



Impact of Internal Migration on Poverty: Evidence from Bangladesh

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Abstract: Internal migration has a pivotal contribution to mitigate household income risk, particularly for those in lower socio-economic groups. This research applies the theory of New Economies of Labour Migration to analyse three years of household-level panel data collected by BRAC for evaluating the outcome of internal migration on household welfare. Welfare is analysed using three key outcome variables, namely household income, capability for asset building, and poverty gap. Remittances significantly enhance household-level welfare and vice versa. The study observes that migrant households earn higher, build more assets, and reduce the poverty gap than non-migrant households.

INTRODUCTION

Internal migration as a livelihood strategy for better employment opportunities and improved earning has been rapidly increasing in both developed and underdeveloped countries, including Bangladesh (Alam and Islam, 2014). Migration allows the migrant households to enhance their resource base which plays a significant role in poverty reduction. Internal migration as income risk-avoidance is a useful strategy that reduces the severity of poverty (Adams and Page, 2003; De and Ratha, 2012) and also reduces the probability of poverty by 0.18 points (Kauser et al., 2016). Skeldon (2006) postulates a hypothesis on the relationship between migration and poverty and finds that migration widens the horizon of poverty-stricken households' access to resources which helps to reduce poverty. In line with Skeldon's findings, Yang et al. (2007) also estimated that the aggregate poverty in China would rise from 14.4% to 15.4% without migration. Poverty reduction in countries like Bangladesh, Ghana, and Uganda can be attributed to the effects of the inflow of remittances (Adams and Page, 2003). However, some other studies, e.g. Finan (2004), argue that migration is a regular livelihood strategy and its ability to reduce

poverty is limited. Similarly, Campbell and Kandala (2011), in their analysis of the impact of remittance on poverty, find that remittance inflow in the migrant households cannot create a positive effect on poverty reduction.

This study undertakes an in-depth analysis of the impact of internal migration through the lens of New Economies of Labour Migration theory (NELM) and a livelihood strategy framework. NELM is a neoclassical migration approach and deals with a household strategy to avoid income risk (Massey et al., 1993; Stark, 1991). This paper endeavours to explain the consequences of internal migration on household well-being.

Research Gap and Research Question

While there is an abundance of research on internal migration, attention to the poverty-stricken, in particular, longitudinal empirical studies is insufficient. This study focuses on the impact of internal migration on poverty reduction. Since remittance inflow from internal migration changes the households' income structure, we intend to investigate:

Does internal migration result in a reduction in households' levels of poverty?

This study considers income, accumulation of assets and reduction of poverty gap as indicators of poverty reduction. The research question is addressed through an in-depth modelling and analysis of the panel data collected by BRAC in rural Bangladesh over three periods: 2007, 2009 and 2011.

METHODOLOGY

This study analyses three outcome variables: income movement, overall capability of asset accumulation, and poverty gap in the households. The migration status, i.e., whether or not a household has at least one migrant member, is the treatment binary variable. This study considers two treatment variables, (i) migrant household (MigHH) and (ii) migrant household new (MigHH New). A MigHH is a household that has at least one migrant member during one or more studied years. A MigHH New is a household that has a migrant member for a period of at least one year during the study period. These two variables are considered for cross-validation of the impact of internal migration on poverty reduction.

The impact assessment of internal migration however, faces methodological challenges due to the fact that the migration decision dummy variable is endogenous. We consider a simple regression model:

Here, in equation (i), the dependent variable, Y_{it} , is the log of income of i^{th} household over t^{th} period. $MigHH$ is a dummy variable; X_{it} is the vector of explanatory variables of the households, and Φ_{it} is the error term. However, the binary variable $MigHH$ is endogenous as in most of the cases it is correlated with the error term, Φ_{it} . Therefore, to confirm the issue of endogeneity, the study conducts the Hausman endogeneity test. Without endogeneity, the OLS model is appropriate, but with endogeneity, an Instrumental Variable (IV) model using the two-stage least squares (2SLS) method is applied for analysis. The traditional IV model in the first stage estimates OLS regression of $MigHH_{it}$ on X_{it} and Z_{it} to obtain the predicted value of $MigHH_{it}$. The regression equation for predicting $MigHH_{it}$ is as follows:

Here, in equation (ii), $MigHH_{it}$ refers to the migration status dummy variable which is equal to 1 for internal migration of at least one member and 0 for none; X_{it} is a vector of the explanatory variable, and Z_{it} is the instrumental variable. The instrument Z should be highly correlated with migrant household, but uncorrelated with unobserved characteristics that affect log of income or poverty status of the household. Hence, to check the validity of the instrument, the study has undertaken two tests: (i) F-test of the excluded instrument, and (ii) over-identification test for models with at least two instruments. Meanwhile, considering the log of income on X_{it} vector of explanatory variable and the predicted value of $MigHH_{it}$, second stage equation of the IV model is estimated by running another OLS. Thus, the following equation is used for estimation at the second stage:

Instrumental variable as a way out

Based on the availability of data, this study uses the different instrumental variable to resolve the endogeneity problem. While it is challenging to find a good instrument, particularly in the case of internal migration, similar studies have successfully applied these instruments. For example, Edouard and Michael (2016) in their study in Uganda, consider the interaction between the log of the distance between origin and destination, and young adult at baseline (aged 15 to 24 years) as an instrument to address the endogeneity problem. Similarly, to solve the endogeneity problem, Chukwuone et al. (2008) use sources of remittance as a tool to analyse the impact of remittances on levels of poverty in Bangladesh, and Shahana (2017) considers the intensity of district-level remitter as an instrumental variable for analysing the impact of remittances on human capital. Other instruments, e.g. predicted value of migration and asset ownership (Hagen-Zanker and Azzarri, 2010), or the highest educational status (Mendola, 2006) have also been used in similar studies. This study analyses households having children below ten years, a member of more than 65 years, marriage dummy, and a mobile phone as instruments. Different regression models have been constructed replacing Y_{it} by overall asset building and poverty-gap to evaluate the impact of internal migration on the households.

DATA ANALYSIS AND DISCUSSION

The study uses secondary data on impoverished communities from 13 districts in Bangladesh. BRAC collected the data through a longitudinal survey of 31477 households over three periods, 2007, 2009 and 2011. Initially, a 'mini census' comprising 160,000 households in the underprivileged areas were conducted. Geographical targeting method was used for the detection of the underprivileged areas. A total of 32000 households were randomly selected from this mini-census, but the total sample size turned into 31477 as unavailable households were dropped from the list during data collection. However, a total of 26,720 households were found in the spot during the study. The dataset is statistically significant for this research.

Mean difference t-test

An overview of the characteristics of the migrant and non-migrant households has been provided in Table 1 containing three different periods, 2007, 2009 and 2011. The head of the migrant households are male-dominated and younger than that of the non-

migrant households implies that the internal migration is more favourable to male-headed households. The average size of the migrant households is significantly larger than that of the non-migrant households. Table 1 also delineates that the mean dependency ratio of the non-migrant household is greater than that of migrant household, which is statistically significant at 1% level of significance. This high dependency is the reason for non-migrant households to avoid internal migration as an income risk-avoiding strategy. In 2007, total consumption expenditure, including food and non-food was higher for non-migrant households than that of migrant households. The mean ownership of the land asset, excluding homestead is also larger for non-migrant households than that of migrant households. Therefore, internal migration is taken place among the poor households in search of earning to minimise income risk as a livelihood strategy. The mean difference test on food security bears testimony of the earlier statement.

Food security increases from pre- to post-migration. The food consumption expenditure of the migrant households was lesser than that of the non-migrant households in 2007, but the scenario reversed in 2009 and 2011, i.e. the migrant households outperformed the non-migrant households in terms of the mean of total expenses. The consumption behaviour of migrant households improves as they earn more and become stable.

The mean difference t-test also reveals that the migrant households have a higher burden of the loan compared to the non-migrant households. Sometimes, the migrant households borrow money for their migration as an initial startup cost, and in some cases, they migrate for increased earning to repay the existing loan. The gaps between migrant and non-migrant households for per capita protein-intake and calorie-intake gradually reduce over the study period.

The mean participation of NGOs is larger for non-migrant households than that of the migrant households. The non-migrant households avoid migration as an income risk averse strategy as they can run different economic activities locally with the help and supports of NGOs and become financially sound.

Table 1: Mean difference t-test of migrant and non-migrant households

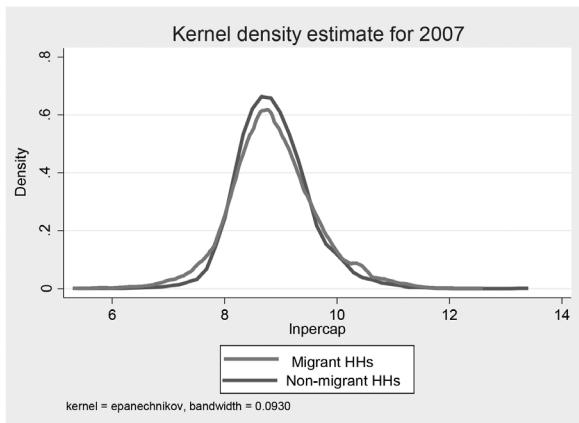
	2007			2009			2011		
	Non-mig.	Mig.	Diff.	Non-mig	Mig.	diff	Non-mig.	Mig.	Diff.
Age of HH head	44.98	42.01	2.96***	46.73	43.96	2.77***	48.28	45.66	2.62***
Sex of HH head	0.75	0.9	-0.15***	0.75	0.88	-0.13***	0.74	0.86	-0.12***
HH size	3.78	4.52	-0.74***	3.84	4.65	-0.81***	4.36	5.10	-0.74***
Last class passed	1.98	1.76	0.22***	2.03	1.77	0.26***	2.12	1.72	0.4***
Can read and write	0.25	0.23	0.02***	0.24	0.22	0.02***	0.24	0.21	0.03***
Can keep account	0.967	0.975	-0.008***	0.973	0.982	-0.009***	0.98	0.987	-0.007***
Dependency ratio	0.31	0.3	0.01***	0.3	0.28	0.02***	0.26	0.24	0.02***
Food consumption	32447	31796	651**	33876	34187	-311	44390	45812	-1422***
Non-food consumption	14105	13183	922**	11446	11295	151	23861	23708	153
Total consumption expenditure	46553	44979	1574**	43439	43496	-57	65076	66252	-1176
House ownership	0.61	0.6	0.01	0.64	0.65	-0.01	0.72	0.72	0
Land asset	57.62	19.46	38.16***	36.12	16.71	19.41***	47.86	23.23	24.63***
Food security	0.73	0.8	-0.07***	0.78	0.83	-0.05***	0.63	0.77	-0.14***
Loan taken by household	0.36	0.44	-0.08***	0.52	0.6	-0.08***	0.39	0.45	-0.06***
House damage	0.052	0.056	-0.0041	0.038	0.0467	-0.0077***	0.0337	0.0382	-0.0045*
Per cap calorie	2270	1900	370***	2090	1768	322***	2019	1788	231***
Per capita Protein	60.59	50.12	10.47***	56	47.23	8.77***	52.34	46.35	5.99***
Ngo participation	0.05	0.03	0.02***	0.12	0.07	0.05***	0.11	0.07	0.04***

Note: ***P<0.01, **P<0.05 and *P<0.1

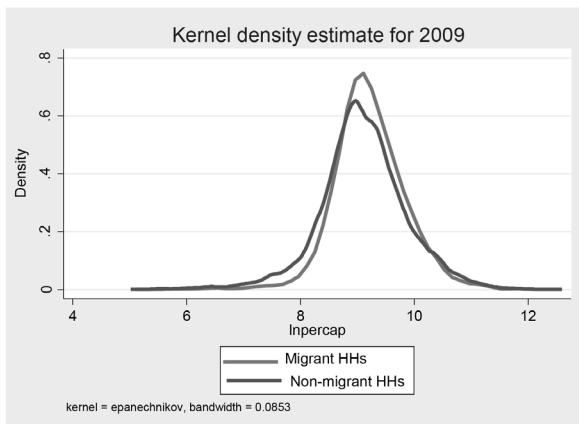
Income density and Household poverty status

The Kernel density compares the income density of migrant and non-migrant households in Figure 1. It reveals that at the beginning of the study, migrant households earn less, but in the end, they earn more compared to non-migrant households.

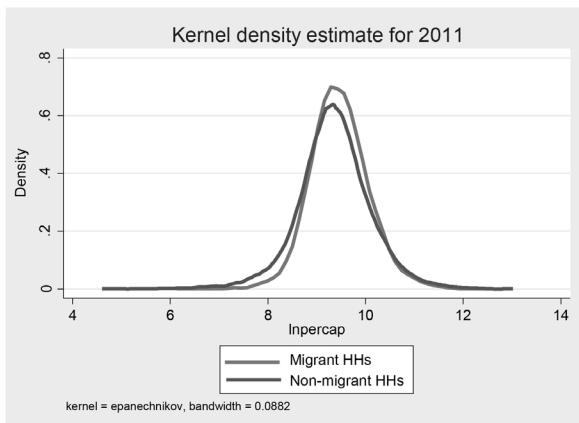
Figure 1: Income density of migrant and non-migrant HHs
2007



2009



2011



The income and poverty status of households by migration status is provided in Table 2. Based on the income and poverty indicators, migrant households appeared to be poorer in 2007, but their per capita income in 2009 and 2011 outperform the non-migrants. On the other hand, per capita income of the migrant households falls drastically if remittance inflow is deducted from the total income, which suggests that mostly the poor people choose internal migration as a livelihood strategy. In other words, internal migration is an important livelihood strategy for the migrant household.

Table 2: Income and poverty status of households, by migration status

	2007			
	All HHs	mig	Non-migHHs	Mean diff.
No. of Households	26,720	6,204	20,516	
Annual Per capita income (in BDT)	9602	8990	9788	-798 ***
Annual per capita non-remittance income (in BDT)	9581	8901	9788	-887***
Annual per capita remittance	20	89	-----	-----
Annual remittance inflow in HHs (in BDT)	87	374	-----	-----
Income poor (%)	69.95	66.55	70.98	-4.4***
Income poor non-remittance income (%)	70.02	66.86	70.98	-4.11***
	2009			
	All HHs	mig HHs	Non-migHHs	Mean diff.
No. of Households	26,718	6,914	19,804	
Annual Per capita income (in BDT)	12176	12396	12099	297*
Annual per capita non-remittance income (in BDT)	12121	12180	12099	-81*
Annual per capita remittance	56	216	-----	-----
Annual remittance inflow in HHs (in BDT)	256	991	-----	-----
Income poor (%)	53.79	41.46	58.09	-16.32**
Income poor non-remittance income (%)	53.98	42.21	58.09	-15.88***
	2011			
	All HHs	mig HHs	Non-migHHs	Mean diff.
No. of Households	26,720	6,084	20,636	
Annual Per capita income (in BDT)	15464	15631	15415	216*
Annual per capita non-remittance income (in BDT)	15433	15496	15415	81
Annual per capita remittance	31	134	-----	-----
Annual remittance inflow in HHs (in BDT)	146	642	-----	-----
Income poor (%)	32.62	18.26	36.86	-18.60***
Income poor non-remittance income (%)	32.71	18.65	36.86	-18.21***

Poverty rate decomposition for the migrant households

Table 3 shows the poverty decomposition with and without remittance of the migrant households. Here, P_o , P_1 and P_2 stand for poverty headcount index, poverty gap index, and poverty severity index. The study estimates P_o , P_1 and P_2 on the poverty line of \$1.25 per person per day (UNICEF, 2013). The poverty status of migrant households reduces drastically over the study period. The study observes internal migration drastically reduces the poverty status of migrant households, which is consistent with Chowdhury et al., (2012). The migrant households become poorer when the remittance is excluded from their income, which is consistent with Gustafsson and Makonnen (1993).

Table 3: Poverty decomposition

	Year-2007			Year-2009			Year-2011		
	P_o	P_1	P_2	P_o	P_1	P_2	P_o	P_1	P_2
All HHs	70.40	33.69	20.18	54.02	22.26	13.03	32.74	13.35	7.62
Migrant HHs	66.61	26.72	13.25	41.49	11.41	4.77	18.26	4.54	1.75
Migrant HHs (excluding remittance)	66.92	27.04	13.49	42.24	11.89	5.09	18.65	4.68	1.83

IMPACT ANALYSIS OF MIGRATION ON POVERTY

The study uses three indicators, i.e. (i) income (ii) asset-building capacity and (iii) poverty gap to evaluate the impact of internal migration on the households' poverty reduction. Impact on household income is assessed under the assumption that poverty is reduced when income increases. The asset-building capacity is used to evaluate how remittance helps the households to build overall asset (business and non-business assets). It is also assumed that that poverty reduces when the asset-building capacity increases. The study then measures poverty gap to evaluate the impact of internal migration.

Impact of Internal Migration on Household Income

The panel data has gone through numerous statistical tests to assess the impact of internal migration on household income. The test results are added in Table 4. Since Model 1 and Model 2 have the problem of endogeneity, the analysis moves towards an IV method. Marriage dummy and children below ten years of age are considered as an IV for migrant HH dummy and migrant HH new dummy. The F-statistics bear justification that the instruments used in Model 1 and Model 2 are powerful instruments. Meanwhile, both of the models are tested for random effect vs fixed effect. The result rejects accept fixed-effect model over the random effect model.

This study captures two different dimensions of internal migration, i.e. migration in any specific year (Mig HH) and migration at least once in three years (Mig HH new). For the first dimension, migration dummy takes value 1 if the household has at least one migrant in any specific year and if there is no migrant from the same household in the following year, then migration dummy takes value zero for that specific year. Therefore, the number of migrant households varies throughout the study period. For the other dimension, migration dummy takes value 1 if the household migrated any time during the study period. It is true if the following condition is satisfied (1-1-1, 1-0-0, 0-1-0, 0-0-1, 1-1-0, 0-1-1=1 and 000=0). Here, the number of migrant households remains the same for all three years (2007, 2009 and 2011).

In table 4, the instrumental variable model reveals that migrant households have 4.13% higher income than non-migrant household, ceteris paribus, and the result is significant at 1% level. The increase of household heads age by one year increase the income of the household by 0.9%, ceteris paribus. Male headed households, increase of educational qualification of the household head, NGO participation, and land asset (excluding homestead) increase the percentage of income.

Table 4 shows that migrant households with land assets decrease the percentage of income than non-migrant households. It indicates that sending migrant is not a good strategy for those households that have income-generating land assets. However, it is better to keep the household member at home and use their skill to boost income generation from the land. House damage and crop-loss are dummy variables take value one if the household experiences house damage or crops loss by natural calamity. Experience of house damage and crop-loss decreases the percentage of income. The study includes a migrant household new variable in model 2 to cross-check the result derived from Model 1. The result shows that all of the variables come with the same sign and the patterns of the variable being significant are also similar. Therefore, from Model 1 and Model 2, it can be concluded that internal migration is a good livelihood strategy that increases the percentage of household income.

Table 4 Impact of internal migration on household income and expenditure

VARIABLES	Model 1		Model 2	
	First Stage Mig. HH	2SLS Log of income	First Stage Mig. HH New	2SLS Log of income
Migrant HH		4.125*** (0.648)		
Migrant HH New				2.495*** (0.327)
Age of the HH head	-0.002*** (0.000)	0.009*** (0.001)	-0.002*** (0.000)	0.008*** (0.001)
Sex of the HH head	0.108*** (0.009)	0.235** (0.096)	0.146*** (0.010)	0.293*** (0.072)
HH head canread and write	-0.003 (0.005)	0.033 (0.023)	-0.013** (0.006)	0.064*** (0.019)
HH head cankeepaccount	0.025** (0.010)	0.187*** (0.046)	0.026** (0.012)	0.205*** (0.037)
HH head last class passed	-0.002*** (0.001)	0.022*** (0.003)	-0.004*** (0.001)	0.023*** (0.002)
NGO participation	-0.002 (0.006)	0.173*** (0.027)	-0.001 (0.007)	0.160*** (0.022)
In Land Asset	-0.060*** (0.001)	0.363*** (0.036)	-0.061*** (0.001)	0.273*** (0.018)
Land*migrant HH	0.230*** (0.002)	-0.843*** (0.142)	0.186*** (0.002)	-0.367*** (0.057)
Loan taken by HH	0.025*** (0.003)	-0.021 (0.024)	0.033*** (0.004)	0.026* (0.015)

VARIABLES	Model 1		Model 2	
	First Stage	2SLS	First Stage	2SLS
	Mig. HH	Log of income	Mig. HH New	Log of income
Seasonality	-0.020*** (0.003)	-0.013 (0.020)	-0.011*** (0.004)	-0.075*** (0.012)
House damage	0.006 (0.007)	-0.166*** (0.034)	0.013 (0.008)	-0.147*** (0.027)
Crop loss	-0.005 (0.005)	-0.099*** (0.022)	-0.010 (0.006)	-0.077*** (0.018)
Marriage dummy	0.041*** (0.008)		0.076*** (0.010)	
Num of child below ten years	0.009*** (0.002)		0.014*** (0.002)	
Constant	0.189*** (0.012)	8.354*** (0.154)	0.327*** (0.015)	8.331*** (0.131)
Observations	72,199	72,199	72,199	72,199
R-squared	0.223		0.150	
Test	Statistics	p-value	Statistics	p-value
F-Test of excluded instruments	34.33	0.0000	68.91	0.0000
Hausman test (Random effect vs fixed effect) (Chi2 &Pvalue)	27.25	0.0115	24.22	0.0292
Hausman test (IV model vs OLS) (Chi2 &Pvalue)	109	0.0000	102.44	0.0000
Over identification test for all instruments				
(Sargan Statistic & Chi2 P-value)	0.0675	0.7976	0.9339	0.3338

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Impact of Migration on Asset Building Capacity

This study considers overall asset-building capacity (business asset and non-business asset) as a proxy of poverty reduction to explore the impact of internal migration on households' poverty. Higher the asset-building capacity lowers the chance of the households suffering from poverty. For the formulation of asset index, the paper applies Principle Component Analysis (PCA) following Filmer and Pritchett (2001). Here, PCA is applied to extract weight from the first principle component of those business and non-business asset. A total of 21 assets of the households from two dimensions (business and non-business asset) are used to conduct PCA. X_1 to X_{21} represents 21 assets of the household. The formula applied for asset index calculation is depicted below:

$$\alpha_1 \left(\frac{x_1 - x_1^*}{Z_1} \right) + \alpha_2 \left(\frac{x_2 - x_2^*}{Z_2} \right) + \alpha_3 \left(\frac{x_3 - x_3^*}{Z_3} \right) + \dots + \alpha_n \left(\frac{x_n - x_n^*}{Z_n} \right)$$

Here, x_n^* and Z_n are the mean and standard deviation of the indicator x_n . For the asset index calculation, α_n represents the weight of each indicator of x and $\alpha_1 \alpha_2 \dots \alpha_n$ are vector coefficient, where the scoring factor taken from the first principle component. Table 6 reports the scoring factor extracted from PCA considering 21 assets (business and non-business asset) of the households (see Table A2 in the Appendix for PCA). The mean of the overall asset index for 21 assets of the households is zero, and the standard deviation is 1.97. Each of the assets used for PCA is dummy variable comprising 0 and 1. Therefore, a move from 0 to 1 changes the index value by the difference factor $\frac{\alpha_n}{Z_n}$. For example, a household that owns a cow has an asset index higher by 0.22 units than the household who does not have a cow. In table 6 the mean difference test confirms that the non-migrant households are wealthier than migrant households. It implies that the poor households choose the decision of internal migration as an income risk reduction livelihood strategy. This result is consistent with Chowdhury et al. (2012) in which the study reveals that people in Bangladesh pushed to other cities because of their poor socio-economic conditions. However, the mean difference test of having a mobile phone is significantly larger for migrant households than that of non-migrant households. It indicates that migrant households use the mobile phone at a greater extent to maintain communication with the migrant members.

In Table 6, by applying IV method, we explore the impact of internal migration on household asset building capacity as a proxy of poverty reduction. Two IV models are used to evaluate the impact of internal migration. In the first IV model, variable “Migration HH” is used, and for the second IV model “Migrant HH new” variable is considered. This is done to check the robustness of the result of the impact of internal migration on asset accumulation capacity. Hausman test is conducted for each model to decide which model is more appropriate. Here, the test statistics prefers a random-effects model over the fixed effects model.

In this analysis, the test result shows rejection of null hypothesis for model 1 (Test statistics 208.71 and p-value 0.00) and model 2 (Test statistics 192.61 and p-value 0.00); it indicates that fixed effect model is preferred over random effect model. The two models are estimated by applying IV method. Children below ten years and senior household members over 65 years are considered as an instrument for migration HH and migration HHnew, since these two dependent groups are negatively correlated with migration decision of the households but not with the error term. The test statistics and p-values of Sargan test justify the validity of the instruments used in both of the models. The endogeneity test statistics justify the validity and relevance of using IV. The f-test of excluded instruments provides strong evidence that the used instruments are sufficiently robust.

Meanwhile, the preference of fixed effect model over the random effect model implies that something within the households may affect the outcome variables, and it is important to control them to trace the right impact of internal migration. The fixed-effect model removes the effect of time-invariant and unobserved characteristics to examine the net impact on the outcome variable.

The two estimated fixed effects models Table 6 shows that the coefficient for the migration status variable (migrant HH), which is the variable of interest, is positive and statistically significant. This confirms that holding other factors constant, households with migrant member have significantly higher asset accumulation capacity compared to their counterpart.

Age of the household head, educational qualification of household head (able to read write, can keep the account, passed last-class), NGO participation, the log of land assets (having income-generating land excluding homestead) have a positive and statistically significant impact on asset accumulation. It implies that an increase in the percentage of land increases the asset accumulation of the households. However, the interaction term of the log of land assets and migration dummy is negative and significant. It implies households that have income-generating land asset can lose their asset accumulation if the household member migrates because there are fewer people to earn money from the land asset. Also, the households having seasonal variation in the food supply, and vulnerable to the natural calamity are less capable to accumulate assets. Maccini and Yang (2009) also find that natural disaster destroys productive asset and pushes the poor into deep poverty.

Table 5: Scoring factor and summary statistics of variables used for computation of the first principal component

	Overall Household					Scoring Factor (sub-indices)	Migrant HH		Non-migrant HH	
	(a)	(b)	(c)	(d)	(e)		(f)	(g)	(h)	
	Scoring Factor (overall asset)	Mean	Std. dev	DF*	Business Asset		Mean	Mean	Difference (f)-(g)	
Business Asset										
Cow	0.220	0.354	0.478	0.463	0.577		0.315	0.377	-0.061***	
Chicken and Ducks	0.145	0.208	0.406	0.358	0.518		0.177	0.221	-0.044***	
Goat/sheep	0.193	0.607	0.488	0.399	0.504		0.638	0.603	0.035***	
Boat	0.035	0.009	0.094	0.535	0.141		0.008	0.009	-0.001	
Fish-net	0.125	0.057	0.231	0.376	0.339		0.057	0.056	0.001	
Rickshaw	0.0129	0.055	0.227	0.059	0.089		0.046	0.057	-0.011***	
Non-Business Asset										
Radio	0.169	0.060	0.238	0.723		0.178	0.050	0.062	-0.011***	
Television	0.308	0.082	0.274	1.119		0.341	0.069	0.088	-0.019***	
Electric Fan	0.298	0.098	0.297	0.995		0.332	0.085	0.102	-0.017***	
Refrigerator	0.116	0.005	0.071	1.661		0.137	0.003	0.005	-0.0148***	
Mobile Phone	0.324	0.203	0.403	0.804		0.351	0.223	0.205	0.0178***	
Cycle	0.274	0.179	0.384	0.711		0.278	0.141	0.197	-0.0558***	
Motor Cycle	0.178	0.015	0.122	1.465		0.196	0.007	0.017	-0.0094***	
Sewing Machine	0.091	0.014	0.117	2.915		0.103	0.010	0.014	-0.0039***	
Chair	0.342	0.479	0.499	0.683		0.359	0.515	0.478	-0.0363***	
Table	0.344	0.474	0.499	0.687		0.362	0.509	0.473	0.0355***	
Cot	0.181	0.870	0.335	0.545		0.191	0.918	0.861	0.056	
Sofa	0.124	0.011	0.105	1.202		0.142	0.008	0.011	-0.002***	
Mosquito net	0.167	0.896	0.304	0.554		0.172	0.935	0.889	0.045**	
Jewellery	0.203	0.685	0.464	0.441		0.205	0.735	0.675	0.06	
No. of good Sharee	0.277	0.559	0.496	0.557		0.290	0.555	0.567	0.011	
Index value of overall asset		0.00	1.97				-0.0039	0.0012		

*** p<0.01, ** p<0.05, * p<0.1

Note: DF (Factor for Difference) = Scoring factor/Standard Deviation. Each of the variables takes value 1 if yes and zero otherwise, here weight assigned for each of the variable (normalised by their corresponding mean and standard deviation) are extracted from the first principle component. The first and second eigenvalues are 3.93 and 1.70, respectively; 18.75% of the covariates are explained by the first principle component.

Table 6: Impact of migration on overall asset-building capacity (2SLS -Fixed effect model)

VARIABLES	2SLS Model 1 First Stage Migrant HH	2SLS Model 2 Second Stage Overall Asset index	First Stage Migrant HH new	Overall Asset index
Migrant HH		3.155*** (0.729)		
Migrant HH New				1.935*** (0.405)
Age of the HH head	-0.001*** (0.000)	0.003** (0.001)	-0.001*** (0.000)	0.002* (0.001)
Sex of the HH head	0.100*** (0.010)	-0.019 (0.084)	0.100*** (0.010)	0.035 (0.068)
HH Head can read write	-0.002 (0.005)	0.391*** (0.027)	-0.002 (0.005)	0.418*** (0.025)
HH Head can keep account	0.025** (0.010)	0.137*** (0.052)	0.025** (0.010)	0.143*** (0.047)
Last class passed by HH Head	-0.002*** (0.001)	0.102*** (0.003)	-0.002*** (0.001)	0.102*** (0.003)
Per capita calorie intake	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
NGO participation	0.004 (0.006)	0.389*** (0.030)	0.004 (0.006)	0.379*** (0.028)
Seasonality	-0.017*** (0.003)	-0.304*** (0.022)	-0.017*** (0.003)	-0.350*** (0.015)
Log of land asset	-0.056*** (0.001)	0.568*** (0.038)	-0.056*** (0.001)	0.502*** (0.021)
Divorced	-0.098*** (0.024)	0.199 (0.141)	-0.098*** (0.024)	0.189 (0.127)
Married	-0.006 (0.014)	0.686*** (0.069)	-0.006 (0.014)	0.649*** (0.063)
Separated	-0.102*** (0.020)	0.352*** (0.124)	-0.102*** (0.020)	0.257** (0.102)
Widowed	-0.052*** (0.017)	0.238** (0.095)	-0.052*** (0.017)	0.236*** (0.086)
Land *migrant HH	0.226*** (0.002)	-0.690*** (0.159)	0.226*** (0.002)	-0.331*** (0.069)
Loan taken by HH (Dummy)	0.025*** (0.003)	0.256*** (0.027)	0.025*** (0.003)	0.292*** (0.019)
House damage (Dummy)	0.008 (0.007)	-0.230*** (0.038)	0.008 (0.007)	-0.216*** (0.034)
Crop loss (Dummy)	-0.004 (0.005)	-0.117*** (0.025)	-0.004 (0.005)	-0.094*** (0.023)
Children below 10 years	-0.000 (0.000)		-0.000* (0.000)	
Senior member above 65 years	-0.032*** (0.004)		-0.032*** (0.004)	
Constant	0.324*** (0.020)	-2.688*** (0.264)	0.324*** (0.020)	-2.673*** (0.237)
Observations	69,900	69,900	69,900	69,900
R-squared	0.231		0.231	
Number of bocd		90		90
Tests	Statistics	p-value	Statistics	p-value
F-Test of excluded instruments	35.42	0.00	55.26	0.00
Hausman test (Random effect vs fixed effect) (Chi2 &Pvalue)	208.71	0.00	192.61	0.00
Hausman test (IV model vs OLS) (Chi2 &Pvalue)	22.59	0.00	22.38	0.00
Over identification test for all instruments				
<i>(Sargan Statistic & Chi2 P-value)</i>	1.28261 0.2574		2.39413	0.1217
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Impact of Migration on Household Poverty Status

In this section, the paper evaluates the impact of internal migration from the lens of household poverty gap. Internal migration has a higher potential of remittance inflow (Afsar, 2003) for reducing the severity of poverty in low-income families. This study uses the poverty line as defined by UNICEF for Bangladesh for the period of 2007 to 2011 (UNICEF, 2013) as an income of \$1.25 per person per day. The annual per capita household income is deducted from the newly constructed annual poverty line, and then it is divided by the newly constructed annual poverty threshold. The study proceeds further to evaluate the impact of internal migration on poverty reduction using the poverty gap as the dependent variable.

Table 7 considers the result of 2SLS model, where model 1 considers migrant HH and model 2 to check the robustness of the result considers migrant HH new variable. Since both the models' migration dummies are used as an explanatory variable, the model might have been suffered from endogeneity. The test statistics (Hausman) justifies the issue of endogeneity, and the number of children below ten years and use of the mobile phone is considered as an instrument for migrant HH and migrant HH new variable. The use of a mobile phone is considered as a proxy of the migration network that is correlated with migration dummy. The test statistics received from Sargan test is also satisfactory. The f-test for excluded instrument also gives evidence of the robustness of the instrument. The Hausman test of fixed effect vs random effect justifies the application of fixed effect estimation for both of the models.

Model 1 of Table 7 depicts strong evidence that migration reduces the poverty gap of the households, *ceteris paribus*. It implies that internal migration is a useful household strategy to avoid income risk. Study of Tandoh-Offin and Awuse (2013) also find in their analysis that there is a positive relationship between internal migration and poverty reduction. With the increase of the age and educational qualification (last class passed) of the household head, the poverty gap reduces. Male headed household reduces poverty gap more than a female-headed household. A household head, who is having knowledge of keeping the account only, increase the poverty gap because they are mainly involved in a job of less salary. This intense poverty pushes the households to send family members for internal migration, the coefficient of the first stage bears testimony to the statement, and it is significant at 5% level.

Loan burden, seasonality and house damage increase household poverty gap. On the other hand, land asset decreases poverty gap. However, the interaction dummy of land asset and migration dummy increases poverty gap. This result is also consistent with the earlier result of asset building where the coefficient for the interaction term depicts the decrease of asset accumulation of the households. In Table 7, migration HH New is consistent with model 1 with the same sign and same variable are significant.

Table 7: Impact of migration on household poverty gap (2SLS-Fixed effect model)

VARIABLES	Model 1		Model 2	
	First Stage Mig HH	Second Stage Poverty gap	First Stage Mig HH New	Second Stage Poverty gap
Migrant HH		-33.056*** (3.036)		
Migrant HH New				-25.263*** (2.120)
Age of HH Head	-0.002*** (0.000)	-0.076*** (0.007)	-0.002*** (0.000)	-0.077*** (0.006)
Sex of HH Head	0.142*** (0.005)	-4.010*** (0.459)	0.142*** (0.005)	-4.744*** (0.477)
HH Head can read write	-0.004 (0.005)	-0.028 (0.173)	-0.004 (0.005)	-0.363** (0.158)
HH Head can keep account	0.026** (0.010)	0.470 (0.331)	0.026** (0.010)	0.616** (0.303)
Last class passed by HH Head	-0.003*** (0.001)	-0.104*** (0.021)	-0.003*** (0.001)	-0.121*** (0.020)
Per capita calorie	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)
NGO participation	0.001 (0.006)	-0.326* (0.198)	0.001 (0.006)	-0.195 (0.179)
Log of Land Asset	-0.058*** (0.001)	-2.082*** (0.162)	-0.058*** (0.001)	-1.653*** (0.112)
Land*migration	0.226*** (0.002)	7.066*** (0.662)	0.226*** (0.002)	4.158*** (0.362)
Loan taken by HH (Dummy)	0.024*** (0.003)	0.967*** (0.137)	0.024*** (0.003)	0.754*** (0.113)
Seasonality	0.013*** (0.003)	0.489*** (0.121)	0.013*** (0.003)	0.069 (0.095)
Crop loss	-0.003 (0.005)	0.177 (0.161)	-0.003 (0.005)	-0.091 (0.147)
House damage	0.010 (0.007)	0.799*** (0.239)	0.010 (0.007)	0.786*** (0.217)
Children below 10 years	0.000 (0.002)	0.000 (0.002)		
Mobile phone	0.034*** (0.004)		0.034*** (0.004)	
Constant	0.287*** (0.013)	10.516*** (0.946)	0.287*** (0.013)	12.765*** (1.038)
Observations	69,682	69,682	69,682	69,682
R-squared	0.230		0.230	
Number of bocd		90		90
Tests	Statistics	p-value	Statistics	p-value
F-Test of excluded instruments	37.85	0.00	54.22	0.00
Hausman test (random effect vs fixed effect) (Chi2 &Pvalue)	22.18	0.07	21.14	0.09
Hausman test (IV model vs OLS) (Chi2 &Pvalue)	5082.73	0.00	5166.48	0.00
Overidentification test for all instruments (Sargan Statistic & Chi2 P-value)	1.5242	0.2170	0.4327	0.5107

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CONCLUDING REMARKS

Internal migration as a livelihood strategy for the poor community in Bangladesh has a positive contribution to boost the household earning, asset accumulation and minimisation of the poverty gap. Withdrawal of remittance from the migrant household income intensifies poverty. Therefore, this paper can help the policymaker to adopt decentralisation of economic activities. That ultimately causes an upward shift of internal migration frontier and reduction of household poverty. Besides, empirical work on internal migration is quite a few. When it is about panel data analysis, then it is very limited in internal migration research. Since this internal migration study is on panel data, it can contribute to bridge the research gap in the ground of existing literature.

This study of internal migration from the perspective of Bangladesh has some limitations. Firstly, some qualitative factors are not incorporated in this study. Secondly, the panel data does not cover the pre-migration characteristics of migrant households. It becomes challenging to evaluate the impact of migration on poverty reduction. Incorporation of before-after data on migrant households and the collection of qualitative data from the field by KII and focus group discussions can be a further research option for experts on internal migration studies.

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Appendix A1: List of variables to address the two research questions

List of Variables	Explanation
Migrant HH(Dummy)	Household sent at least one migrant, and there is an oscillation in the migrant household over the year (2007, 2009 and 2011) and 0 for the non-migrant household
Migrant HH New(Dummy)	Household sent at least one migrant in any of the year (2007, 2009 and 2011) and 0 for non-migrant household
Income	Amount of total income including remittance for the migrant household
HH Expenditure	Food and non-food expenditure of the household
Overall Asset Building	An index includes business asset and non-business asset
Poverty gap	Per capita household income per year - per person poverty line per year/ per person poverty line per year
Destination preference	Destination preference of the migrant household,i.e.,1= Nearby villages in the same district, 2= Different Districts, 3=Dhaka and Chittagong
Age of household head (HHH)	Age of HHH in years
Sex of HHH	1= Male HHH and 0=Female HHH
HHH read write	HHH can read and write
HHH keep account	HHH can keep account
HHH last class pass	Last class passed by the HHH
Marital Status of HHH	Unmarried, Divorced, Married, Separated and widow (Unmarried dummy is considered as a reference dummy to avoid the dummy variable trap)
Occupational status of HHH	Labour, Farmer, Service, Small business, Large business, Skilled labour and others(Labour dummy is considered as a reference dummy to avoid the dummy variable trap)
HH size	Total household member
Dependency ratio	The ratio between below 10 years and above 65 years household member by the working-age members of the household due to a lot of child labour in Bangladesh.
Land ownership	Amount of income-generating land household possess excluding homestead (in decimal)
Loan burden (Dummy)	Loan taken by household (1=Yes, 0= No)
NGO part (Dummy)	1=Household involve in NGO activities and 0= Otherwise
Seasonality (Dummy)	A household faces seasonal variation in the food supply. (1=Yes, 0= No)
House Damage(Dummy)	A household experiences damage to the house due to a natural disaster. (1=Yes, 0= No)
Crop Loss (Dummy)	A household experiences loss of crops due to a natural disaster. (1=Yes, 0= No)

Author's compilation

Appendix A2

Migration over three years (2007, 2009, 2011)	Freq.	Percent	Cum.
Never migrate	15,636	58.52	58.52
At least once among three year	5,311	19.88	78.39
At least two times over three years	3,428	12.83	91.22
Migrate each of the year	2,345	8.78	100
Total	26,720	100	

