOH	1329.1	84.21	15.78	0.000***
NOD	-1211.54	155.14	-7.81	0.000***
Constant	475.2	487.77	0.98	0.33
No of observation = 145 F(17,236) = 114.73				
Prob> F = 0.000				
R- square = 0.71Adj.				
R- square = 0.70				

*** Significant at 1% **Significant at 5%Source: Survey result, 2020

Table 1 above depicts the regression result for the determinants of labor input among migrant-sending rural households. The Adjusted R.-square model summary value (coefficient of determination) shows that about 70% of the change in labor-hours among migrant-sending households are explained by the changes in the number of migrants, size of a household, and several dependents. The ANOVA statics of 114.73 (for 3 numerator degree of freedom and 141 denominator degree of freedom) shows that the model is different from zero and significant at 99 percent of confidence level. In other words, the model is fit at a 99 percent confidence level. It implies that the independent variables were related to the dependent variables.

The regression coefficient result shows that out-migration of a family member in households is associated with labor hour allocation for farmincome negatively and significantly (p=0.000) at 99 percent of confidence level. A unit of increase in the number of out-migrants in the household reduces the labor hour allocation for farm income by 1480.43 units. The finding confirms the NELM model which argues that the labor loss effect of out-migration. And the finding is consistentwith Lucas (1987) which out-migration reduces the available labor in the households. The household size

is also associated with the allocation of labor-hours positively and significantly (p=0.000) at 99 percent of confidence level. The result indicates that, as the member of household size increases, the labor hour allocation increases by 1329.1 units. Also, the result revealed that households with a dependent member are found to have a negative and significant (p=0.000) relationship with labor hour allocation at 99 percent of confidence level. An increase in a dependent family member in the household by one unit has reduced the allocation of labor-hours on farming activities by 1211.84 units. Households with more dependents are supposed to take care of the dependents left in the house and that hampers the time to be allocated for farm activities. From the above regression coefficient result, we can conclude that available labor in a household is negatively influenced by the number of out-migrants and dependentsin a household and positively affected by the household size.

TABLE 2: Determinants of the capital stock of migrant-sending ruralhouseholds

Dependent variable farm capital stock				
Explanatory variables	Coefficients	Std.Error	t-value	P>|t|
RI	0.41	0.142	2.87	0.005***
FI	0.26	0.025	10.48	0.000***
MC	-0.209	0.606	0.344	0.731
Constant	-506.75	974.95	-0.520	0.604
No of observation = 145F(3,141) = 43				
Prob> F = 0.000				
R- square = 0.48				
Adj. R- square = 0.47				

*** Significant at 1% **Significant at 5%Source: Survey result, 2020

Table 2 above presents the OLS estimation results regarding the determinants of the capital stock of migrant-sending rural households.
The Adjusted R-square value or the coefficient of determination result above shows, about 47% of the variation in farm capital stock ofmigrant-sending rural households is explained by the variation in remittance income, farm income, and cost of migration. The ANOVA statics of 43 (for 3 numerator degree of freedom and 141 denominator degree of freedom) shows that the model is different from zero and significant at 99 percent of confidence level. In other words, the model is fit at a 99 percent confidence

level. It implies that the predictor variables were related to the criterion variables.
The study result also indicates, remittance income has a positive and significant (p=005) effect on farm capital stock investment in migrant- sending rural households at 95 percent of confidence level. According to the result, as the remittance income increase by one unit the amount of farm capital stock in migrant-sending households increases by 0.41 units. This implies that remittances received by households may have been used to acquire capital goods (or agriculture inputs) to boost yield. The finding is consistent with the findings of Quinn (2009) in Mexico and Beneberu (2012) in Ethiopia found that remittance incomeboosts the working capital of migrant-sending rural households. This finding contradicts the finding of Raju et al. (2014) in Nepal; where found that remittance-receiving rural households did not use productivity-enhancing agricultural inputs such as chemical fertilizers even though remittances enhanced their income.
The regression coefficient result also shows that farm income has positive and significant (p= 0.000) effects on farm capital stock of migrant-sending rural households at 99 percent of confidence level. The regression result shows that, as the farm income increase by one unit the capital stock increases by 0.26 in migrant-sending rural households. This means the increase in the amount of farm income predicts increased investment in farm capital stock. In other words, higher-income from farm increases the savings and then investment on the capital stock that in turn enhance farm production and income. The regression model also shows that the effect of migration cost on-farm capital stock of migrant-sending rural households is found to be insignificant. This means that the capital stock of migrant-sendinghouseholds is almost not depleted as a result of sending migrants. The cost of migration can be sponsored from the savings from farm income, from relatives/friends in origin or destination region, or loans. From the above econometric estimation results and test statistics, we can confirm that remittances and farm income positively affect the farm capital stock whereas the effect of the cost of migration on-farm capital stock of migrant-sending households is negligible.

3.2 Econometric Results of the effect of out-migration and remittanceon farm income

Rural-out migration and inflow of remittances affect the farm income of rural households through changing the farm labor and farm capital stock. To see the effect of out-migration and remittance income on farm income of migrant-sending rural households, the predicted values of the labor variable and capital stock variable based on the OLSestimation results in table two and three including land variable would be used as determinants factors affecting farm income of migrant-sending rural households. The effects of out-migration and remittances are already embedded in labor and capital variables.
Before running the regression model, the problem of multicollinearity among the explanatory variables was checked by using collinearity diagnostics or Variance Inflation Factor (VIF). The value of VIF for each variable proved that the assumption

of multicollinearity was not violated or there was no serious problem among the variables, as VIF values for each variable are less than 10. Similarly, using the Durbin-Waston authocollinearity checked and found that there was no authocollinearity problem.

TABLE 3: OLS result of the effect of out-migration and remittanceon farm income

Dependent variable farm income				
Explanatory variables	Coefficients	Std.Error	t-value	P>|t|
lnPL	0.048	0.023	2.06	0.041**
lnPC	1.26	0.041	30.38	0.000***
lnLS	0.09	0.029	3.42	0.001***
Constant	-1.612	0.411	-3.92	0.000***
No of observation =145 F(3,141) = 551.41				
Prob> F = 0.000				
R- square = 0.821				
Adj. R- square = 0.820				

*** Significant at 1% **Significant at 5%Source: Survey result, 2020

In table 3 above the Adjusted R-square results indicate that about 82% of the variations in farm income are explained by the changes in farm labor, farm capital stock, and farm landholding of migrant-sendingrural households. The ANOVA statics of 551.41 (for 3 numeratordegree of freedom and 141 denominator degree of freedom) shows thatthe model is different from zero and significant at 99 percent of confidence level. In other words, the model is fit at a 99 percent confidence level. It implies that the predictor variables were related to the criterion variables.

Labor has a positive and significant (p=0.041) effect on farm incomeof migrant-sending rural households at 95 percent of confidence level. The result indicates that a one percent increase in the labor-hours leads to a 0.048% increase in farm income of migrant-sending households. This implies that the marginal product of labor is still positive and out- migration has made labor productive for migrant-sending rural households. This finding is inconsistent with the finding of Raju et al (2014) found that decline in agriculture production due to the shortageof labor from migration and similarly, Rozelle et al (1999) found that the migration of an additional family member led to a maize yield loss in rural China.

The farm capital stock variable also affects the farm income of migrant-sending rural

households positively and significantly (p=000) at 99 percent of confidence level. The model result indicates that a one percent increase in farm capital stock leads to a 1.26% increase in farmincome of migrant-sending rural households which is invested as a result of savings from remittances and farm income. But, the cost of migration has an insignificant effect on farm capital stock and thus having a negligible effect on farm income. The farm capital stock is more predictor than the rest of the production factors. Therefore, the change observed in farm income of migrant-sending rural households is mainly as a result of changes in farm capital stock, which is in turn influenced by the investment made from remittances and farm income. The finding is consistent with De Baruw (2014) which found thatremittance as a result of migration increases agricultural production.

Also, the size of farmland by migrant-sending households affects the farm income positively and significantly (p=001) at 95 percent of confidence level. The result indicates that a one percent increase in the size of farmland increases the farm income of migrant-sending households by 0.09%. In general, the regression estimation results haveproduced a positive and significant effect of production factors on farmincome. Out-migration and remittances affect the farm income of rural households through their effects on labor and capital inputs.

4. CONCLUSION

The central purpose of the study was to assess the effect of rural out- migration and remittance income on farm income of migrant-sending rural households of Alaje *woreda*, Tigray region, Ethiopia.

Using the Econometric model the effect of rural out-migration on farm income has been discussed. To estimate the effect of out-migration on- farm income first, the determinants of labor and capital input includingout-migration and remittances have been estimated and then the effect on farm income was estimated. The finding shows that out-migration has been found to reduce significantly the available labor of migrant- sending households and remittance income has played a positive and significant role in boosting investment in capital stock. The effect on farm income based on the predicted value of labor and capital results has shown that migrant-sending households have obtained higher income from farms even though out-migration reduces the available labor in migrant-sending households. The increment in farm income of migrant-sending households has been predicted as a result of positive marginal product of labor and higher amount of remittances received that facilitates investment in capital stock. Therefore, out-migration rather makes the remaining rural labor 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 general, rural-out migration plays an important role both in meeting the labor demands of industries and facilitating the process of rural transformation. Remittances sent to families of migrants residing of rural origin can contribute to rural development not only by facilitating investment but also by enhancing the living standard of

households. Out-migration can be taken as a strategy particularly for the poorest groups of rural households where they can supplement their farm income and then diversify risks.

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