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Impact of Ex-Ante Access to Microfinance on the Coping Strategies to Cope with *Monga* of Poor Households in North-Western Bangladesh

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Abstract

Bangladesh is a highly natural hazard prone country. Rural households are vulnerable to a range of climate-related natural hazards such as floods, cyclones, riverbank erosion, drought, storm surges, and tornados. In north-western parts of the country, almost every year they face seasonal (September-November) hardship in the form of a near famine situation, which is termed as *monga*. To cope during *monga*, poor households adopt various strategies including advance labor sale, asset sale, informal borrowing and internal migration. This paper evaluates the impact of ex-ante access to microfinance on these coping strategies, using switching regression to control the unobserved selection bias in deciding to be a member of a microfinance scheme. The analysis reveals that the dependence on these coping strategies is significantly lower for households with ex-ante access to microfinance than those without. These observations are particularly pertinent to the development of adaptation strategies, as poor households in north-western areas of Bangladesh are experiencing increasingly drier weather associated with climate change.

Keywords: Ex-ante Access to Microfinance, Coping Strategies, Switching Regression, *monga*.

Impact of Ex-Ante Accees to Microfinance on the Coping Strategies to Cope with Monga of Poor Households in North-Western Bangladesh

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1. Introduction

Bangladesh is one of the most natural hazard prone countries in Asia. These hazards come in the form of floods, cyclones, riverbank erosion, droughts, storm surgesand tornados, etc. The frequency and severity of these events make it difficult for poor rural households to lift themselves out of poverty. This situation is particularly apparent in the north-western parts of the country, where poor households face almost every year a seasonal hardship and near famine situation known as *monga* (period of food insecurity). *Monga* is associated with the low time in the agricultural seasons, i.e. between the planting and harvest of crops such as paddy, when employment and income opportunities are very limited.

Due to their limited assets and opportunities, the rural poor are vulnerable to *monga*, as they are to all kinds of shocks. During *monga*, poor households experience acute fluctuations in consumption, including a significant reduction in their daily intake of food. A census survey of poor households in Lalmonirhat district revealed that in 2006, outside *monga* 70 percent of the sampled households had three meals a day. In contrast, during *monga* only around one-third of households could afford three meals a day. The situation is even worse in Kurigram district, where in 2006 even during the normal period only 28 percent of poor households had three meals a day (InM-PKSF Census Survey 2006-2007, InM 2008). Coping with seasonal poverty is thus a serious challenge for poor rural households in these areas. With climate change projected to bring even drier weather to northern parts of Bangladesh, this situation is likely to worsen.

To cope with shocks, households adopt both ex-ante and ex-post coping strategies. The ex-post coping strategies are essentially the risk management strategies to smooth consumption. The choice of coping strategies depends on the credit and insurance markets. If they have access to these markets, households might be able to reduce the temporal fluctuations in their consumption patterns (consumption smoothing),but in most cases, poor rural households do not have this access. When formal financial services are not available, poor households can mitigate risk using inter-temporal strategies and/or risk-sharing strategies during the period of

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shocks. These strategies often include borrowing from informal markets, selling assets, food rationing, and advance sale of labor. Also, some households may receive relief from the government and have the opportunity to participate in government programs, such as food-for-work. Whether poor households have access to these services depends on their placement, which households have no control over.

Empirical studies conducted in Bangladesh and neighboring countries provide important insights into the coping strategies that households adopt to deal with shocks. Rosenzweig and Wolpin (1993) found that households in rural India were 34 percent more likely to sell bullocks, which are mostly used to provide 'animal traction' during a shock. Studies on the basis of a sample of 280 households (Haque and Zaman, 1993; 1994) found that majority of the households adopted some coping strategies to minimize flood loss. It was evident that more than 71 percent of the sample households sold their land, livestock, or belongings to reduce their loss to floods. Bangladesh Disaster and Emergency Response (DER Sub-Group, 2004) reports about the different coping strategies adopted by the affected households in Monsoon Floods 2004. The strategies include informal loan with very high interest rate, advance labor sale, migration to the main cities, sale of assets such as livestock at low price.

Another common coping strategy, and one that might be employed by households wanting to protect their resource base or with no assets to sell, is the advance sale of labor and crops. Some households also resort to purchasing food on credit. In their review of how households coped with the 1998 floods in Bangladesh, del Ninno et al. (1998) found that almost 57 percent of the more severely flood affected households they surveyed purchased food on credit, and that this accounted for almost 39 percent of monthly household expenditure.

A concern that arises is that some coping strategies may contribute to coping in the short-term, but may prove to be erosive over the long-term, i.e. they result in a long-term reduction in the asset base of the household, which it cannot recover from. Classifying coping strategies as erosive and non-erosive is not straightforward. A coping measure that proves erosive for one household may not be erosive for another. However, in general, if a household sells assets as a coping strategy to smooth consumption during a shock, this may be considered an erosive, or undesirable, measure. This strategy would be especially erosive if the asset is an income-generating one. The advance sale of labor might also be considered undesirable, as it means forgoing income during future employment. Borrowing from the informal credit market for today's consumption during a shocks potentially erosive, as future income must be used to repay the principle and to pay interest, which for informal sector loans is typically very high.

These observations raise the question, what ex-ante strategy can poor households adopt to smooth consumption in times of shock without compromising their future earnings or eroding assets. This question has attracted a lot of interest, especially with regards to how access to financial services might impact the adoption of coping strategies. Eswaran and Kotwal (1990), for example, argue that access to consumption credit will, under the assumption of households having the same risk preferences, increase capacity to absorb Risk. Zeller (1999) likewise argues that access to microfinance can contribute to consumption smoothing, explaining that

this can happen through two pathways. First, access to financial services – loans, savings, insurance – can increase ex ante income that can then be used to buffer the impacts of the shock. Second, consumption smoothing can be achieved through access to and use of ex-post credit for consumption, use of precautionary savings, and insurance claims. In another study on financial services and coping, Islam and Maitra (2012) analyzed a large panel data set from rural Bangladesh to evaluate the effect of health shocks on household consumption. They found that households sold livestock to cope with health shocks, but that the tendency to rely on livestock sales was lower for households with access to microcredit.

The question of what ex-ante strategies can poor households adopt to smooth consumption in times of shock can be reformulated as what types of policies and support services enable poor households to avoid erosive coping strategies? As household coping strategies can differ according to the types of shocks, their asset base and the opportunities available to them, context-specific empirical analysis can help in providing an answer to this question. Given the seriousness of *monga*, empirical research into the determinants of coping strategies of *monga* affected households can be considered a high priority for the development and climate change agendas in Bangladesh. In particular, whether access to formal financial services reduces the dependence of *monga* affected households on erosive coping strategies deserves attention. Microfinance emerged in the mid-1980s in the vacuum created by the formal credit market failing to deliver services to the doors of rural households. Collectively, microfinance institutions (MFIs) now have more than 19,000 branches across Bangladesh, meaning that millions of poor rural householdshave access to microfinance as an ex-ante strategy to minimize income variability, increase, and diversify their income, and grow their asset base.

Murdoch (1995) argues that there are two stages in risk coping strategies. The first is income smoothing, which households can achieve by conservative production and employment decisions or by diversifying their income generating activities. The second is income smoothing, which households can achieve by reducing saving, using credit, and by selling asset stocks. The basic objective of this paper is to assess the impact of ex-ante access to microfinance as an income smoothing strategy on the strategies adopted by households to cope with monga. It is hypothesized that households with access to microfinancial services prior to monga will have higher ability to minimize the adverse impacts of *monga.*

In 2006, the Palli Karma-Sahayak Foundation (PKSF), a not-for-profit wholesale lending agency in Bangladesh, launched the Programmed Initiatives for *Monga* Eradication (PRIME) program, with the aim of mitigating the impacts of *monga* on rural households in north-western parts of the country. PRIME consists of a package of activities to support *monga* affected households and is implemented by MFIs that are registered as PKSF partner organizations (POs). Through the POs, PRIME provides assistance to households in the form of emergency loans and food-for-work opportunities to immediately cope with *monga*. Its long-term objective is creating diversified income sources within households to eradicate *monga*, and it aims to achieve this through flexible microcredit, microsavings, and training on income generating activities. PRIME participants also have access to health services and medicines. In a recent evaluation of the

impacts of PRIME on mitigating *monga*, Khalily and Latif (2010) showed that the program had contributed to reducing seasonal poverty by five percentage points. Our study builds on this earlier finding by examining whether and to what extent ex ante access to microfinance impacts household strategies to cope with *monga*.

The remainder of this paper is structured into three sections. Section 2 describes the data and research methodology for assessing the impacts of ex-ante access to microfinance on the coping strategies adopted by *monga* affected households. Section 3 presents the results of the empirical analysis, which includes descriptive analysis and analysis employing a switching regression model. Section 4 presents conclusions.

2. Data and Methods

This study used the survey data of 480,918 poor households in the greater Rangpur, North-Western region of Bangladesh generated by the Palli Karma-Sahayak Foundation and the Institute of Microfinance in 2006. The survey covered five districts – Gaibandha, Kurigram, Lalmonirhat, Nilphamari and Rangpur. All the upazilas of Kurigram (except Kurigram Sadar) and Lalmonirhat were covered in the survey, while four upazilas from Gaibandha and three upazilas from both Lalmonirhat and Rangpur districts were covered. A total of two hundred and nine unions and 2,531 villages were surveyed.

2.1. Outcome Variables

This study assesses the impact of ex-ante access to microfinance on the main coping strategies usually adopted by poor households during *monga* in Greater Rangpur. The main coping strategies are advance labor sale, asset sale, informal borrowing and internal migration. The first three outcome variables are measured in Bangladesh Taka (Tk.), while migration is measured as a dichotomous variable having value 0 in the absence of migration and 1 in the presence of migration.

The poor households considered in the study are not all members of microfinance programs. They decided whether or not to join a microfinance program. As membership with microfinance programs is a choice variable, access to microfinance is endogenous. Taking endogeneity into account, an endogenous switching regression approach (Maddala 1983) is used to assess the impact of access to microfinance on coping strategies. The estimation of endogenous switching model is carried out in two phases. First, we regress access to microfinance, a dichotomous variable to important individual and household characteristic. This model is some sometimes known as selection model and in this study probit regression technique is used to estimate the parameters of the model from where finally inverse mills ratio is estimated. In the second phase of estimation, we regress coping strategies to individual and household characteristics along with inverse mills ratio and through which we evaluate the impact of ex-ante access to finance. The mathematical specification of the endogenous regression model is discussed in the section later. The variable "ex-ante access to microfinance" is generated as a dichotomous variable having value 1 if the household has membership in a microfinance program and 0 for the

following three cases:

- If the household does not have membership in a microfinance program;

- If the household has membership in a microfinance program, but the total amount of loans outstanding reported by the household is higher than the amount taken from the formal market, which means that the household also borrowed from the informal market; and

- If the household has membership in a microfinance program, but the reported loan outstanding amount is zero and the amount taken from the formal market is greater than zero, which shows anomalies as they should have outstanding loans.

2.2. Explanatory Variables

A series of explanatory variables, both continuous and dichotomous, are used in the model to meet the objective of our study. The continuous explanatory variables are age and age squared of the household head, dependency ratio and total land holdings in decimals. The dichotomous variables are family occupation (monthly salaried, agriculture, non-agriculture, day laborer), room or house roofing materials (tin or others), place of residence (char(sandbank) or others), location (union having river or not) and whether support was received during *monga* or not.

2.3. Model Specification

In the formulation of the switching regression model, the outcome variables under this study, i.e. the different coping strategies (advance labor sale, asset sale, informal borrowing and internal migration), are observed for two regimes, namely for households who have ex-ante access to microfinance and those who do not. We observe the impacts on the coping strategies not only for observed characteristics but also for unobserved characteristics, i.e. for the counterfactual, in order to remove selection bias. We produce the results in terms of "average coping amount" of the household with and without ex-ante access to microfinance. The model is formulated as follows:

Consider the latent variable or criterion function I_i that determines the $i^t h$ household decision on ex-ante access to microfinance by the following selection model :

$I_i = 1$ if $\gamma Z_i + u_i > 0$ i.e. the ith household has ex-ante access to microfinance
$I_i = 0$ if $\gamma Z_i + u_i < 0$ i.e. the ith household has no ex-ante access to microfinance $\qquad$ (1)

where, Z_i is a vector of household and village characteristics that determines the household choice of ex-ante access to microfinance, γ is the parameter to be estimated and u_i is the error term.

Further, consider the models representing the outcome coping behavior of the households for two regimes as households with and without ex-ante access to microfinance as

Regime 1: $y_{1i} = \beta_1 X_{1i} + \epsilon_{1i}$ if $I_i = 1$ $\qquad\qquad$ (2)
Regime 2: $y_{0i} = \beta_0 X_{0i} + \epsilon_{0i}$ if $I_i = 0$ $\qquad\qquad$ (3)

where, y_{1i} is the value of the outcome variable of ith household with ex-ante access to microfinance and y_{0i} is the value of the outcome variable of ith household without ex-ante access to microfinance. The vector X_{ji}, $j=1,0$ is the vector of explanatory variables and β_1 and β_0 are the vector of parameters. In the selection and outcome models, it is assumed that u_i, ϵ_{1i} and ϵ_{0i} have a trivariate normal distribution with a zero mean vector and covariance matrix:

$$\Sigma = \begin{pmatrix} \sigma_u^2 & . & . \\ \sigma_{1u} & \sigma_1^2 & . \\ \sigma_{0u} & . & \sigma_0^2 \end{pmatrix} \qquad (4)$$

where, σ_u^2 is the error variance of the selection equation, σ_1^2 and σ_0^2 are the error variances of the outcome equations (2) and (3) respectively and σ_{1u} is the covariance between u_i and n_{1i} while σ_{0u} is the covariance between u_i and ϵ_{0i}.

Under the assumption of the distribution of the disturbance term, the logarithm of the likelihood function for the system of equations (2) and (3) is:

$$\ln L = \sum_{i=1} \left[I_i w_i \ln(F(\eta_{1i})) + \ln(f(\epsilon_{1i}/\sigma_1)/\sigma_1) + (1 - I_i) w_i \ln(1 - F(\eta_{0i})) + \ln(f(\epsilon_{0i}/\sigma_0)/\sigma_0) \right] \qquad (5)$$

where F is a cumulative normal distribution function, f is a normal density function, w_i is an optimal weight for i^{th} household and

$$\eta_{ji} = \frac{(\gamma Z_i + \rho_j \epsilon_{ji}/\sigma_j)}{\sqrt{(1 - \rho_j^2)}} \quad ; j = 0,1 \qquad (6)$$

where, $\rho_1 = \frac{\sigma_{1u}^2}{\sigma_u} \sigma_1$ is the correlation coefficient between ϵ_1 and u and $\rho_0 = \frac{\sigma_{0u}^2}{\sigma_u} \sigma_0$ is the correlation coefficient between ϵ_0 and u.

After estimating the parameters of the models, we can calculate the following conditional and unconditional expectations (Lokshin and Sajaia, 2004):

Unconditional expectations:

$xb_{1i} = E(y_{1i}/x_{1i}) = x_{1i}\beta_1$

= Unconditional expected value of the coping amount under ex-ante access to finance   (7)

$xb_{0i} = E(y_{0i}/x_{0i}) = x_{0i}\beta_0$

= Unconditional expected value of the coping amount without ex-ante access to finance   (8)

Conditional expectations:

$yc_{1_{1i}} = E\left(\frac{y_{1i}}{I_i} = 1, x_{1i}x_{y^2}\right) = x_{1i}\beta_1 + \frac{\sigma_1 \rho_1 f(\gamma Z_i)}{F(\gamma Z_i)}$

  = Conditional expected value of the coping amount of the ex-ante)   (9)
    access to finance households under ex-ante access to finance

$$yc_{0\_1i} = E(y_{0i}/I_i = 1, x_{1i}) = x_{1i}\beta_0 + \sigma_0\rho_0 f(\gamma Z_i)/F(\gamma Z_i)$$

= Conditional expected value of the coping amount of the ex-ante (10)
   access to finance households without ex-ante access to finance

$$yc_{0\_0i} = E(y_{0i}/I_i = 0, x_{0i}) = x_{0i}\beta_0 + \sigma_0\rho_0 f(\gamma Z_i)/[1 - F(\gamma Z_i)]$$

=Conditional expected value of the coping amount of the non-access (11)
   to finance households without ex-ante access to finance

$$yc_{1\_0i} = E(y_{1i}/I_i = 0, x_{0i}) = x_{0i}\beta_1 + \sigma_1\rho_1 f(\gamma Z_i)/[1 - F(\gamma Z_i)]$$

= Conditional expected value of the coping amount of the non-access (12)
   to finance households under ex-ante access to finance

2.3.1. Impact Evaluation Indicators

Based on the equations (9) to (12), the following three indicators can be constructed to evaluate the impact of access to microfinance on different coping strategies:

$$\Pi = x_{1i}\beta_1 - x_{0i}\beta_0$$

= (Expected coping amount of ith household under AF) (13)
- (Expected coping amount of ith household without AF)
= Expected gain in coping amount of ith household under AF

$$\Pi_1 = yc_{1\_1i} - yc_{0\_1i}$$

= (Expected coping amount of ith sample AF household under AF) (14)
- (Expected coping amount of ith sample AF household if it had not AF)
= Expected gain in coping amount of ith sample AF household under AF

$$\Pi_0 = yc_{1\_0i} - yc_{0\_0i}$$

= (Expected coping amount of ith sample NAF household if it had AF) (15)
- (Expected coping amount of ith sample NAF household)
= Expected gain in coping amount of ith sample NAF household if it had AF

Where, AF = access to microfinance and NAF = no access to microfinance.

3. Empirical Results

3.1. Coping Strategies and Household Characteristics in North-Western Bangladesh

Poor households adopt various strategies to cope with shocks. The coping strategies under study in this paper are advance labor sale, asset sale, informal borrowing and migration. The frequency distribution of the adoption of individual coping strategies as well as the adoption of at least one of the strategies under study is presented in Table 1. The table shows that around 53 percent of the households adopted at least one of the specified coping strategies during *monga*, while the rest did not adopt any. In terms of frequency of adoption, at around 39 percent

migration was the main coping strategy, compare with 4.36 percent for advance sale of labor,14.24 percent for asset sales and 12.38 percent for informal borrowing. A total of 20,967 households sold an average of around nine days labor in advance during *monga*. The average amount of assets sold per household for those who sold assets to cope with *monga* was Tk.1,302. During *monga* the amount of borrowing from the informal market was quite large. Some 59,558 households took an average of Tk. 1,874 in informal loans during this period.

Table 2 reports the distribution of households by principal occupation and coping status. One of the major reasons for the seriousness of *monga* among the poor households in the Greater Rangpur region is the high dependency of these households on the agricultural sector for employment. More than 70 percent of the surveyed households were engaged in day labor and around 56 percent of their household heads adopted one or more of the coping strategies. Because of their greater economic hardship, these households are more likely to resort to seasonal migration or advance sale of labor for coping. In contrast, households engaged in self-employed agriculture have relatively higher wealth and are more likely to resort to asset sales. Householdheads in paid service employment, on the other hand, tend to adopt informal borrowing and/or sale of assets for coping with *monga*, probably because of their higher ability to repay loans as a result of having a stable income flow.

The distribution of households by coping strategies and some of the key fixed effect variables are presented in Table 3. No substantial differences are observed in average land holdings and average family size with respect to the adoption of the coping strategies. In contrast, the percentage of households under safety net programs who adopted the coping strategies was significantly higher than those outside these programs for all of the coping strategies. The percentage of households with savings was marginally higher for the households who adopted at least one of the specified coping strategies, but the impacts are small and mixed. A slightly smaller percentage of households with savings resorted to advance sale of labor, though a slightly greater percentage resorted to migration and asset sales. Of the households who adopted at least one of the specified coping strategies, the number living in char areas was 10 percent higher than that of non-char areas. Compared to non-char dwellers, a greater percentage of char households resorted to asset sale, informal borrowing and migration. The observations in rivers belts are similar, i.e. they have a greater percentage of households adopting at least one coping strategy, and a great proportion of households resorting to asset sale, informal borrowing and migration. The differences in percentages of households resorting to advance sale of labor between char and non-char areas and river belt and non-river belt areas are small.

3.2. Access to Microfinance in Study Areaand Initial Observations on Access to Microfinance and Coping Strategies Adopted

Poor households may tap both formal and informal credit markets to support their household financial management and to access funds for investment. Table 4 shows that around 35 percent of the poor households had access to microfinance prior to *monga*. Such access varies by region. Gaibandha had the highest ex-ante access to microfinance in both absolute numbers

and percentage of households surveyed, followed by Kurigram, Lalmonirhat and Nilphamari (in absolute numbers).This differential access to microfinance could impact the intensity and extent of coping.

Table 5 shows the different coping behavior of households with and without ex-ante access to microfinance. The table shows that the percentage of households that adopted advance sale of labor as a coping strategy in both char and river belt areas is much lower for households with ex-ante access to microfinance. The same applies to the sale of assets, informal borrowing and migration as coping strategies. These observations suggest that ex-ante access to microfinance matters to the coping decisions of the households.

3.3. Determinants of Ex-ante Access to Finance

Table 6 reports the result of the determinants of the selection model of ex-ante access to microfinance described above. The table shows that older household heads are more likely to use microfinance, which could be explained by them having larger families, meaning they carry greater financial burdens. These households are more likely to demand credit for both income and consumption smoothing. This is also true for the households having tin roofed rooms or houses . Land ownership, which in rural Bangladesh is a proxy for wealth, tends to have a negative impact on ex ante use of microfinance. The table shows that households with their heads in monthly salaried employment or self-employment in agriculture and non-agriculture are more likely to use microfinance, whereas households with heads engaged in day labor participate less in microfinance programs. The table also suggests that households living in the river belt or char areas are less likely to take microcredit, probably because of limited economic opportunities, the high degree of covariate risk they face, and the limited availability of financial services in these areas. Those who receive government support during monga are arguably the most vulnerable and poor group, and this may explain why the table shows a higher percentage of them participating in microfinance programs.

Overall, the empirical results are quite consistent. In brief, the results suggest that households with higher volatility in income and higher demands for consumption have the greatest ex-ante demand for credit. They also reinforce the common understanding that vulnerable households take extra measures to smooth their income and consumption during any natural shock.

4. Impact of Ex-ante Access to Microfinance on Coping Strategies

The expected impacts of access to microfinance on coping strategies determined by the switching regression method are reported in Table 7. As hypothesized, ex-ante access to microfinance does impact the coping strategies adopted by poor households. Considering all sampled households, the average number of days sold in advance by households with ex-ante access to microfinance is 3.52 days lower than for households if they did not have ex-ante access to microfinance and the result is significant at the 1% level of significance . The analysis showed earlier that ex-ante access to microfinance resulted in households selling a total of 20,967 days overlaboring advance, with an average of nine days sold per household. Our

analysis employing the switching regression method finds that without ex-ante access to finance households would have sold 73,803 more labor days in advance. For all the sample households with access to microfinance, the number of labor days sold in advance decreased by an average of around four days per household due to ex-ante access to microfinance. For all the sampled household without access to microfinance, on average every household would sell 5.31 days less of labor in advance if they had access to microfinance. Since day labor is the principal profession of more than 50 percent of the poor households sampled, ex-ante access to microfinance can be seen as significant for coping with *monga*.

As noted earlier, asset sale during *monga* can potentially be a highly erosive coping strategy. As shown in Table 1, the average amount of asset sale per household of some 68,480 households was around Tk.1,302. As reported in Table 7, the value of asset sales per household was significantly lower for those household with ex-ante access to microfinance. The expected average value of asset sales for households with ex-ante access to microfinance is around Tk.1,727 lower(significant at the 5%level)than the counterfactual. According to the reported average gain, the total gain from ex-ante access to microfinance for some 68,480 households who resorted to asset sale during *monga* is Tk.118.30 million. Ex-ante access to microfinance thus enabled poor households to collectively avoid a huge disinvestment in assets. The switching regression analysis for the sample households with access to microfinance reveals that the average gain per household from ex-ante access to microfinance, in the form of avoided assets sales, was around Tk.1,663. The analysis for the sample households without ex-ante access to microfinance indicates that the average sale of assets per household would be around Tk.2,009 lower if they had access to microfinance. Both the outcomes for sample households with and without ex-ante access to microfinance are significant at the 1% level. All these results suggest that ex-ante access to microfinance reduces dependence on the sale of assets for coping during *monga*.

Informal borrowing is generally costly for households because of the high interest rates commonly charged. When possible, they may endeavor to avoid this strategy to cope with *monga* and other shocks. The direction of the average gain in informal borrowing due to ex-ante access to microfinance is the same as for asset sales, though the impacts on informal borrowing are larger. It is evident from Table 7 that for all the sample households, ex-ante access to microfinance reduces informal borrowing by around Tk.3,401 per household. The total reduced amount for 59,558 households who borrowed from the informal market during *monga* is Tk.202.55 million. The average gain for the sample of households with ex-ante access to microfinance is around Tk.3,455. Analysis of the sample households without ex-ante access to finance indicates that the average gain per household if they had access to microfinance would be around Tk.3,951. In other words, with access to microfinance they would have on average borrowed around Tk.3,951 less from the informal market. All the expected gains from ex-ante access to finance on informal borrowing are significant at the 1% level.

The expected values of impact of ex-ante access to microfinance on internal migration are measured in terms of probability. Three different probabilities calculated from three different

samples, i.e. all the sample households, all the sample households with ex-ante access to microfinance and all the households without ex-ante access to microfinance, indicate that the probability of internal migration is lower if the households had access to microfinance. This observation is supported by the negative expected probabilities.

Table 7 also shows the results of the switching regression model estimated separately for only the poor households living in char areas. The expected coping amount of different coping strategies shows that the poor households in char areas would resort more to all the coping measures, except informal borrowing, if they had no ex-ante access to microfinance. The expected gains of ex-ante access to microfinance in terms of reduced reliance on these coping strategies (other than informal borrowing) in the char areas are significantly higher than that obtained from the sample of poor households in all areas under study. Thus, ex-ante access to microfinance would be of particular help to poor households in char areas in their coping with *monga*.

5. Conclusion

This paper examined the role of access to microfinance as an ex-ante measure of income smoothing on the coping strategies of poor households in north-western Bangladesh during the phenomenon of seasonal food insecurity known as *monga*. The analysis suggests that the nature and intensity of coping strategies adopted by households depends on their assets/abilities and household characteristics. An endogenous switching regression approach was used to control hidden potential self-selection biases of the households in choosing to be a member of a microfinance program, and in turn having ex-ante access to credit. The selection equation clearly identifies the important determinants of ex-ante access to microfinance. The households with larger land holdings and living in char areas are less likely to participate ex-ante in microfinance. Conversely, or households with a higher dependency ratio, older household heads, and a tin roofed room or house are more likely to access microfinance prior to *monga*. Differences were also observed across occupational types and participation in microfinance, with day laborers less likely to participate ex ante in microfinance than other groups.

The findings from the endogenous switching regression model are quite clear. Ex-ante access to microfinance does reduce dependency on various potentially erosive coping strategies. Dependence on advance sale of labor, sale of assets and informal borrowing as coping strategies during *monga* is lower for poor households having ex-ante access to microfinance. The probability of migration as a coping strategy is also lower for household's with ex-ante access to microfinance. The analysis also suggests that ex-ante access to microfinance can particularly assist households in char areas avoid resorting to erosive strategies to cope during *monga*.

The overall conclusion of this study is that financial services that enable households to generate income and savings and develop off-farm economic activities can make an important contribution to household resilience. This observation has important policy implications for

policy. As climate change is projected to increase the frequency and intensity of certain types of climate-related shocks in Bangladesh, the question of how microfinance institutions can most effectively contribute to climate change adaptation deserves wide discussion. The government, wholesale lending agencies and microfinance institutions should further develop their financial services with a view to building household capacity to deal with shocks such as *monga*. This could include greater customization and flexibility of products. Thought should also be given to increasing the outreach of financial services to poor households in the most climate-vulnerable areas, such as chars. Microfinance providers may prefer to avoid such areas because of high transaction costs and relatively higher risks of default, yet our analysis suggests that microfinance can make its greatest contribution to household coping capacity in these areas.

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Appendix

Table 1. Distribution of Coping Strategies Adopted by Poor Households of North-Western Bangladesh

Coping Strategies	Frequency (%)		Mean(SD) (Tk.)
	No	**Yes**	
Advance labor sale	459,951 (95.64)	20,967 (4.36)	9.05 (13.16)
Asset Sale	412,438 (85.76)	68,480 (14.24)	1,302 (3,488)
Informal Borrowing	421,360 (87.62)	59,558 (12.38)	1,874 (3,306)
Migration	291,047 (60.52)	189,871 (39.48)	-(-)
Adopted at least one strategy	226,580 (47.11)	254,338 (52.89)	-(-)

Table 2. Distribution of Households by Principal Occupation and Adoption of at Least One Coping Strategy/Mechanism

Principal Occupation	Frequency (%)	Coping Status	
		No Coping	**Adopted at least one**
Agriculture	13,979 (2.91)	55.46	44.54
Non-agriculture	68,856 (14.32)	51.68	48.32
Day Labor	356,844 (74.20)	44.23	55.77
Service	2,381 (0.50)	57.29	42.71
Others	36,282 (7.54)	61.83	38.17
No Work	2,576 (0.54)	62.50	37.50
Total	480,918 (100)	47.11	52.89

Table 3. Key Household Characteristics by Different Coping Strategies

Coping Strategies		Household (HH) Characteristics					
		Average Land Size	Average Family Size	% of HHs under Safety Net	% of HHs Having Savings	% of HHs Living on Char	% of HHs Living in River Belt
Advance Labor Sale	No	8.25	3.90	31.14	33.70	19.21	34.60
	Yes	7.08	4.04	43.17	31.86	18.53	29.81
Asset Sale	No	8.00	3.87	29.86	33.27	17.94	33.00
	Yes	9.39	4.11	42.58	35.70	26.61	42.76
Informal Borrowing	No	8.21	3.87	30.37	33.82	18.75	33.53
	Yes	8.17	4.12	40.86	32.15	22.23	40.49
Migration	No	8.28	3.80	30.13	32.60	14.64	32.43
	Yes	8.09	4.07	34.03	35.18	26.14	37.39
Adopted at least one strategy	No	8.09	3.74	27.30	32.11	14.11	30.73
	Yes	8.30	4.05	35.55	34.96	23.69	37.65

Table 4. Distribution of Households by Ex-ante Access to Microfinance by District

Ex-ante Access to Microfinance	District					Overall
	Gaibandha	Kurigram	Lalmonirhat	Nilphamari	Rangpur	
No	65,889	86,355	67,128	42,657	48,638	310,667
	(54.71)	(66.95)	(65.26)	(75.14)	(67.68)	(64.60)
Yes	54,537	42,632	35,738	14,115	23,229	170,251
	(45.29)	(33.05)	(34.74)	(24.86)	(32.32)	(35.40)
Total	120,426	128,987	102,866	56,772	71,867	480,918
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Percentages are provided in the brackets.

Table 5. Key Household Characteristics by Different Coping Strategies and Ex-ante Access to Microfinance

Coping Strategies	Ex-ante Access to Microfinance	Household (HH) Characteristics					
		Average Land Size	Average Family Size	% of HHs under Safety Net	% of HHs Having Savings	% of HHs Living on Char	% of HHs Living in River Belt
Advance Labor Sale	Yes	7.56	4.25	40.55	82.67	12.88	26.96
	No	6.84	3.95	44.42	7.63	21.22	31.17
Asset Sale	Yes	9.41	4.26	41.75	82.76	20.95	33.76
	No	9.38	4.02	43.07	7.86	29.96	48.09
Informal Borrowing	Yes	8.38	4.29	39.46	76.03	16.45	32.23
	No	8.06	4.03	41.67	7.07	25.54	45.22
Migration	Yes	8.33	4.17	32.91	85.46	20.52	31.56
	No	7.96	4.01	34.65	7.42	29.24	40.61
Adopted at least one strategy	Yes	8.55	4.12	31.76	84.09	15.02	29.87
	No	8.01	3.78	31.62	5.96	21.46	36.87
Overall		8.20	3.90	31.67	33.62	19.18	34.39

Table 6. Selection Model of Ex-ante Access to Microfinance on Household Characteristics

Selection Model	Coefficients	Standard Error
Age of HH Head	0.003***	0.001
Square Age of HH Head	-0.000***	0.000
Household Size	0.078***	0.002
Dependency Ratio	0.024***	0.002
Total landholdings in Decimals	-0.001***	0.000
Family Occupation: Monthly Salaried	0.054***	0.020
Family Occupation: Agriculture	0.050***	0.007
Family Occupation: Non-agriculture	0.121***	0.008
Family Occupation: Day Labor	-0.029***	0.005
Own Room: Tin	0.105***	0.003
Char Dummy	-0.288***	0.008
River Dummy	-0.154***	0.007
Whether receive Support	0.036***	0.004
Constant	-0.601***	0.018
Number of observations	478994	
LR Chi2(158)	54819.30	
Log likelihood	-284023.23	
Prob>Chi2	0.000	
Pseudo R2	0.088	

Note: *p<0.10, **p<0.05, and ***p<0.01

Table 7. Impact of Ex-ante Access to Microfinance on Coping Strategies: Expected Gain in Coping Amount of Access to Microfinance Household over Non-access to Finance Households

Sample Type	Households Type	Expected Sale of Labor Day	Expected Asset Sale Amount (Tk.)	Expected Informal Borrowing Amount (Tk.)	Expected Probability of Internal Migration
All Households under Study	1. All HHs (Π)	-3.52***	-1,727.48***	-3,400.83***	-0.03***
	2. HHs with Ex-ante Access to Finance (Π_1)	-4.06***	-1,662.94***	-3,454.57***	-0.08***
	3. HHs without Ex-ante Access to Finance (Π_0)	-5.31***	-2,008.80***	-3,950.63***	-0.08***
Households Living in char Area	1. All HHs (Π)	-8.11***	2,565.56***	-386.60***	-0.09***
	2. HHs with Ex-ante Access to Finance (Π_1)	-6.85***	-2,370.50***	-323.31***	-0.16***
	3. HHs without Ex-ante Access to Finance (Π_0)	-8.32***	-2,661.02***	-426.57***	-0.15***

Note: ***p<0.01

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